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ANNOTATED CATALOGUE OF THE ITALIAN *PSYLLOIDEA*. SECOND PART (*Insecta Homoptera*)

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In addition to a wide survey on the Italian psyllidology, this second and final part of the present Catalogue deals with the remaining 69 species of *Psylloidea* found up to now in Italy (from n. 131 to n. 199). According to the general criteria already reported in the Abstract of the first part, the following families are examined: *Spondyliaspidae* (1 species), *Calophyidae* (1 species), *Homotomidae* (2 species) and *Triozidae* (65 species). The synonymy *Bactericera perrisii* (= *B. maritima*) is proposed. General considerations on some aspects of the Italian psyllid fauna are also drawn out, which summarize all data reported in both the first and in this second part of the Catalogue; in particular, emphasis is given to chorological and altimetrical distribution, frequency, biology (host, shelter and occasional plants; number of yearly generations; life length of the adults; life-cycles; phenology of nymphs and adults; overwintering; migrations; galls; natural enemies), with a final short notice on the economic importance. An annotated Bibliography (with more than 600 references), arranged in four parts, and the Indexes of both the *Psylloidea* and their host plants, referred also to the first part, conclude the Catalogue. The work is supplied with 6 tables and 24 figures, including 9 colour photos.

Key words - *Psylloidea*, Italy, Catalogue.

Riassunto - *Catalogo commentato degli* Psylloidea *italiani. II parte* (Insecta Homoptera).

La seconda e ultima parte del presente Catalogo, dopo un'ampia rassegna storica sulla psillidologia italiana, completa la trattazione delle rimanenti 69 specie di Psilloidei finora riscontrate in Italia (dal n. 131 al n. 199). Sono esaminate le famiglie *Spondyliaspidae* (1 specie), *Calophyidae* (1 specie), *Homotomidae* (2 specie) e *Triozidae* (65 specie), seguendo i criteri già esposti nel Riassunto della prima parte. Viene proposta la sinonimia: *Bactericera perrisii* (= *B. maritima*). A sintesi dei dati riportati nella prima e nella seconda parte, vengono inoltre fornite considerazioni generali relative alla fauna italiana del gruppo, riguardanti: distribuzione corologica e altimetrica, frequenza, biologia (piante nutrici primarie, di rifugio e occasionali; numero di generazioni annuali; durata della vita degli adulti; cicli vitali; fenologia di ninfe e adulti; svernamento; migrazioni; galle; nemici naturali), con cenni finali sull'importanza eco-

nomica. La Bibliografia commentata (oltre 600 lavori), distinta in quattro parti, e gli Indici degli *Psylloidea* e delle piante nutrici primarie, riferiti anche alla prima parte, concludono il Catalogo. Il lavoro è corredato da 6 tabelle e da 24 figure, incluse 9 fotografie a colori.

PAROLE CHIAVE - *Psylloidea*, Italia, Catalogo.

FOREWORD

Following up the first part, which have been published three years ago (CONCI, RAPISARDA & TAMANINI, 1993), the present paper completes the annotated Catalogue of the Italian Psyllids, dealing with the families Spondyliaspidae, Calophyidae, Homotomidae and Triozidae.

No relevant changes occur in the arrangement of this second part, compared to the first one. Thus, notes on the general aim and on the structures and significance of the paragraphs may be found at pages 34-43 of the first part.

Little differences occur only in the paragraphs «*Descriptions*», with deeper details on the literary references. Within the «*Italian reports*», all references to works anyhow dealing with psyllid species in Italy (in a broader sense) are included here. Small variations may be also found in some abbreviations as it is explained below.

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ABBREVIATIONS

Biol., B.	= Biology, life-history	loc.	= Locality, localities
C	= Central	n.	= Noxious, reported in the work
col.	= coloured	N	= North
Des.	= Descriptions	*Obs., O.*	= Observations
E	= East	S	= South
g.	= Galls, reported in the work	Tic.	= Ticino
Gen. Dis.	= General Distribution	W	= West
It.	= Italy	*	= Bibliography not seen
It. Dis.	= Italian Distribution	[ ]	= Reports in geographical but not in political Italy
It. Rep.	= Italian Reports		
leg.	= Legit, collected		

HISTORICAL SURVEY

1. From the forerunners to the First World War

According to some bibliographic reports, knowledge on Psyllids might have a very old origin and the first psyllid record (regarding *Euphyllura olivina*) could be the one given by the Roman Author Caius (or Gaius) Plinius Secundus (born in Como on 23 A.D. and died near Naples on 79 A.D.) in his «*Historia Naturalis*» (or «*Historiae mundi*») (vol. 17, paragraph 229). Nevertheless, it is reasonable to ascribe the above quotation to some moth species (Lepidoptera), as for example the Yponomeutidae *Prays oleae* (Bernard) or the Pyraustidae *Palpita unionalis* (Hb.), rather than to a psyllid.

The history of Italian psyllidology has its true starting point with Marcello Malpighi (born in Crevalcore, near Bologna, on 1628 and died in Rome on 1694, fig. 16), who is considered the founder of cecidology. His reference to deformed leaves of Laurel (presently known as being caused by the psyllid *Lauritrioza alacris*) - reported in the chapter «De Gallis» of his famous «*Anatomes Plantarum Pars altera*» (1679: 23) - is the first (though indirect) record in the world of damages caused by a psyllid to a cultivated plant; it is also the first record in Italy and one of the first ones in the world regarding a psyllid gall. The same quotation is reported in the following editions of the work (1686, 1687, etc.). As regard this topic, see Massalongo C. (1898) and Conci & Tamanini (1985c: 253-254, figs 44-45).

First psyllid descriptions by an Italian Author (though not based on Italian material) came about one century later, when Antonio Scopoli (born in Cavalese, near Trento, on 1723 and died in Pavia on 1788), in his «*Entomologia Carniolica*» (1763: 140), described, among other species, the psyllids *Chermes Senecionis* and *C. Pruni* (presently *Trioza senecionis* and *Cacopsylla pruni*, respectively).

Towards the end of XVIII century, Prof. Cosimo *Moschettini wrote on Olive-tree (likely dealing also with the Olive Psyllid in Italy) in a not better precised book, as it is reported by O.G. Costa (1839: 110, 111; 1840: 22, 23) and by A. Costa (1857: 35, 36; 1877: 56). No further data on this Author are available to us.

During the beginning of XIX century, other references to a psyllid species have been reported in the Italian literature on Olive cultivation (economically very important especially in Central and South Italy), and they obviously regard the Olive Psyllid (now *Euphyllura olivina*). It is worth to mention the treatise by Giuseppe *Tavanti (1819) - a Tuscan georgophylous of the very early nineteenth century - whose chapter «Degl'Insetti nocivi all'ulivo» [On the Insects noxious to Olive] reports the wide and cottony wax secretion due to a «psillo» (information drawn by Goidanich (1975: 986), owing to the missfinding of this very rare text). A brief mention to a not better defined *Psylla oleae* is also given by the Tuscan philosopher Gabriello Grimaldi (from Lucca) (1825: 108; and also printed in 1828), with reference to De Candolle.

Oronzio Gabriele Costa (born in Alessano, near Lecce, on 1787 and died in Naples on 1867) described the above Olive Psyllid (and this is the first description of a species found in the Italian territory), though grossly missing its exact systematic position, by including it in the order Thysanoptera: infact the psyllid was firstly described as *Trips olivinus* (Costa, 1839: 111) and subsequently corrected as *Thrips olivinus* (Costa, 1840: 23). Some years later, the right interpretation was given to the species by Baldassare Romano (1845: 23-25, fig. 12), who ascribed the Costa's taxon to the genus *Psylla* and dealt with the insect as very noxious in Sicilian Olive groves.

No references to the Italian territory occur in the monograph by Arnold Förster (1848), the founder of psyllidology, while only *Homotoma ficus* (found at Stresa, along the coasts of the Lake Maggiore) is reported by Gustav Flor (1861b: 416). Such as *Euphyllura olivina*, also this species shall be frequently reported as noxious in the following Italian literature and up to now.

In the great entomological collection of Massimiliano Spinola (first half of XIX century), among the determined Italian Psyllids only «*Psylla spartii*» (now?) occurs, which has been collected in Liguria and received from Ghiliani (Casale, 1981).

Knowledge on the Italian psyllids has been considerably improved in the second half of the XIX century. During this period, brief contributions have been given by various Authors and are scattered in several papers. In his book on agricultural entomology (1857; re-edited in 1877), Achille Costa (born in 1823 and died in 1898), son of O.G. Costa, gave a long and detailed treatment of the Olive Psyllid; some years after (1863), the same Author described *Psylla lactea* (now *Livilla radiata*), found in the Region Calabria, on the Aspromonte; later on (1883 and 1884) he wrote two notes on damages by «*Psylla olivina*» and *Homotoma*

ficus, while, in three works on Sardinian geofauna (1882, 1883 and 1884), he listed 10 species of psyllids from that Region.

At Riva del Garda (province Trento), G.R. FRAUENFELD (1869: 60) found galls on *Centranthus ruber* and ascribed them to the action of *Psylla Neilreichii* (*Trioza centranthi*, at present days). Enrico RAGUSA, in three notes (1875, 1887 and 1907), quoted 7 psyllid species from Sicily.

Fig. 16 - Marcello Malpighi (Crevalcore near Bologna, 1628 - Rome, 1694) in the work *Anatomes Plantarum Pars altera*, chapter *De Gallis* (1679), reports the first Italian record of a Psyllid, which is also the first, through indirect, record in the world of damages caused by a Psyllid to a cultivated plant. This famous naturalist is considered the founder of Cecidology.

Auguste PUTON (1876) described *Psylla* (now *Arytainilla*) *cytisi* on the base of material collected also in Genoa by P.M. Ferrari. Adolfo TARGIONI-TOZZETTI, in six different notes (1877-1893), dealt with damages caused in Italy by *Euphyllura olivina*, *Psylla* (now *Cacopsylla*) *pulchella* and *Trioza* (now *Lauritrioza*) *alacris*. Eduard *STRASSBURGER (1879) reported showy galls found on *Rumex* sp. at Macugnaga (Region Piemonte), which are now ascribed to *Trioza rumicis*. Similar reports of galls caused by psyllids have been variously given by numerous other Authors, between 1880 and 1919, and a separate paragraph is later dedicated to this topic. DALLA TORRE (1882) reported from Tyrol (now Trentino - Alto Adige) *Psylla alpina*, *P. fusca* and *P. alni*, all of them new for Italy.

But the most outstanding mention is undoubtedly due to two Authors who worked on psyllids in the second half of XIX century, applying in their studies an almost correct methodology and the systematic concepts which were in course of development in that period nearly all over Europe.

First in chronological order, a good specialist of Heteroptera, the genoese naturalist Pietro Mansueto FERRARI (born on 1823 and died on 1883) carried out several psyllid collections in Liguria, especially near Genoa and Stazzano (the latter locality presently belongs to the Region Piemonte, province Alessandria); this collection is still well preserved, at moment, and is stored at the Civic Museum of Natural History in Genoa. In addition to a few data reported in two short notes (1885a, 1885b), this Author published in 1888 a list of 25 species, collected both in Liguria (15 species) and at Stazzano (16 ones), 9 of which have never been recorded before in the Italian territory. Since Ferrari was helped by Puton and Löw in determining the psyllid material, his faunistic list may be considered as the only sure and reliable one, among the works published during the XIX century and regarding territories which belonged to Italy at that time. A biography of P.M.Ferrari is provided by GESTRO (1893).

Almost at the same time, the most important and authoritative contribution to the Italian psyllids was given by the Viennese pediatrician Franz LÖW (born on 1829 and died on 1889), who was the most competent world specialist on psyllids in the whole XIX century. As regard to Italy, various species have been recorded by this Author in several notes: *Trioza tripunctata* (now *Phylloplecta trisignata*) from Torbole (province Trento) (1877); *Floria* (now *Livilla*) *spectabilis* from Naples (1879); *Psylla alaterni*, *P. peregrina* (both presently belonging to the genus *Cacopsylla*), *Livilla ulicis* and *Bactericera Perrisi* [sic], all of them new

Fig. 17 - Pietro Mansueto Ferrari (1823-1893), physician and teacher in Genoa, specialist on *Hemiptera*, is the first entomologist who formed a collection of Italian Psyllids, over all from Liguria and Piemonte. This material, whose data have been published by him in 1888, is still preserved in the Civic Museum of Natural History of Genoa.

for Italy (1882a). LÖW also described *Aphalara calthae* var. *maculipennis* (now *Aphalara maculipennis*) from Levico and *Floria* (now *Livilla*) *vicina* from Raibl (LÖW, 1886), reporting in the same work also *Floria* (now *Livilla*) *vittipennella* from Raibl (new for Italy) and other species from a few more Italian localities. Moreover, in his work on the psyllids of the Austro-Hungarian Empire (1888), the same Author listed as many as 53 species from localities which became Italian after the First World War and presently belong to the Regions Friuli-Venezia Giulia and Trentino-Alto Adige. Among these species, 28 ones were new for the «present Italy» and may be added to those ones (35) already known at that time.

Within the same group of outstanding Authors, Geza HORVATH (Director of the Natural History Museum in Budapest and eminent specialist of Heteroptera) is worth of mention, too, for his first Italian record of *Psylla* (now *Asphagidella*) *buxi* from Florence and Rome (1887) (this reference has been missed in the first part of the present catalogue, which erroneously assignes (page 36, n. 64) the first record of *A. buxi* to Massalongo) and various other psyllids he reported, in his *Fauna Regni Hungariae* (1897b), from presently Croatian yet geographically Italian localities (Istria: Susak = Fiume).

We can also remember here the figure of Mario BEZZI, one of the most famous experts of Diptera in the world, who wrote a juvenile note in 1893, reporting 10 psyllid species and one variety from Trentino.

Between the late XIX and the early XX century, various entomological notes recorded six more species, new for the Italian territory: *Calophya rhois* (Caro Benigno MASSALONGO, 1896), *Asterolecanium rhamni* (now *Trioza kiefferi*) (KIEFFER, 1898), *Psylla mali* (Antonio BERLESE, 1900) and *P. peregrina* (Gustavo LEONARDI, 1901) (presently both belonging to the genus *Cacopsylla*), *Psyllopsis fraxinicola* (G. LEONARDI, 1901), *Trioza dispar* (Giuditta MARIANI, 1909). Moreover, in the same period, Teodosio DE STEFANI PEREZ (1901) described *Psylla ilicina*, recently re-described as *Trioza ilicina*, while a few poorly important records for the Region Lazio have been given by Leonello PICCO (1908).

A bit later, an important contribution came from Eduard GRÄFFE (1911), who recorded 32 species of psyllids (partly determined also by Horvath) from «Küstenland», that was the Adriatic coastal land of Austro-Hungarian Empire (Hungarian Region). At present, most of localities reported by Gräffe lye in Italy (Region Friuli-Venezia Giulia: see first part of this catalogue, page 41); the remaining ones belong to Slovenia and Croatia (Tolmino, Istria, Fiume and Dalmazia). In the list (which raised up to 74 the psyllid species known in the Italian fauna) it is interesting to point out the first and only record of *Psylla* (now

Cacopsylla) *parvipennis*, not found any more in Italy up to now. Unfortunately, Gräffe's paper was neglected to all psyllidologists, though it was the result of one of the widest psyllid collections in Italy, together with those ones by Ferrari and P. Zangheri.

In this period, first records of parasitoids of Italian psyllids have been given by Luigi Masi (1911) and Filippo Silvestri (1915).

From a general point of view, the beginning of the XX century, especially its second decade, has been marked by an important changing in descriptive and speciographic methods, mostly due to the works of Karel Sulc - monographs on the genus *Trioza* (1911-1914) and similar papers on the genus *Psylla* (1907-1915) - who completed his accurate species descriptions with very clear morphological drawings of taxonomically important body parts, thus making easier to determine taxa and stimulating wider interests on this group.

In order to conclude this paragraph, a brief mention is to be made to various catalogues, by Auguste Puton (1875, 1886 and 1899), F. Löw (1882a and 1882b), B. Oshanin (1907-1910 and 1912), G. Aulmann (1913). All of them ignore part of the Italian literature and are referred to the boundaries as they were at that time, that is previous to the First World War; thus, they still consider as Austrian many localities (and relative psyllid records) that became Italian as a consequence of that sad event. This fact subsequently led many foreign and also Italian Authors to report as «new for Italy» several psyllid species which have been already recorded by Löw or by Gräffe.

2. Cecidological works

Several psyllids may variously cause specific and characteristic galls or deformations to plants. As to Italy, these effects have been reported and described in more than 90 papers, mostly published between 1890 and 1920. Seventhy of these papers exclusively regard Italian galls produced by psyllids and other agents; more than 20 other works deal with wider topics, involving also Italian galls. Due to their peculiar argument, we discuss all these works in this separate paragraph. Details on shape and structure of the galls caused by psyllids are reported in chapter 3.3. (pages 146-151). A complete Italian cecidological bibliography is given at page 181.

We already spoke about the works and psyllid records by Malpighi (1679), Frauenfeld (1869) and *Strassburger (1879). Most part of the subsequent, numerous references may be groupped and synthesized as follows.

Leopoldo NICOTRA (1880) described flower galls on *Fedia cornucopiae* in Sicily, which at present are obviously ascribed to *Trioza centranthi*.

Karl Wilhelm DALLA TORRE (1888-1896) published 4 papers, with reports of galls found in several localities of Tyrol, which presently belong to Italy; unfortunately, various mistakes are scattered in these works, such as many references to psyllid species which are presently known to have no gall-forming responsibility.

Caro Benigno MASSALONGO wrote 17 works between 1881 and 1921 (one in collaboration with H. ROSS), of which a half concerning findings carried out in the environs of Verona; in particular, his 1898 study on Malpighi's *Anatomes Plantarum* is worth of being mentioned. A biography and bibliography of C. Massalongo is provided by MATTIROLO *et al.* (1929).

Following up, through description of their galls, Margherita MISCIATTELLI PALLAVICINI (1894) recorded 3 psyllid species from the Region Lazio and Orseolo MASSALONGO (1896) did the same with 9 species from Veneto (environs of Verona).

A bit later, Tuscan environments (mostly the Forest of Vallombrosa, near Florence) have been taken under examination by Giacomo CECCONI, who published 10 works on this topic between 1897 and 1906. Almost contemporary, Alessandro TROTTER (1898-1908) wrote 8 notes on galls from several Italian regions. Moreover, the two latter Authors jointly prepared the *Cecidotheca italica* (TROTTER & CECCONI, 1898-1917), a cecidological herbarium with printed explications, in 23 issues.

The following Authors are also worth to be mentioned: Mario BEZZI (1893, 1899), who recorded 3 species from Trentino, rectifying some wrong Dalla Torre's records; Isaia BALDRATI (1900), who dealt with 6 species of gall-forming psyllids, one of which (collected on *Obione portulacoides*) likely new; Alfredo CORTI (1901-1911) and his 4 papers, 3 of which dealing with findings from Valtellina; Teodosio DE STEFANI (subscribed also as DE STEFANI PEREZ and DE STEFANI-PEREZ) (9 works from 1902 to 1919) and his grandson Teodosio DE STEFANI (1 work, on 1944), with psyllid records mainly from Sicily; Giuditta MARIANI (1907-1909), who wrote 5 papers mostly regarding records from the Region Valle d'Aosta; Roberto COBAU (1911, 1912) and Carlo COZZI (1914, 1915), with notes on Brenta Valley (province Vicenza) and the Region Lombardia, respectively.

References to Italian works may be often found in the classic cecidological treatises by G. DARBOUX & C. HOUARD (1901) and by C. HOUARD (1908, 1909, 1913), such as in the later volumes by H. ROSS & H. HEDICKE (1927) and by H. BUHR (1964-1965).

After 1915, cecidological works practically disappeared from Ital-

ian literature on psyllids, with some valuable exceptions represented by Natalia Borelli (1920), on biological complex living on galls of Laurel, Francesco Boselli (1929b), with references to galls caused by *Spanioza galii*, and Achille Sampò (1975, 1977), on galls collected in the Regions Piemonte and Valle d'Aosta. In the end, Giuseppina Pellizzari Scaltriti (1988) very recently published a volume with information and color photos on the main Italian galls, including those ones caused by 3 psyllid species.

3. From the First World War to present days

All over Europe, the First World War caused a break in biological studies and researches, which have been started again as soon as peace and quite returned in the Continent. Thus, from about 1920 some works on Psyllids have been published in Italy, mainly concerning general biological aspects; it is worth to mention here the above reported study by Natalia Borelli (1920), on biology of *Trioza* (now *Lauritrioza*) *alacris*, and those ones by Mario Salfi (1928) and Isabella Tarsia In Curia (1934), on symbiotic organ of the same species. Almost during the same years, *Aphalara menozzii* (= *Agonoscena cisti*) has been described by Frederick Laing (1929) on the base of material collected in Liguria.

But the most outstanding figure of these years is surely Francesco B. Boselli (born in Florence on 1897 and died in Cagliari on 1964; fig. 18), who worked during that time at the Laboratory of agricultural Entomology in Portici (Naples), directed by Filippo Silvestri, where he deeply studied psyllids. Between 1929 and 1931, 10 valuable works on both Italian and foreign psyllids have been published by this Author; moreover, two other ones followed, respectively in 1960 and 1961, when Boselli worked in Cagliari (Sardinia), as Director of the Observatory for Plant Diseases. As to the Italian species, the monographs on *Homotoma ficus* (1929a), *Spanioza galii aspinovelutina* (1929b), *Rhinocola succincta* (1930) and *Diaphorina putoni* (misidentification for *D. lycii*) (1960) are worth of mention. For the quality of his works, precision of his morphological descriptions and accuracy of the drafts they were accompanied by, Boselli may be considered as the only Italian specialist of Psylloidea, up to 1970. Moreover, after Gordon Ferris (1923-1928) and F.D. Klyver (1930, 1931), Boselli was the third Author in the world, and the first one in Europe, who modernly studied also the morphology of psyllid preimaginal stages. A biography of Boselli has been published by Russo (1965).

In the period between about 1930 and 1960 information on Italian

psyllids has been given also by several other Authors. Lamberto GOLFARI (1937) studied the biology of *Psylla* (now *Cacopsylla*) *pyricola* in Emilia-Romagna. From the same Italian Region, faunistic data were reported by Pietro ZANGHERI (1934 and 1966, respectively dealing with 14 and 26 species), whose collection is now stored at the Civic Museum of Natural History of Verona. Other records are those ones by George HESLOP-HARRISON (1946: finding of *Trioza* (now *Heterotrioza*) *chenopodii* in Sardinia), H.A. SCHÄFER (1949a), Omero CASTELLANI (1951, 1952, 1953), Karel VONDRACEK (1951, 1953, 1957b), Cesare MANCINI (1954, 1955), Livio TAMANINI (1955: finding of 17 species, but none new for the Italian fauna, contrarily to the Author report), W. WAGNER & H. FRANZ (1961). An important monograph on *Trioza urticae* has been published by Sergio ZANGHERI (1955), while various information has been given by Athos GOIDANICH (1960, 1975). In the same period, data on psyllids have been also reported in general treatises of Entomology, as those ones by Filippo SILVESTRI (1934) and Guido GRANDI (1951).

Starting from the early sixties (BUA, 1960), the pear psyllid *Cacopsylla pyri* became a serious pest in Italy and its populations rapidly increased in pear groves. Due to its economic importance, from these years and through the following decades, tens of papers on this species have been published by various researchers and phytopathologists. As to this aspect, details are variously reported in the present catalogue, both in the first part (pages 119-120) and in this second one (third section of the bibliography).

But also general faunistic and biological studies on psyllids have not been neglected from 1960 onwards and various contributions are available from several Authors. First in chronological order, Wilhelm WAGNER (1961) described *Trioza* (now *Bactericera*) *tremblayi*, on the base of material found in the Region Campania. On the same species and a few years later, Ermenegildo TREMBLAY (1965b) published an important and complete monograph, which is the widest and most detailed work that has been ever published on psyllids in Italy. TREMBLAY himself, in a series of papers published between 1958 and 1985, gave various information on *T. tremblayi*, especially regarding the damages it causes on onion plants in Campania.

About in the same years, Giorgio DOMENICHINI (1963, 1967b) gave valuable biological contributions on *Psylla* (now *Cacopsylla*) *melanoneura*, while Livio TAMANINI (1966) published a study on the Italian species of the genus *Homotoma*.

A bit later, Ferdinando BIN (1970, 1972) gave interesting data respectively on *Psylla* (now *Cacopsylla*) *visci* and *Trioza* (now *Bactericera*) *femoralis*.

Almost contemporary, a redescription of the very rare *Psylla* (now *Cacopsylla*) *intermedia*, based on specimens found in Trieste, has been given by Sedzimir Maciej KLIMASZEWSKI (1970), while Pavel LAUTERER (1971) recorded *Trioza urticae* from Sardinia. The former Author, in his Check-List of the palaearctic psyllids (KLIMASZEWSKI, 1975), reported for the Italian fauna less than a half of the species which were effectively known in this Country at that time.

Subsequently, various psyllid records occurred in the Italian literature. This is the case of biological data and photos on several gall-form-

Fig. 18 - Francesco B. Boselli (1897-1964) was Assistant of Prof. F. Silvestri at the Laboratory of Agricultural Entomology in Portici (Naples) and afterwards Director of the Observatory for Plant Diseases in Cagliari. Boselli was the only Italian specialist of Psyllids up to 1970 and published on this group 11 valuable works.

ing species found in the Regions Valle d'Aosta and Piemonte, reported by Achille SAMPÒ (1975, 1977), or the record of three species from the Regions Veneto and Friuli-Venezia Giulia, published by Alessandro MINELLI (1977) and by A. MINELLI & Maria Pia MANNUCCI (1979); in this context, the findings of *Psylla alpina* on snow, reported by Luigi MASUTTI (1978), are worth of mention, too. In the same years, Livio TAMANINI described *Colposcenia sarda* (1977a) (subsequently synonymized with *Stigmaphalara tamaricis*), *Colposcenia italica* (1977b) (recently synonymized with *C. aliena*) and *Psylla cordata* (1977c); he also recorded (1977d) 24 species from Alps and PreAlps, 7 of which were new for Italy. As to economically important species, the massive and highly injurious infestations by *Psylla* (now *Cacopsylla*) *pyri* in Piemonte were reported by Carlo VIDANO *et al.* (1978) and by Alessandra ARZONE (1979), who also dealt with the natural enemies of this pest.

Information on Italian Psyllids is variously scattered also in the entomological literature of the following ten years (1980-1992). Excluding the papers published by the Authors of the present catalogue, since they are separately discussed below, brief notes on economically important species are given during the early eighties by F. ANNUNZIATA *et al.* (1980) (damages and control of *Trioza* (now *Bactericera*) *tremblayi*) and by Pellegrino FIMIANI (1980, 1985) (data on the olive psyllid, *Euphyllura olivina*). Moreover, among treatises of applied Entomology, interesting notes are given by Ermenegildo TREMBLAY (1981).

But the most important aspect of the psyllid literature in the above decade, are the reports of a lot of species by various Italian and foreign Authors. First in a roughly chronological order, Ian D. HODKINSON (1981b) described *Trioza* (now *Bactericera*) *trigonica*, on the base of material found in Friuli-Venezia Giulia; two years later, the same Author (1983b) gave a list of 37 species mostly collected in Friuli-Venezia Giulia by P.G. Coceano, 8 of which were new for the Italian fauna. During about the same years, B. CAVALCASELLE (1982) recorded the finding in Western Liguria of *Ctenarytaina eucalypti*, new for the Italian fauna; Leandro MICIELI DE BIASE (1983) collected a huge amount of *Trioza* (now *Bactericera*) *nigricornis* and *T.* (now *B.*) *trigonica*, in potato and carrot fields of the Region Abruzzo; A. ARZONE & C. VIDANO recorded (1983) *Psylla* (now *Acizzia*) *uncatoides* from Western Liguria, new for Italy, later giving more detailed data on the same species (1985).

Starting from this period, numerous data on Italian Psyllids have been also provided by Daniel BURCKHARDT, a Swiss specialist who variously referred to material collected in Italy, while taxonomically revising particular groups or faunistically defining some European or Medi-

terranean Countries. Following a chronological order, we can mention the record of 4 species (*Craspedolepta* (now *Magnaphalara*) *bulgarica*, *Aphalara sauteri*, *Arytainilla spartiophila* and *Cacopsylla affinis*) new for the Italian fauna (Burckhardt, 1983b); the description of *Rhinocola fusca*, on the base of material collected in the Region Apulia (Burckhardt, 1984); various Italian chorological data on some West Mediterranean species of the genus *Diaphorina* (Burckhardt, 1985a); the new record for Italy of *Trioza* (now *Dyspersa*) *laserpitii* and *T.* (now *D.*) *mesembrina* (Burckhardt, 1986a) as well as of *Cacopsylla bidens* (Burckhardt & Hodkinson, 1986); the invalidation, due to synonymy, of *Colposcenia sarda*, *C. italica* and *Rhodochlanis hodkinsoni*, in addition to chorological data on some other Italian Psyllids (Burckhardt, 1989); information on morphology, biology and distribution in Italy of some Rhinocolinae (Burckhardt & Lauterer, 1989) and *Eutrioza opima* (Burckhardt *et al.*, 1990); the description of *Trioza tripteridis*, based also on Italian findings (Burckhardt *et al.*, 1991). Most of the above data have been reported by this Author already in his valuable doctorate thesis (Burckhardt, 1983a; unpublished).

Last but not least, among the contribution from foreign Authors, very important data on Italian Psyllids are reported by I.D. Hodkinson & David Hollis (1987), who described 3 species of the genus *Livilla* (*bimaculata*, *magna* and *siciliensis*) on the base of material collected in this Country, giving also biological and chorological information on a lot of other species of the subfamilies Acizziinae and Arytaininae.

A few more papers are worth of being mentioned, too: a report of Psyllid findings on *Alnus viridis* (Cristiana Colpi & Luigi Masutti, 1984); a biological study on *Ctenarytaina eucalypti*, with description of its young stages (Alberto Alma & Alessandra Arzone, 1988); a report of biological observations on *Cacopsylla pyri* in the Region Veneto (Sandro Terza & Francesco Pavan, 1988); a doubtful record of *Bactericera tremblayi* in Apulia (Lina Ippolito & Paolo Parenzan, 1990); a report of biological data on *Cacopsylla pyri* in Campania (Rosa Priore, 1991); a morphological description of all nymphal stages of *Trioza ilicina* (Donatella Battaglia, 1992) and the first Italian record of *Cacopsylla ulmi* (Giuseppe Carlo Lozzia & Pietro Binaghi, 1992).

During the all mentioned decade, some very interesting studies have been carried out in Italy also on psyllid antagonists, and various works by Gennaro Viggiani (1983, 1986, 1988 and 1991), above all on parasitoids of *Trioza ilicina*, are to be mentioned here.

A brief survey on the European literature in the same post-war period

It is not useless, now, to briefly discuss this topic, due to the great importance that the European literature on Psyllids of the last 50 years had in influencing the Italian studies on these insects. Therefore, in order to better understand the national psyllidological production and to fit it within a wider cultural context, some notes are shortly reported here on the main research lines which have been developed in this period by European researchers.

Valuable and important contributions to the psyllids only sparsely appeared in Europe up to about 1960. As regards the previous decades, it is worth to mention here some of the most outstanding Authors: Hermann HAUPT (1935), who briefly dealt with psyllids of Central Europe, reporting information on about 119 species; George HESLOP-HARRISON, whose numerous papers (1935-1961) mostly tried to understand the psyllid phylogeny; H.A. SCHÄFER, who gave many interesting data, in his monograph on Swiss psyllids (1949); Carlos RAMIREZ GOMEZ (1956a, 1956b, 1960), who only modestly treated the potentially very interesting Spanish fauna.

Starting from 1960, studies on palaearctic psyllids have been energically improved nearly all over Europe and a huge number of papers has been published on this topic by a few but highly qualified specialists, some of which are still active. Thus, in the latter 30 years many new species have been described and old ones re-described, numerous intricate species groups have been revised and important information has been provided on psyllid biology, chorology and morphology of their nymphal stages.

The most outstanding among the above European specialists are examined below, in a chronological order based on their main monographs.

Karel VONDRACEK continued Sulc' studies on psyllids and published (in Czech) the important volume within the «Fauna of Czechoslovakia» (1957b), dealing with 110 species.

During about the same years, Ecaterina DOBREANU & Constantin MANOLACHE published (in Rumanian) a volume of the «Fauna Republicii Populare Romine» (1962), dealing with 96 species. Their very accurate and detailed morphological drawings are among the best ones which are known up to now.

Marianna M. LOGINOVA actively worked on psyllids for about thirty years, producing more than 60 papers (1953-1981), nearly all of them in Russian. She described many new palaearctic species and revised numerous groups. Her synthetic survey on the psyllids of the European ex USSR (1964, translated into English in 1967) deals with 155 species.

Sedzimir Maciej KLIMASZEWSKI, a Polish zoologist who devoted to psyllids about thirty years of his highly prolific scientific activity, wrote about 70 works (1963-1993) on taxonomy, faunistic, phylogeny and general biology of this insect group. It is worth to mention here his monographs, in German, on the genus *Psylla* (1963) and the family Triozidae (1967b), both practically covering all Central Europe, as well as his «*Fauna Poloniae*» (1975), in Polish, dealing with 117 species. Moreover, his «Annotated Check-List» of the palaearctic psyllids (1973), reporting 504 species, is still a basic work.

Pavel LAUTERER (Museum of Brno) published on psyllids more than 20 papers (1963-1994), nearly all of them in English and regarding the ex Czechoslovakia. He reported numerous taxonomic and faunistic data, but above all the results of his interesting biological observations, mainly carried out through laboratory breedings.

During the last twenty years, the British entomological school played an outstanding role within the studies on taxonomy and systematics of Psylloidea and important progresses have been achieved thanks to the precious work of Ian D. HODKINSON, David HOLLIS and Ian M. WHITE. The above Authors mostly used to work individually, though very often largely co-operating each other. World-wide studies have been carried out by I.D. HODKINSON, in his nearly 50 papers on psyllids (1971-1993).

In particular, his check-lists of psyllids from four zoogeographical regions (1981, in co-operation with WHITE, 1982, 1986, 1988) are worth of mention, together with his important revisions of various psyllid groups. HODKINSON & WHITE (1979) published a very useful volume on Psyllids of the British fauna, a pattern of synthesis dealing with 77 species. HODKINSON & HOLLIS (1987) revised the west palaearctic legume-feeding psyllids, giving also great information for the Italian fauna. D. HOLLIS paied an even more oriented attention to the tropical and subtropical fauna, in his nearly 15 papers (1973-1987). Last but not least, I.M. WHITE worked on psyllids for a shorter time, but giving a very important contribution to nymphal taxonomy and systematics of psyllids (WHITE & HODKINSON, 1982, 1985), applying also a cladistic method.

A highly prolific activity has been performed during the last ten years by Daniel BURCKHARDT (Museum of Geneva), who published up to now (alone or in collaboration with other Authors) more than 40 papers (1983-1994), on psyllids of nearly all the Continents. Important contributions to the knowledge of the Italian psyllid fauna have been largely given by this Author, as it has been already reported above (see page ...).

The Swedish homopterologist Frey OSSIANNILSSON, a highly qualified specialist on Auchenorrhyncha, had a lasting scientific activity also on psyllids (1937-1992). He mainly worked on the North European species and his studies are synthetized in an excellent volume (published in English) on the fauna of Fennoscandia and Denmark (1992), which deals with adults and nymphs of 98 species.

In the end, A.M. GEGECHKORI (Museum of Tiflis - Georgia) published (in Russian), nearly 50 papers (1966-1990), including two monographic volumes (1984, 1985) on the Psyllids of Caucasus. His studies mainly regard an Asiatic territory which is not included in our treatment, yet his contribution to the «Annotated Catalogue» of the psyllids of the whole ex USSR (GEGECHKORI & LOGINOVA, 1990) is to be mentioned here.

Going back to the Italian literature, during the last three lustres, and following the general European trends, the most outstanding and specialistic contribution to psyllid studies has been provided by the Authors of the present catalogue.

Collections of Italian Psyllids were sporadically started by Livio TAMANINI since about 1943, while mainly working on Heteroptera. By this way, he built up an appreciable psyllid collection, partly determined by G. Heslop-Harrison, and he wrote 6 notes on these insects (1955, 1966, 1977a, 1977b, 1977c, 1977d). But a stronger thrust has been given to the researches from 1981, when Cesare CONCI joined to Tamanini in collecting and studying psyllids. From this moment and nearly up to now, the two Authors strictly co-operated in methodical field collections, bibliographic researches and laboratory studies. They wrote together more than 40 papers on psyllids, 5 of which in collaboration with foreign specialists; moreover, 4 more notes have been published on the topic by Conci alone. Carmelo RAPISARDA's approach to psyllid studies occurred a few years later, since he started his first collections from about 1983. He published up to now nearly 30 papers on psyllids, 9 of which in co-operation with other Authors.

Field researches carried out by the three Authors practically con-

Fig. 19 - Map of Italy with the abbreviations used in the text for the 20 Regions

Abr.	=	Abruzzo	Mol.	=	Molise
Bas.	=	Basilicata	Piem.	=	Piemonte
Cal.	=	Calabria	Pu.	=	Puglia
Camp.	=	Campania	Sard.	=	Sardegna
Em. R.	=	Emilia-Romagna	Sic.	=	Sicilia
Fr. V.G.	=	Friuli-Venezia Giulia	Tosc.	=	Toscana
Laz.	=	Lazio	Tr.A.A.	=	Trentino-Alto Adige
Lig.	=	Liguria	Um.	=	Umbria
Lomb.	=	Lombardia	V.A.	=	Valle d'Aosta
Mar.	=	Marche	Ven.	=	Veneto

cerned the whole Italian territory, which has been investigated through a complex of about 800 excursions, made in more than 500 localities. Obvious practical reasons allowed deeper studies to involve the northern Regions (especially Trentino - Alto Adige) and Sicily, where appreciable and almost complete knowledge on psyllid fauna is presently available. The huge psyllid material collected during these field researches is stored in three separate collections: «C. Conci» (a private

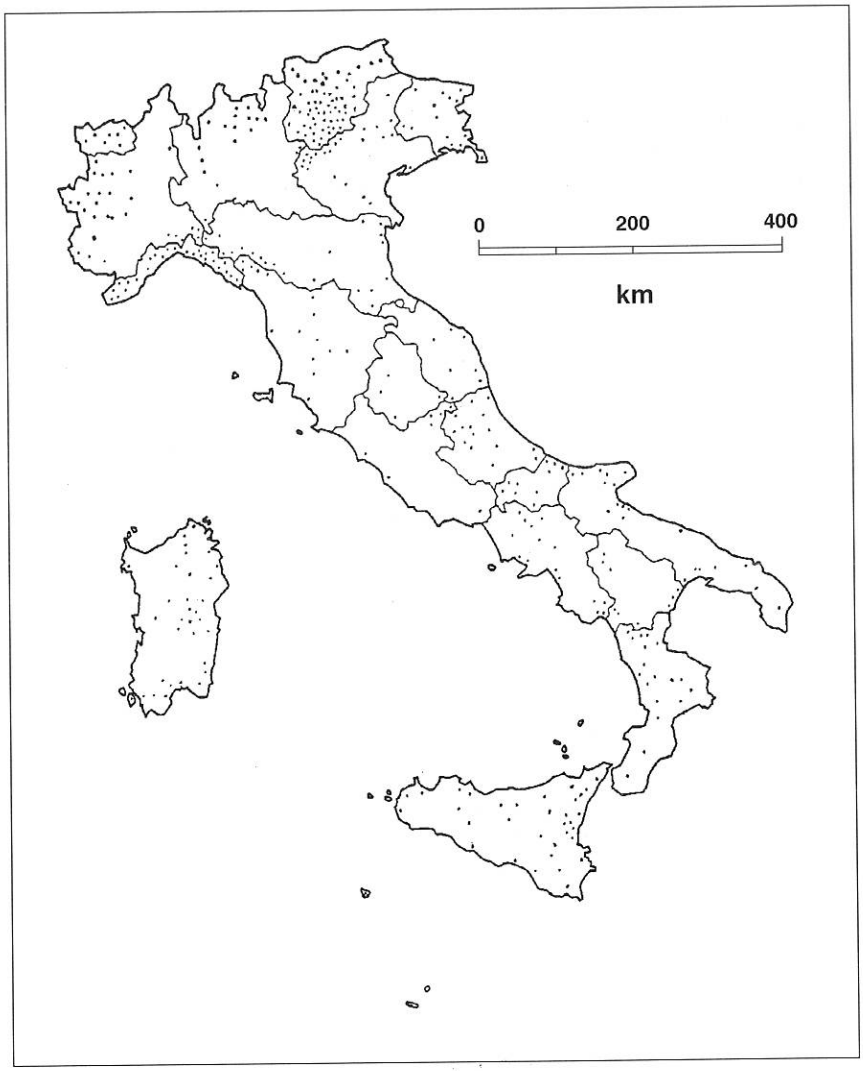


Fig. 20 - Map of Italy with the main collecting localities of Psyllids.

collection, presently preserved at the Author's home, consisting with about two tens of thousands specimens), «C. Rapisarda» (private in its greatest part, but presently hosted by the Institute of agricultural Entomology of the University of Catania), «L. Tamanini» (recently given to the Civic Museum of Rovereto (Trento), where it is presently stored). The study of all this material allowed the three Authors to totally publish 76 papers, giving information on various aspects of Italian Psylloidea.

From the faunistic point of view, the huge amount of data which have been acquired by the three Authors, allow to almost satisfactory define the psyllid distribution in Italy, which was almost neglected before. The writers variously recorded in several papers a total of 87 species of psyllids new for the Italian fauna. On the whole, their field researches allowed to find 191 among the 199 species which are presently known to occur in Italy; as to the other 8 species, 6 of them were recently found by other researchers and the last 2 (*Cacopsylla parvipennis* and *Trioza thomasii*) have been recorded in ancient bibliography but escaped to all recent researches.

As to taxonomy, within their studies on psyllids the writers described 15 still valid species, 2 subgenera, 4 genera and one subfamily.

Psyllid morphology has been also taken into great consideration, in order to improve the knowledge on those species which were only badly or completely non defined before, such as the rarest species or those ones exclusively living in southern environments. For this reason, nearly all the papers by the three Authors include accurate morphological details and drawings, thus giving useful data for adult identification; on the whole, they report morphological drawings of adults for more than 80 species. In this context, young stages have not been neglected and morphological notes are also given by the three Authors on nymphs and eggs of respectively 33 and 24 species; in particular, a complete description of all preimaginal stages has been provided for two species of the genus *Arytainilla* (*A. barbagalloi* and *A. cytisi*).

Various aspects of psyllid biology (host plants, life-cycles, gall forming activity) have been also studied by the writers, who reported on these aspects notes on several species, which were biologically poorly known before.

In the end, a special care has been paid to economically important species, as it is shown by the studies on the pear psyllid, *Cacopsylla pyri*, and its parasitic complex in Sicily.

ANNOTATED CATALOGUE

? Family SPONDYLIASPIDAE Schwarz, 1898

The genus *Ctenarytaina* still has a controversial family attribution, having been recently approached to Euphyllurinae. Here we follow the arrangement proposed by WHITE & HODKINSON (1982).

Genus *Ctenarytaina* Ferris & Klyver, 1932

131 ([1]). *Ctenarytaina eucalypti* (Maskell, 1890)

Des. - HODKINSON & WHITE, 1979b: 79, figs 313-317. – Nymphal stages I-V: ALMA & ARZONE, 1988: 506-508, figs 1 (B-F), 2 (A-E).

It. Rep. - CAVALCASELLE, 1982: 3-8 (of the reprint), 3 col. photos (Lig., noxious); ALMA & ARZONE, 1988: 505-512, 2 groups of figs (Lig., noxious); TREMBLAY, 1988: 116 (It., noxious); CONCI *et al.*, 1993: 37, n.95 (It.).

It. Dis. - Introduced little before 1982, it is presently localized in West Liguria, Communes San Remo and Ventimiglia. Many specimens collected by B. Cavalcaselle, A. Alma and A. Arzone, between the sea level and 300 m; we did not collect this species.

Gen. Dis. - Indigenous to Australia and reported also from New Zealand and Papua-New Guinea; introduced in South Africa, Great Britain, North Italy (Liguria), Spain, Portugal and Canary Islands.

Biol. - According to the literature, strictly oligophagous on *Eucalyptus* spp. (Myrtaceae). In Italy, all its stages have been collected on *Eucalyptus globulus* Labill. and *E. cinerea* Müll.; adults also on *E. rostrata* Schlecht.. Careful observations on life-cycle are reported by ALMA & ARZONE (1988); according to these Authors, *C. eucalypti* performs in Liguria up to 6-8 generations per year and overwinters in all stages, with a slowing down occurring in its development in December-February and July-August.

([1]) The numeration of the Italian species continues with number 131 rather than 132, for the reasons exposed at page 131 of the first part.

Obs. - *C. eucalypti* injuries in Liguria the cultivated *Eucalyptus*, by writhing and deforming buds and leaves, which are also soiled with exuviae, wax and honeydew.

Family CALOPHYIDAE Vondracek, 1957

Genus *Calophya* Löw, 1878

132. *Calophya rhois* (Löw, 1877)

Des. - DOBREANU & MANOLACHE, 1962: 126-129, figs 80-82; HODKINSON & WHITE, 1979b: 33, figs 79-82.

It. Rep. - MASSALONGO O., 1896: 190 (Ven., galls); [HORVATH, 1897b: 58 (Croatia: Susak=Fiume)]; MASSALONGO C., 1897: 139-140 (Ven., galls); BEZZI, 1899: 26 (Tr.A.A., galls); [MASSALONGO C., 1907: 42 (France: Nizza = Nice, galls)]; COBAU, 1911: 387 (Ven., galls); TAMANINI, 1977d: 107 (Tr.A.A.); HODKINSON, 1983b: 279 (Fr.V.G.); RAPISARDA & CONCI, 1989: 630 (Fr.V.G.); CONCI *et al.*, 1993: 37, n. 65 (It.).

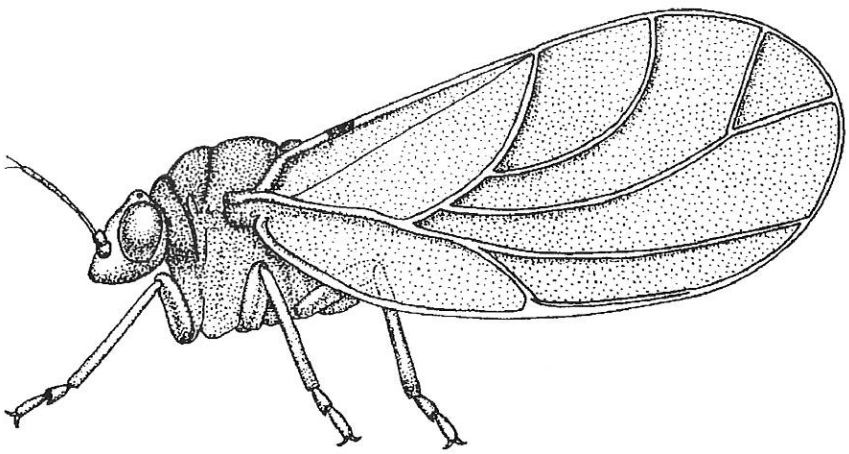


Fig. 21 - *Calophya rhois*, male, Veneto. (Drawing R. Pace).

It. Dis. - Common; sometimes abundant. Found by us in 6 Regions of North and Central Italy; hundreds of specimens in more than 30 localities, with more than 40 findings, between 50 and 1000 m.

Gen. Dis. - From Caucasus to Southern Europe; northward up to Czech Republic.

Biol. - Monophagous on *Cotinus coggygria* Scop. (= *Rhus cotinus* L.) (Anacardiaceae). We collected adults from May to November and nymphs from May to August on the host plant. P.G. Coceano found adults on yellow water trays (near Udine) from May to September. Probably one generation per year and overwintering as egg. We never found adults in winter; literary references to overwintering adults are doubtful.

This psyllid deforms the leaves, causing small depressions at the underface, where the nymphs settle, and corresponding pimples at the upper one; the margins of the leaves can be wrinkled, curled or rolled down to the underface. As to these galls, see (f.e.) Massalongo C. (1897, 1907), Cobau (1911); Houard (1909); Ross & Hedicke (1927), Dobreanu & Manolache (1962: fig. 83); Buhr (1964); our fig. 38 at page 75.

Obs. - *C. rhois* was found sometimes abundant in Veneto (near Verona, by Prof. G.C. Lozzia) and in Friuli-Venezia Giulia (near Udine, by Dr P. Zandigiacomo) on *Vitis vinifera* L. (Vitaceae), but apparently causing no damage to this plant.

Family HOMOTOMIDAE Heslop-Harrison, 1958

Genus *Homotoma* Guérin-Méneville, 1844

133. *Homotoma ficus* (Linnaeus, 1758)

Des. - Klimaszewski, 1961a: 116-118, figs 5-8; Tamanini, 1966: 105-110, figs 1-4, 9-12; Hodkinson & White, 1979b: 16, 78, figs 308-312; Rapisarda, 1994b: 101-104, fig. 1.— V instar nymph: White & Hodkinson, 1982: 45-46, figs 175-177; Rapisarda, 1989b: 17; Rapisarda, 1994b: 101-104, fig.2. The detailed description given by Boselli (1929a: 219-246, 13 gr. figs) is based on mixed material of both *H. ficus* and *H. viridis*.

It. Rep. - Flor, 1861: 416 (Piem.); *Costa, 1881: 340 (It., noxious); Costa, 1884 (Sard.); Ferrari, 1885a: 292 (? Camp.); [Horvath, 1886: 315 (Croatia: Susak = Fiume)]; Ragusa, 1887: 187 (Sic.); Ferrari, 1888: 76 (Piem., Lig.); [Löw, 1888: 20-21 (Croatia: Susak = Fiume)]; Massalongo O., 1896: 189 (Ven.); [Horvath, 1897: 59 (Croatia: Susak = Fiume)]; Cavallero, 1900: 180 (It., noxious); Del Guercio, 1900: 297 (Lomb., n.); Leonardi, 1901: 177 (It., n.); Del Guercio, 1902: 443-445 (It., n.); Ragusa, 1907: 237 (Sic.); Picco, 1908: 101 (Laz.); Gräffe, 1911: 294 (Fr.V.G.); Silvestri, 1911: 95, figs 87: 1-2 (It., n.); Leonardi, 1922: 33 (It., n.); Berlese, 1924: 316 (It., n.); Craveri, 1926: 243 (It.,

n.); GRANDI, 1927: 200 (It., n.); BOSELLI, 1929a: 219-246, 13 gr. figs (Camp.); GRANDI, 1930: 248 (It., n.); DELLA BEFFA, 1934: 732-733, figs 351-352 (It., n.); SILVESTRI, 1934: 382-384, figs 351-352 (It., n.); DELLA BEFFA, 1949: 126-127, figs 109-110 (It., n.); GRANDI, 1951: 820 (It., n.); VONDRACEK, 1951: 126 (Tr.A.A.); TAMANINI, 1955: 11 (Tr.A.A., Laz.); SERVADEI, 1956: 224 (It., n.); ZANGHERI, 1960: 801 (Em. R.); TAMANINI, 1966: 106 (Ven., Tr.A.A., Lomb., Piem., Laz., Camp., Cal.); SERVADEI *et al.*, 1972: 346 (It., n.); ANONYMOUS, 1975: 346, 1 fig. (It., n.); DIOLI, 1977: fig. 4 (It.); TREMBLAY, 1981: 94, fig. 100 (It., n.); [BURCKHARDT, 1983b: 84 (Tic.)]; RAPISARDA, 1985a: 112 (Sic.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA, 1989c: 13-18 (Sic.); RAPISARDA & CONCI, 1989: 630 (Fr.V.G.); RAPISARDA, 1991: 38-39 (Sard.); CONCI *et al.*, 1993: 35, n.3, (It.); RAPISARDA, 1994b: 101-104, 2 figs (Sic.). Reports previous to 1961 may regard both *H. ficus* and *H. viridis*.

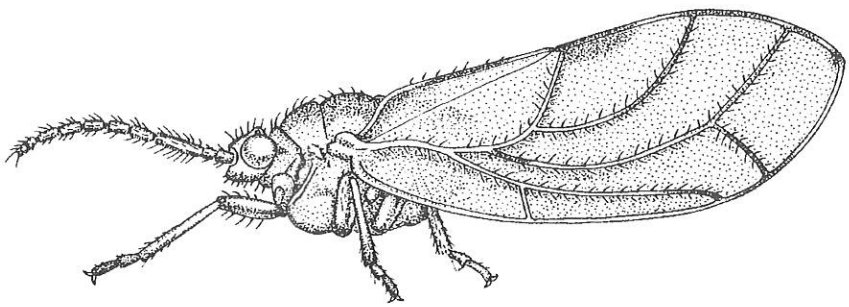


Fig. 22 - *Homotoma ficus*, male, Trentino-Alto Adige. (Drawing R. Pace).

It. Dis. - Common. Found by us and others in 19 Regions throughout Italy; hundreds of specimens in more than 60 localities, with more than 80 findings, between the sea level and 900 m; specimens carried by wind up to 1600 m.

Gen. Dis. - From Iran to all Mediterranean Basin; northwards to Switzerland (Tessin); introduced in Great Britain and California.

Biol. - Monophagous on *Ficus carica* L. (Moraceae). We collected adults from June to December on the host plant and nymphs in April-June; adults were found also in yellow water trays and on occasional plants. BOSELLI (1929a: 247-250), who reports careful biological observations carried out in South Italy (Naples), states how *H. ficus* performs one yearly generation and overwinters as egg: eggs hatching occurs from mid March to early April, adults fly from late May to beginning of June,

then they mate in September and oviposit on the buds from late September to early October (this life-cycle may also regard the close *H. viridis*).

Obs. - Damages by this psyllid are reported in various Italian works of applied entomology but cannot be confirmed by our field observations.

134. *Homotoma viridis* Klimaszewski, 1961
Homotoma ficus Auct. nec L. (partim)

Des. - Klimaszewski, 1961: 114-116, 118, figs 1-4; Tamanini, 1966: 105-110, figs 5-8, 13-15; Rapisarda, 1994b: 101-104, fig.1.— V instar nymph: Rapisarda, 1989c: 15-16, figs 1-6; Rapisarda, 1994b: 101-104, fig.2.

It. Rep. - Various reports of *H. ficus* previous to 1961 (in part); Tamanini, 1966: 106 (Ven., Tr.A.A., Camp., Cal.); Rapisarda, 1988b: 620 (Sic.); Rapisarda 1989c: 13-18, figs 1-6 (Ven., Tr.A.A., Lomb., Piem., Lig., Em.R., Um., Laz., Camp., Cal., Pu., Sic.); Conci *et al.*, 1993: 37, n.82 (It.); Rapisarda, 1994b: 101-104, 2 figs (Sic.).

It. Dis. - Common. Found by us in 15 Regions throughout Italy and in Sicily; hundreds of specimens in about 40 localities, with more than 60 findings, between the sea level and 800 m.

Gen. Dis. - Mediterranean Basin; northwards to Switzerland (Tessin).

Biol. - Monophagous on *Ficus carica* L. (Moraceae). Life-cycle as in *H. ficus*; Rapisarda's (1989c: 17) report of a shorter adult life (occurring on the plants up to beginning of August) is invalidated by further observations.

Obs. - Such as *H. ficus*, also *H. viridis* does not damage its host plant.

Family TRIOZIDAE Löw, 1879

Genus *Trichochermes* Kirkaldy, 1901

135. *Trichochermes walkeri* (Förster, 1848)
Trichopsylla walkeri

Des. - Dobreanu & Manolache, 1962: 256-257, fig. 178; Hodkinson & White, 1979b: 61-62, figs 234-237; Ossiannilsson, 1992: 221, figs 937-946.

It. Rep. - LÖW, 1888: 21 (Fr.V.G., Tr.A.A., galls); DALLA TORRE, 1893: 148 (Tr.A.A., galls); MASSALONGO, 1893a: 6 (Ven., g.); MASSALONGO O., 1893b: 266-267, plate 4: 1 (Ven., g.); DALLA TORRE, 1896: 154 (Tr.A.A., g.); MASSALONGO O., 1896: 190 (Ven., g.); BEZZI, 1899: 26 (Tr.A.A., g.); LEONARDI, 1901: 177 (It., erroneous report as noxious); CORTI, 1904: 567 (Lomb., g.); TROTTER, 1904a: 80 (It., g.); TROTTER & CECCONI, 1904: 12, n. 277 (Ven., g.); COBAU, 1911: 386-387 (Ven., g.); GRÄFFE, 1911: 294 (Fr.V.G.); COBAU, 1912: 55 (Ven., g.); COZZI, 1914: 531 (Lomb., g.); SAMPÒ, 1975: 164, figs 8-9, col.plate I: 3-4 (V.A., g.); TAMANINI, 1977d: 116 (Tr.A.A., Lomb.); [BURCKHARDT, 1983b: 64 (Tic.)]; CONCI *et al.*, 1993: 36, n. 49 (It.).

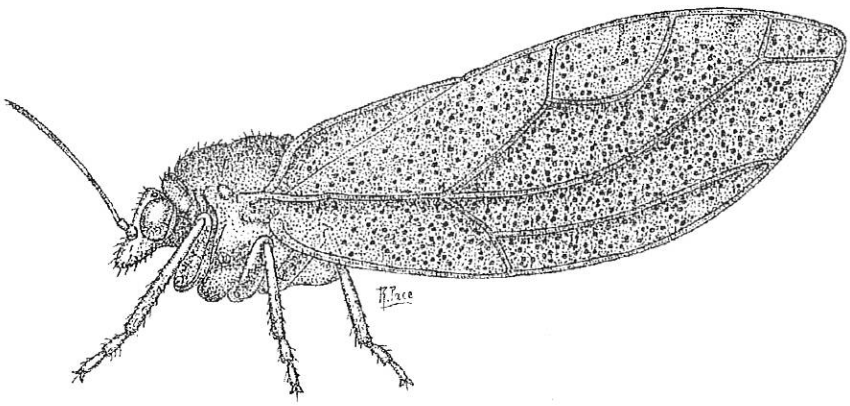


Fig. 23 - *Trichochermes walkeri*, male, Friuli-Venezia Giulia. (Drawing R. Pace).

It. Dis. - Fairly common. Found by us and other collectors in 6 Regions of North Italy and in Abruzzo; more than hundred specimens in about 30 localities, with more than 30 findings, between 450 and 1350 m.

Gen. Dis. - Caucasus and the greatest part of Europe.

Biol. - According to the literature, strictly oligophagous on *Rhamnus* spp. (Rhamnaceae). Adults were collected by us from July to October on *Rhamnus catharticus* L.; nymphs in June and July on the same plant. One generation per year; overwintering as egg (a very uncommon case in the family Triozidae).

The species causes great and showy galls, widely described in the literature, by rolling and thickening the leaf margins; see (f.e.) MASSALONGO (1893b, 1896), HOUARD (1909) and SAMPÒ (1975). Galls

are reported also on *Rhamnus saxatilis* Jacq. (Cobau, 1912: 55) and on *Frangula alnus* Miller (Cozzi, 1914: 531); but the latter information is to be considered as doubtful.

Genus *Bactericera* Puton, 1876

136. *Bactericera* (*Bactericera*) *perrisii* Puton, 1876
Bactericera perrisi (uncorrect)

Des. - Dobreanu & Manolache, 1962: 254-255, fig. 177; Klimaszewski, 1967b: 241, figs 12-15.

It. Rep. - Löw, 1882a: 213 (It.); Ferrari, 1888: 76 (Piem.); Löw, 1888: 21 (Fr.V.G.: Görz = Gorizia); Gräffe, 1911: 294 (Fr.V.G.); Conci & Tamanini, 1988b: 167, fig. 20.1 (Fr.V.G., Ven., Tr.A.A., Lomb., Piem., Lig., Abr., Pu., Bas., Cal.); Rapisarda & Conci, 1989: 632 (Fr.V.G.); Conci & Tamanini, 1991: figs 21-22 (Tr.A.A.); Conci *et al.*, 1993: 36, n.17 (It.).

It. Dis. - Fairly common. Found by us and others in 12 Regions of North, Central and South Italy, but not in the Isles; more than 300 specimens in more than 30 localities, with more than 40 findings, between the sea level and 1000 m on the host plants (between 600 and 1000 m and also at 1700 m and 1850 m on meadows). A collecting biotope is figured by Conci & Tamanini (1991: figs 21-22).

Gen. Dis. - From Mongolia to France and Egypt.

Biol. - According to the literature, strictly oligophagous on *Artemisia* spp. (Compositae). Adults were collected by us from March to November (except in April) on *A. alba* Turra and *A. campestris* L. in North and *A. variabilis* Ten. in South Italy. We never collected nymphs, nor overwintering specimens on conifers. According to Lauterer (1982: 143; 1991: 256) this species performs in the Czech Republic two or three generations per year and overwinters as adult.

Obs. - The characteristics of *Bactericera maritima* Horvath, which are reported in the original description (Horvath, 1892: 140; see also pages 128 and 135) and in its re-description by Klimaszewski (1962a: 131, figs 4-6, numbers 2 and 4 having been transposed), come within the variability of *Bactericera perrisii*. Such a statement derives from our examen of a wide material, compared with the re-descriptions of *B. perrisii* given by Vondracek (1957b: 299-301, figs 180-181), Klimaszewski (1962b: 217-218, figs 7-10; 1967b: 241-242, figs 12-15; 1975: 240-241, figs 438-442) and Lauterer (1982: 142-144).

Thus, the synonymy *B. perrisii* (Puton, 1876) = *Bactericera maritima*

Horvath, 1892 (**syn. n.**) is here proposed. Burckhardt examined the types of *B. maritima* stored in the Natural History Museum of Budapest and confirms our opinion (*in litteris* 17.IV.1991).

The type locality (the only known collecting locality) of *B. maritima* is France, Dép. Hérault, Montpellier, Pérols, dunes de Carnon, near the sea. The host plant is *Artemisia* sp.; KLIMASZEWSKI (1973: 232) reported *Artemisia maritima*, without objective elements.

137. *Bactericera* (*Bactericera*) *kratochvili* Vondracek, 1957

Des. - VONDRACEK, 1957a: 174-176, figs 3-5; LAUTERER, 1965: 178, figs 3-13; CONCI & TAMANINI, 1991: 44, figs 25-29.

It. Rep. - CONCI & TAMANINI, 1991: 44-45, figs 1.2, 21-22, 25-29 (Tr.A.A.); CONCI *et al.*, 1993: 39, n. 189 (It.).

It. Dis. - Very localized. Found by us only in one locality: Trentino-Alto Adige, Province Trento, Commune Rovereto, loc. Vallunga, 340-380 m, meadows in a xerophilous and calcareous zone; this biotope is reported by CONCI & TAMANINI (1991: figs 21-22). We collected about 90 adults, eggs and nymphs, with 12 findings.

Gen. Dis. - From Mongolia to European Russia, Czech Republic, NE Italy.

Biol. - The species has been collected in ex Czechoslovakia and Italy on *Allium lusitanicum* Lam. (= *A. senescens* subsp. *montanum* (Fries) Holub) (Liliaceae) and in Asia GEGECHKORI & LOGINOVA, 1990: 83) on *Artemisia* sp. (Compositae). Therefore, it is one of the very few European psyllids regularly living on Monocotyledones. According to LAUTERER (1965: 182; 1991: 255), *B. kratochvili* performs in the Czech Republic 2-4 or more generations per year and overwinters as adult, V instar nymph and also as egg. We collected adults on its host plant from May to September, nymphs in May and June, eggs in April and June; we never found overwintering specimens.

138. *Bactericera* (*Klimaszewskiella*) *femoralis* (Förster, 1848)
Trioza acutipennis Auct. nec Zetterstedt, *Trioza femoralis*

Des. - DOBREANU & MANOLACHE, 1962: 325-327, figs 233-234; KLIMASZEWSKI, 1967b: 275-277, figs 65-69; OSSIANNILSSON, 1992: 226, figs 951-961.

It. Rep. - LÖW, 1888: 24 (Tr.A.A., *sub T. acutipennis*); DALLA TORRE,

1893: 104 (id., galls); Bin, 1972: 45-53, 10 figs (Em.R., g.); Tremblay, 1981: 96 (It.); [Burckhardt, 1983b: 77 (Tic.)]; Hodkinson, 1983b: 279 (Fr.V.G.); Conci & Tamanini, 1988b: 172, fig. 20.9 (Fr.V.G., Ven., Tr.A.A., Lomb. Piem., Lig., Em.R., Um., Mar., Laz., Abr.); Rapisarda & Conci, 1989: 632 (Fr.V.G.); Conci *et al.*, 1993: 36, n. 55 (It.).

It. Dis. - Very common in the North. We found this orophilous species in 13 Regions of North and Central Italy; hundreds of specimens in about 90 localities, with more than 150 findings, between 1200 and 2200 m on the host plants and between 900 and 2550 m on conifers and occasional plants; the highest finding has been carried out in Piemonte, Province Torino, Commune Prali, loc. Bric Round, near Punta Cialancia, 2550 m, 3.IX.1988, on *Larix decidua*. Hodkinson (1983b) reports this species as collected at 130 m by traps.

Gen. Dis. - From Far Eastern Russia to North, Central and Central-South Europe.

Biol. - According to the literature, strictly oligophagous on *Alchemilla* spp. (Compositae). Adults were collected by us throughout the year: from May to October on *Alchemilla* spp. gr. *alpina* and gr. *vulgaris*; nearly all the months (except in June) on conifers; frequently found also on meadows or occasional plants. According to Bin (1972: 45-46), two generations per year; overwintering as adult on conifers.

According to Houard (1908) and Buhr (1964), this species may wrinkle the leaves; moreover, leaf yellowing is reported by Bin (1972: 46). We did not note alterations to plants.

139. *Bactericera* (*Klimaszewskiella*) *bohemica* (Sulc, 1913)
Trioza bohemica

Des. - Dobreanu & Manolache, 1962: 328-330, figs 236-237; Conci & Tamanini, 1985d: 108-109, figs 17-29; Ossiannilsson, 1992: 231, figs 981-990.

It. Rep. - [Burckhardt, 1983b: 77 (Tic.)]; Conci & Tamanini, 1984e: 268, fig. 1.26 (Ven., Tr.A.A., Lomb., V.A., Tosc.); Conci & Tamanini, 1985d: 108-109 (It.); Conci & Tamanini, 1988b: 168, fig. 20.4 (Ven., Tr.A.A., Lomb., Piem., V.A., Tosc.); Conci *et al.*, 1993: 38, n. 142 (It.).

It. Dis. - Fairly common. We found this orophilous species in 6 Regions, on the Alps and Tuscan Apennine; about hundred adults in about 25 localities, with more than 35 findings, at 1450, 2000, 2100 and 2520 m on the host plants (between 1100 and 2450 m on conifers). A collecting biotope is illustrated in fig. 24.

Gen. Dis. - From Mongolia to North and Central Europe.

Biol. - According to the literature, strictly oligophagous on *Geum montanum* L. and *G. rivale* L. (Rosaceae Rosoideae). We collected adults on conifers from February to April and from July to October; nymphs in August and October on both the host plants. Probably one generation per year; overwintering as adult on conifers.

140. *Bactericera* (*Klimaszewskiella*) *harrisoni* (Wagner, 1955)
Trioza harrisoni

Des. - CONCI & TAMANINI, 1985d: 100-101, 108-109, figs 1-15.

It. Rep. - HODKINSON, 1983b: 279 (Fr.V.G.); CONCI & TAMANINI, 1985d: 99-110, figs 1-16 (Fr.V.G., Ven., Tr.A.A.); CONCI & TAMANINI, 1988b: 172, fig. 20.10 (ibid.); RAPISARDA & CONCI, 1989: 632 (Fr.V.G.); CONCI *et al.*, 1993: 37, n. 103 (It.).

It. Dis. - Fairly rare. We and others found this orophilous species in 3 Regions of North-Eastern Italy (Fr.V.G., Ven., Tr.A.A.); more than 80

Fig. 24 - Biotope of *Bactericera bohemica*, on *Geum montanum*, and *B. harrisoni*, probably on *Geum* sp., in NE Italy, Trentino-Alto Adige, Dobbiaco-Toblach, Cornetto di Confine-Markinkell, stony meadow, 2100 m, at the upper limit of conifers. (Photo C. Conci, VIII. 89).

specimens in 20 localities, with 30 findings, between 1400 and 2450 m (except the record by HODKINSON (1983b), at 130 m, by traps). Our largest finding is the one in Tr.A.A., Province Bolzano-Bozen, Commune Dobbiaco-Toblach, Mount Cornetto di Confine-Markinkell, 2050-2100 m, 3.X.1988, about 15 males and 18 females, on *Picea abies*, mixed with many specimens of *Bactericera bohemica*. A collecting biotope is illustrated in fig. 24.

Gen. Dis. - Known only from Rumania, Slovakia, Czech Republic, Austria, Switzerland and NE Italy. Distribution map in CONCI & TAMANINI (1985d: fig. 16).

Biol. - Host plant unknown; probably a *Geum* sp. (Rosaceae, Rosoideae). Adults were found by us in January, March, May and August-October on conifers; rarely on meadows. According to the literature, one generation per year and overwintering as adult on conifers.

Obs. - Part of material collected by us on conifers was not determined, due to the close resemblance between *B. harrisoni* and *B. bohemica*.

141. *Bactericera* (*Klimaszewskiella*) *bucegica* (Dobreanu & Manolache, 1962)

Des. - DOBREANU & MANOLACHE, 1962: 351-354, figs 259-261; CONCI & TAMANINI, 1991: 37-40, figs 2-17.

It. Rep. - CONCI & TAMANINI, 1988b: 168, fig. 20.5 (Ven., Tr.A.A.); CONCI & TAMANINI, 1991: 37-43, figs 1.1, 2-20 (Tr.A.A.); CONCI *et al.*, 1993: 39, n. 169 (It.).

It. Dis. - Very localized. We found this orophilous species only in two Regions of NE Italy, in the following 5 localities, with 14 findings (at 1420 m on the host plants; at 1450 and between 1950 and 2200 m on conifers): Ven., Province Vicenza, Commune Lastebasse, loc. Fiorentini, Le Fratte, 1450 m; Tr.A.A., Province Bolzano-Bozen, Commune Laces-Latsch, loc. Coldrano-Goldrein, 2200 m; Tr.A.A., Province Trento, Communes Vigo di Fassa (loc. Ciampedie, 1950 m), Pozza di Fassa (loc. Ciampedie, Prà Martin, 2000 m) and Folgaria (loc. Malga II Posta, 1420 m). We collected only about ten adults; but in the last locality we found many nymphs, from which nearly 200 adults emerged in laboratory. The main collecting biotope is shown by CONCI & TAMANINI (1991: figs 19-20).

Gen. Dis. - Rare and sporadic: Rumania, Slovakia, Austria, Switzerland and NE Italy. Distribution map in CONCI & TAMANINI (1991: fig. 18).

Biol. - Perhaps polyphagous. According to the literature, living on *Campanula patula* L. (Campanulaceae) and *Homogyne alpina* L. (Compositae). We found two V instar nymphs on *Homogyne alpina* and eggs and many nymphs on *Ranunculus aconitifolius* L. (Ranunculaceae). We collected adults on conifers in September-October and on the host plants in August; eggs in July; nymphs in July-early September. Probably one generation per year. Overwintering as adult on conifers.

142. *Bactericera* (*Klimaszewskiella*) *modesta* (Förster, 1848)
Trioza recondita Flor, 1861

Des. - KLIMASZEWSKI, 1967b: 308, figs 125-126; CONCI & TAMANINI, 1986d: 52-53, figs 31-46.

It. Rep. - LÖW, 1888: 22 (Fr.V.G.: Görz = Gorizia, *sub T. recondita*); [HORVATH, 1897; 59 (Croatia: Istria)]; GRÄFFE, 1911: 294 (Fr.V.G., *sub T. recondita*); SULC, 1913: 47 (Fr.V.G.); CONCI & TAMANINI, 1986d: 51-57, figs 31-47 (Fr.V.G., Ven., Tr.A.A., Tosc.); CONCI & TAMANINI, 1988b: fig. 20.11 (ibid.); RAPISARDA & CONCI, 1989: 632 (Fr.V.G.); CONCI *et al.*, 1993: 26, n. 51 (It.).

It. Dis. - Fairly rare. Found by us and others in 5 Regions of North and Central Italy (Fr.V.G., Ven., Tr.A.A., Lig., Tosc.); a hundred of specimens in about 12 localities, with about 17 findings, between 80 and 1000 m, always on meadows or conifers. We always collected very few specimens for each finding, except one time.

Gen. Dis. - From Mongolia to Central Europe.

Biol. - According to LAUTERER (1991: 256), monophagous on *Sanguisorba minor* Scop. (= *Poterium sanguisorba* L.) (Rosaceae Rosoideae). Adults were collected by us in February and March on conifers; in June-July and September-November on meadows. We never found nymphs. Number of yearly generations unknown, but probably only one; overwintering as adult on conifers.

143. *Bactericera* (*Klimaszewskiella*) *nigricornis* (Förster, 1848)
Trioza nigricornis

Des. - DOBREANU & MANOLACHE, 1962: 281-284, figs 196-197; KLIMASZEWSKI, 1967b: 283-285, figs 81-82; HODKINSON, 1981b: 673-676, figs 2, 7, 15-19; OSSIANNILSSON, 1992: 254, figs 1088-1097.

It. Rep. - LÖW, 1888: 24 (Fr.V.G.: Görz = Gorizia); GRÄFFE, 1911:

294 (Fr.V.G.) (these two records could regard *B. trigonica*); Hodkinson, 1981b: 673 (North It.); Tremblay, 1981: 95-96, fig. 102 (Abr.); Hodkinson, 1983b: 279 (Fr.V.G., Piem.); Micieli De Biase, 1983: 103-110 (Abr.); Rapisarda, 1985a: 112 (Sic.); Tremblay, 1985: 767 (Abr.); Rapisarda, 1988b: 620 (Sic.); Conci & Tamanini, 1988b: 172-173, fig. 20.12 (Fr.V.G., Ven., Tr.A.A., Piem., V.A., Em.R., Abr., Sic.); Rapisarda & Conci, 1989: 632 (Fr.V.G.); Conci *et al.*, 1993: 36, n. 54 (It.). The record of *Trioza nigricornis* by Tremblay (1958: 160) regards *B. tremblayi*.

It. Dis. - Widespread but not common; only locally abundant. Found by us and others in 8 Regions of North, Central and South Italy and in Sicily: more than 300 specimens in about 30 localities, with more than 70 findings, between 70-200 and 800-1600 m, but also at higher height, up to 2200 m, on its host plants (between 70 and 2100 m on occasional plants, rarely on conifers); in addition, it is worth to mention the very huge collection (11,520 specimens) by Micieli De Biase (1983) in Abruzzo (Province L'Aquila, Commune Avezzano, loc. Piana del Fucino) by means of yellow water trays. *B. nigricornis* has a great variability and is very close to *B. tremblayi* and *B. trigonica*, the males being necessary to be examined for a sure determination. Therefore, we do not report here many other findings, based on females only.

Gen. Dis. - Holopalaearctic, excluding Japan.

Biol. - Polyphagous, on many plant species belonging to different orders. We found *B. nigricornis* in Italy from May to November on *Chenopodium* sp. (Chenopodiaceae), *Brassica oleracea* L., *B. rapa* L., *Raphanus sativus* L., *Rorippa* sp. (Cruciferae), *Daucus carota* L. (Umbelliferae), *Solanum tuberosum* L. (Solanaceae), *Cichorium intybus* L., *Leontodon* sp., *Taraxacum* sp. (Compositae) and some occasional plants. According to the literature, overwintering as adult on conifers. Perhaps 2-3 generations per year, but in need of being verified.

Obs. - *B. nigricornis* is reported as a pest of *Solanum tuberosum* L. in North and Central Europe, where it is also noxious to *Daucus carota* L., *Petroselinum sativum* Hoffm. (= *hortense* Auct.), *Beta vulgaris* L., *Brassica rapa* L. (see f.e. Schewket Bey, 1931; Heinze & Profft, 1939). On the contrary, damages by this psyllid are not reported from Italy, even by Micieli De Biase (1983), who collected a huge amount of adults in the Plain of Fucino, in mixed potato and carrot fields; this Author at most suspects this psyllid to be vector of potato viruses.

Note - *Bactericera brassicae* (Vasiljev, 1922), reported by Sovietic Authors as noxious to *Brassica oleracea* in the ex USSR, may be a synonymous of *B. nigricornis*.

144. *Bactericera* (*Klimaszewskiella*) *tremblayi* (Wagner, 1961)
Trioza nigricornis Auct. nec Förster, 1848; *Trioza tremblayi*

Des. - WAGNER, 1961: 263-269, figs 1, 2, 5-8; TREMBLAY, 1965b: 38-96, figs I-XVIII, XX-XXIII; HODKINSON, 1981b: 673-676, figs 3, 8, 20-23.

It. Rep. - TREMBLAY, 1958: 160-170, 2 figs (*sub Trioza nigricornis*, Camp., noxious); WAGNER, 1961 (Camp., surroundings of Naples, type locality); TREMBLAY, 1961: 1-6, 4 figs (Camp., n.); TREMBLAY, 1965a: 1-15, 4 figs (Camp., n.); TREMBLAY, 1965b (the best and most complete Italian study on a psyllid species): 37-138, 34 gr. figs (Camp., n.); KLIMASZEWSKI, 1968: 788 (Camp.); ANNUNZIATA *et al.*, 1980: 10157 (Camp., n.); HODKINSON, 1981b: 671 (It.); TREMBLAY, 1981: 95, figs 101-102 (Camp., n.); IPPOLITO & PARENZAN, 1990: 91-92 (Pu., doubtful report); TREMBLAY, 1985: 767, 1 fig. (Camp., n.); CONCI & TAMANINI, 1988b: 174, fig. 20.15 (Camp.); TREMBLAY, 1988: 117, 125, fig. 5 (It. n.); CONCI *et al.*, 1993: 37, n. 80 (It.).

It. Dis. - *B. tremblayi* was abundant and noxious in South Italy (Campania), where its infestations on onions were noted from 1957; yet a sharp break down occurred in its populations from about 1980 and it is presently fairly rare and localized. We never collected this species, up to now; findings by other collectors have been exclusively carried out in Campania (Provinces Caserta, Avellino, Napoli and Salerno), between the sea level and about 300 m. The record from the Region Puglia is doubtful.

Gen. Dis. - Iran (BURCKHARDT & LAUTERER, 1993: 871), Turkey (KLIMASZEWSKI & LODOS, 1979: 13), Greece (BURCKHARDT, 1987: 108), Switzerland (BURCKHARDT, 1983b: 75-76) and South Italy; doubtfully recorded from Syria (KLIMASZEWSKI, 1968: 788-789) and the ex European USSR (BOUNDAROVIC, 1927, *sub Trioza nigricornis* on *Allium cepa*). According to TREMBLAY (1988: 125), the species could have been recently introduced in Italy from the ex USSR.

Biol. - According to TREMBLAY (1958, 1965b), *B. tremblayi* has a certain polyphagous behaviour; in fact, abundant and noxious on *Allium cepa* L. (Liliaceae), it has been found also on *Allium porrum* L. (Liliaceae), *Brassica oleracea* L. (Cruciferae) and *Capsicum annuum* L. (Solanaceae), even if not in a great amount. Moreover, and in experimental conditions, the above Author observed eggs, nymphs and adults on other plants of different orders, such as *Capsella bursa-pastoris* (L.) Medicus (Cruciferae), *Chenopodium* sp. (Chenopodiaceae) and *Stellaria media* (L.) Vill. (Caryophyllaceae). On the contrary, *Solanum tuberosum*

L. (Solanaceae) and *Allium sativum* L. (Liliaceae) were rejected by the psyllid. Data lack regarding *Daucus carota* L. (Umbelliferae). Burckhardt & Önucar (1993: 563) report from Turkey also *Raphanus sativus* (L.) (Cruciferae). *B. tremblayi* performs up to ten generations per year, with an almost continuous cycle and all stages occurring throughout the whole year (Tremblay, 1965b: 99-123). Each female lays about 400-800 eggs, which represent the more resistant stage during winter. The entire cycle takes about two months in winter and two weeks in summer; while the embryonal development takes from 5 to an undefinible number of days.

This species causes considerable leaf distorsions, in shape of spiral or cork-screw curlings (see Tremblay, 1958: figs III-IV, 1961: figs III-IV, 1965a: fig. III).

An ectophagous wasp, *Tetrastichus* sp. (Hymenoptera Eulophidae), has been frequently noted to parasitize *B. tremblayi* nymphs (Tremblay, 1965b: 129-133). His female oviposits on the sternal region of the nymphs; the ectophagous larva pupates underneath the host, after having transformed its body into a protective theca. Emergence takes place through a round hole, opened in the thoracic region. From hosts mummified in early stages, only males of the parasite emerged, while from oldest and largest nymphs only females were obtained.

Obs. - In the past and for some years, *B. tremblayi* was highly noxious to onion cultivations, overall in autumn and winter, causing considerable leaf alterations and also parching of the plants.

145. *Bactericera* (*Klimaszewskiella*) *trigonica* (Hodkinson, 1981)
Trioza trigonica

Des. - Hodkinson, 1981b: 676, figs 1, 5, 6, 9-14.

It. Rep. - Hodkinson, 1981b: 677 (Fr.V.G.: Godia, near Udine, type locality); Hodkinson, 1983b: 279 (Fr.V.G.); Micieli De Biase, 1983: 103-110 (Abr.); Tremblay, 1985: 767 (Fr.V.G., Abr.); Conci & Tamanini, 1988b: 174-175, fig. 20.16 (Fr.V.G., Tr.A.A., Piem., Lig., Em.R., Abr., Mol.); Rapisarda, 1988b: 620 (Sic.); Rapisarda & Conci, 1989: 632 (Fr.V.G.); Conci *et al.*, 1993: 37, n. 94 (It.).

It. Dis. - Fairly common. Found by us and others in 7 Regions of North and Central Italy and in Sicily; more than 150 specimens in about 15 localities, with more than 40 findings, between the sea level and 700 m (even once at 1200 m) on its host plants. In addition to the above data, it is worth to mention the wide collection (1466 specimens) by

MICIELI DE BIASE (1983) in Abruzzo (Province L'Aquila, Commune Avezzano, loc. Piana del Fucino) by means of yellow water trays.

Gen. Dis. - Iran, Turkey, Israel, Cyprus, Greece, Czech Republic, Italy, Portugal, Egypt, Algeria.

Biol. - Polyphagous on Umbelliferae and Compositae. We found adults in July and October on *Daucus carota* L. and in April, June and July on *Ferulago campestris* (Besser) Grec. (Umbelliferae); in October on *Achillea ligustica* All. and in November on *Sonchus oleraceus* L. (Compositae); moreover, many adults have been collected by water trays in July-October (in Fr.V.G., by P.G. Coceano) and in April-October (in Abr., by L. Micieli De Biase, in potato and carrot fields). We observed eggs and nymphs only one time, in July, on *D. carota* (at Ravenna, Em.R.). Probably two or more generations per year and overwintering as adult; but no adults were found by us on conifers during winter.

Obs. - *B. trigonica* is a potential noxious species, but we never noted damages caused by this insect.

146. *Bactericera* (*Klimaszewskiella*) *crithmi* (Löw, 1880)
Trioza crithmi

Des. - HODKINSON & WHITE, 1979b: 72, 75, figs 246, 261, 283, 300; CONCI & TAMANINI, 1988b: figs 9-19.

It. Rep. - LÖW, 1888: 38 (Fr.V.G.: Triest = Trieste); SULC, 1913: 27 (ibid.); ZANGHERI, 1966: 800 (Em.R.); CONCI & TAMANINI, 1988b: 168-170, fig. 20.7 (Fr.V.G., Lig., Em.R., Pu., Cal.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA, 1991a: 42-43 (Sard.); CONCI *et al.*, 1993: 36, n. 63 (It.).

It. Dis. - Fairly common. We and others found this species in 9 Regions throughout Italy, except on the Alps, especially along the sea coasts; about 50 specimens in 10 localities, with about 20 findings, mostly at the sea level, on *Crithmum maritimum*; one time in the inland of Sardinia (Province Nuoro, Commune Lodè, Mount Albo, 850 m), on *Seseli bocconii*, and other two times in the inland of Emilia-Romagna (Province Forlì-Cesena, Commune Dovadola, Mount Paolo, 430 m; same Province, Commune Verghereto, loc. Balze, 1080 m). A collecting biotope is illustrated in our fig. 28 at page 55.

Gen. Dis. - From Central Asia to Caucasus, Moldavia, France, Great Britain and Italy.

Biol. - According to the literature, widely oligophagous on *Crithmum* spp., *Daucus carota* L. and *Seseli bocconii* Guss. (Umbelliferae). We

mostly collected adults on *Crithmum maritimum* L. on the sea coasts, from January to June, in October and December; one time on *S. bocconii*, in May. Eggs and nymphs in June, on *C. maritimum*. The two specimens collected by ZANGHERI (1966) in the inland of Romagna were found on meadows. According to the literature, one generation per year and overwintering as adult on the host plants.

147. *Bactericera* (*Klimaszewskiella*) *curvatinervis* (Förster, 1848)
Trioza curvatinervis

Des. - DOBREANU & MANOLACHE, 1962: 279-281, figs 194-195; KLIMASZEWSKI, 1967b: 287, figs 83-85; HODKINSON & WHITE, 1979b: 72, 75, figs 247, 262, 284, 301; OSSIANNILSSON, 1992: 250-251, figs 1062-1072.

It. Rep. - HODKINSON, 1983b: 279 (Fr.V.G.); CONCI & TAMANINI, 1988b: 170, fig. 20.8 (Fr.V.G., Ven., Tr.A.A., Lomb., Piem., V.A., Lig., Tosc., Mar.); RAPISARDA & CONCI, 1989: 632 (Fr.V.G.); CONCI *et al.*, 1993: 37, n. 102 (It.).

It. Dis. - Common in North Italy. Found by us in 10 Regions of North and Central Italy; more than 130 specimens in about 50 localities, with about 80 findings, on *Salix* spp., between the sea level and 1700 m (between 200 and 2000 m on conifers).

Gen. Dis. - From Far East Asia to North and Central Europe.

Biol. - According to the literature, strictly oligophagous on *Salix* spp. (Salicaceae). Adults were found by us from April to October on *Salix appendiculata* Vill., *S. caprea* L., *S. elaeagnos* Scop., *S. glabra* Scop. and *S. purpurea* L.; throughout the year on conifers; nymphs on *S. glabra* and *S. caprea* in September. One (or two?) generation per year; overwintering as adult on conifers.

148. *Bactericera* (*Klimaszewskiella*) near *silvarnis* (Hodkinson, 1974)

Des. - HODKINSON, 1974: 82-83, figs 27-30 (*sub Trioza curvatinervis* subsp. *silvarnis*); ? HODKINSON & WHITE, 1979b: 72, 75, figs 247, 262, 284, 301 (*sub T. curvatinervis*); RAPISARDA, 1994c: 168-169, figs 5-12.

It. Rep. - CONCI *et al.*, 1993: 39, n. 197 (It.); RAPISARDA, 1994c: 167-171, figs 5-14 (Sic.).

It. Dis. - Very rare. Found by us only in Sicily; 8 adults and 12 nymphs in the following 5 localities, with 6 findings, between the sea level and

900 m: province Messina (commune Fondachelli, m 900); province Catania (Communes Adrano (River Simeto, m 350), Bronte (River Simeto, m 550), Calatabiano (mouth of River Alcantara, sea level), Castiglione di Sicilia (River Alcantara, m 350)).

Gen. Dis. - France, Great Britain, Sicily and Algeria.

Biol. - Strictly oligophagous on *Salix* spp. (Salicaceae). We collected adults in June-July and September-October, on *Salix pedicellata* Desf. and *Salix* sp.; one time in February by generic sweeping. Nymphs in October-November on *S. pedicellata*. The life-cycle of this species needs to be better understood in Italy; according to HODKINSON & WHITE (1979: 87) it performs in Great Britain one generation per year and overwinters as adult on conifers.

Obs. - The Sicilian specimens are dubiously ascribed to *B. silvarnis*, since the adults perfectly fall within characters reported in the literature for this species, while final instar nymphs differ in chaetotaxy, especially the number of marginal sectasetae (RAPISARDA, 1994c: 167-168, fig. 13). A better taxonomic understanding of the Ponto-Mediterranean species of the *Bactericera curvatinervis* (Förster) group would be desirable, in order to correctly determine these Sicilian specimens.

149. *Bactericera* (*Klimaszewskiella*) *striola* (Flor, 1861)
Trioza striola

Des. - DOBREANU & MANOLACHE, 1962: 274-277, figs 189-190; KLIMASZEWSKI, 1967b: 288, figs 86-88; CONCI *et al.*, 1988: 235, figs 12-16, 28-33, 36-37; OSSIANNILSSON, 1992: 244-245, figs 1038-1047.

It. Rep. - LÖW, 1888: 25 (Fr.V.G.: Görz = Gorizia); GRÄFFE, 1911: 294 (Fr.V.G.); SULC, 1912a: 26 (Fr.V.G.); CONCI & TAMANINI, 1988b: 173-174, fig. 20.13 (Fr.V.G., Tr.A.A., Lomb., Piem., V.A., Abr.); CONCI *et al.*, 1988: 228, 229, 231, 233 (Tr.A.A.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA & CONCI, 1989: 632 (Fr.V.G.); CONCI *et al.*, 1993: 36, n. 56 (It.).

It. Dis. - Common in North Italy. Found by us and others in 9 Regions of North and Central Italy and in Sicily; more than hundred specimens in about 40 localities, with more than 50 findings, between the sea level and 1750 m, on the host plants and on conifers.

Gen. Dis. - Asiatic-European.

Biol. - According to the literature, strictly oligophagous on *Salix* spp. (Salicaceae). Adults were found by us from April to October on *S. elaeagnos* Scop. and *S. purpurea* L., from September to March on coni-

fers; nymphs in July. Presumably two generations per year. Overwintering as adult on conifers.

150. *Bactericera* (*Klimaszewskiella*) *parastriola* Conci, Ossiannilsson & Tamanini, 1988
? *Trioza* near *striola*; *Bactericera* sp. near *striola*

Des. - Conci *et al.*, 1988: 226-232, figs 1-11, 17-27, 34-35; Ossiannilsson, 1992: 248, figs 1052-1061.

It. Rep. - ? Hodkinson, 1983b: 279 (Fr.V.G., *sub Trioza* sp. near *striola*); Conci & Tamanini, 1988b: 174, fig. 20.14 (Fr.V.G., Tr.A.A., *sub Bactericera* sp. near *striola*; Conci *et al.*, 1988: 225-236, figs 1.11, 17-27, 34-35 (Fr.V.G., Tr.A.A.); ? Rapisarda & Conci, 1989: 632-633 (Fr.V.G., *sub B.* sp. near *striola*); Ossiannilsson, 1992: 248 (It.); Conci *et al.*, 1993: 39, n. 168 (It.).

It. Dis. - Rare and localized. We found this orophilous species in two Regions of NE Italy; about 30 specimens in the following 4 localities, with 11 findings, between 1300 and 1900 m on the host plants (1300-1800 m on conifers): Fr.V.G. (Province Pordenone, Commune Aviano, Mount Cavallo, loc. Piancavallo, 1300-1800 m; type locality at 1300 m); Tr.A.A. (Province Bolzano-Bozen, Commune Badia-Abtei, loc. San Cassiano-Sankt Kassian, Prati Sciadii, 1600 m; Province Trento, Communes Brentonico, Mount Altissimo, 1800 m, and Ala, Mount Carega, 1900 m).

Gen. Dis. - Sweden, Poland, Switzerland, Rumania, NE Italy.

Biol. - Strictly oligophagous: on *Salix waldsteiniana* Willd. and *Salix* sp. in Italy; *S. lapponum* L. and *S. phylicifolia* L. in Sweden (Salicaceae). Adults were found by us on *S. waldsteiniana* in September, on *Salix* sp. in October and on conifers in August-September. Nymphs unknown. Probably one generation per year and overwintering as adult on conifers.

151. *Bactericera* (*Klimaszewskiella*) *salicivora* (Reuter, 1876)

Des. - Sulc, 1912: 18-21, fig. 25; Hodkinson & White, 1979b: 72, 76-77, figs 254, 271, 274 (the latter figure not corresponding with the drawings given by other Authors nor with our specimens), 291; Ossiannilsson, 1992: 240, figs 1023-1033.

It. Rep. - Rapisarda, 1991a: 43 (Sard.); Conci *et al.*, 1993: 39, n. 188 (It.).

It. Dis. - Rare and localized in Sardinia; we found only 24 specimens in the following four localities: Province Sassari (Commune S. Francesco d'Aglientu, 350 m, 4 males, 16.V.1985, on *Salix pedicellata* Desf.); Province Nuoro (Commune Fonni, 1100 m, 2 females, 18.V.1985, on *Salix* sp.; Commune Lodè, Mount Albo, 850 m, 7 males, 8 females, 22.V.1986, on *Salix* sp.; Commune Siniscola, Mount Albo, 550 m, 1 male, 2 females, 22.V.1986, on *Salix atrocinerea* Brot.).

Gen. Dis. - Holarctic circumpolar. In Europe, it was known before only from Northern and Central areas, Ukraine and Great Britain.

Biol. - Strictly oligophagous on *Salix* spp. (Salicaceae). According to the literature, one generation per year and overwintering as adult on conifers.

152. *Bactericera* (*Klimaszewskiella*) *versicolor* (Löw, 1888)

Des. - Dobreanu & Manolache, 1962: 349-351, figs 257-258.

It. Rep. - Conci & Tamanini, 1988b: 175-176, fig. 20.17 (Ven., Em.R., Tosc., Abr., Camp.); Conci *et al.*, 1993: 39, n. 170 (It.).

It. Dis. - Rare. Found by us in 4 Regions of North, Central and South Italy; about 40 specimens in 5 localities, with 7 findings, between the sea level and 100 m. The determination of some other specimens is doubtful. The specimens from Emilia-Romagna were destroyed.

Gen. Dis. - Far Eastern Russia, Rumania, Hungary, ex Yugoslavia, Italy.

Biol. - According to the literature, found only on *Salix rosmarinifolia* L. (Salicaceae). Adults were collected by us in July and August on *Salix alba* L., *S. elaeagnos* Scop., *S. purpurea* L. and *Salix* sp.. Nymphs and life-cycle unknown; probably overwintering as adult on conifers.

153. *Bactericera* (*Klimaszewskiella*) *albiventris* (Förster, 1848)
Trioza albiventris

Des. - Dobreanu & Manolache, 1962: 270-273, figs 185-187; Klimaszewski, 1967b: 305-306, figs 121-122; Conci & Tamanini, 1988b: figs 1-8; Ossiannilsson, 1992: 239, figs 1009-1018.

It. Rep. - Ferrari, 1888: 77 (Piem.); Löw, 1888: 23 (Fr.V.G.); Gräffe, 1911: 294 (Fr.V.G.); Zangheri, 1934: 59 (Em.R.); Castellani, 1953: 11 (Laz.); Zangheri, 1966: 800 (Em.R.); [Burckhardt, 1983b: 77 (Tic.)]; Hodkinson, 1983b: 279 (Fr.V.G.); Conci & Tamanini, 1988b: 167, fig.

20.3 (Fr.V.G., Ven., Tr.A.A., Lomb., Piem., Lig., Em.R., Tosc., Um., Mar., Laz., Abr., Camp., Bas., Cal., Sard.); Rapisarda, 1988b: 620 (Sic.); Rapisarda & Conci, 1989: 631 (Fr.V.G.); Rapisarda, 1991a: 42 (Sard.); Conci *et al.*, 1993: 36, n. 33 (It.).

It. Dis. - Very common. Found by us and others throughout Italy, except in Puglia; hundreds of specimens in about 100 localities, with more than 120 findings, from the sea level to 1500 m, on *Salix* spp. (0-1900 m on conifers).

Gen. Dis. - From East Russia to Western Europe.

Biol. - Strictly oligophagous on *Salix* spp. (Salicaceae). We collected adults from April to October on *Salix alba* L., *S. aurita* L., *S. babylonica* L., *S. elaeagnos* Scop., *S. purpurea* L., *S. triandra* L. and *S. viminalis* L. and from September to April on conifers. One or two generations per year; overwintering on conifers.

154. *Bactericera* (*Klimaszewskiella*) *calcarata* (Schäfer, 1949)

Des. - Schäfer, 1949: 66-68, figs 34-40; Conci & Tamanini, 1986d: 44-48, figs 1-20; Ossiannilsson, 1992: 257, 259, figs 1102-1111.

It. Rep. - Conci & Tamanini, 1986d: 43-51, figs 1-29 (Tr.A.A.); Conci & Tamanini, 1988b: 168, fig. 20.6 (Tr.A.A.); Conci *et al.*, 1993: 38, n. 153 (It.).

It. Dis. - Fairly rare. Found by us on the Alps, in 3 Regions (Tr.A.A., Lomb., V.A.); nearly hundred specimens in the following 12 localities, with 19 findings, between 550 and 1250 m on the host plant, one time at 1700 m on conifers: Tr.A.A. (Province Bolzano-Bozen, Communes Dobbiaco-Toblach, Bressanone-Brixen (loc. Plose), Fié allo Sciliar-Völs am Schlern, Ultimo-Ulten (loc. Valle Pracupola-Schmiedhofer); Province Trento, Communes Soraga, Moena, Ruffrè (loc. Mount Penegal, 1700 m), Amblar, Malosco and Terragnolo); Lomb. (Province Sondrio, Commune Albaredo per San Marco); V.A. (Province Aosta, Commune Nus, 550 m). The species was common only at Malosco.

Gen. Dis. - Very widely diffused, but sporadic. From Far Eastern Asia to Scandinavia, Austria, Switzerland, North Italy.

Biol. - Monophagous on *Artemisia vulgaris* L. (Compositae). We found adults on the host plant from July to September and nymphs in September; only one female on conifers, in September. Problably one generation per year and overwintering as adult on conifers (the latter aspect needs to be better investigated).

Genus *Phylloplecta* Riley, 1883

155. *Phylloplecta trisignata* (Löw, 1886)
Trioza tripunctata Löw, 1877; *Trioza trisignata*

Des. - Conci & Tamanini, 1984g: 252-253, figs 1-14; Conci & Tamanini, 1986c: 96, figs 1-5.

It. Rep. - Löw, 1877; 150-151 (Tr.A.A.: Torbole, type locality); Löw, 1886: 163 (Piem.: Stazzano, erroneously reported as «Strazzano in Ligurien»); Ferrari, 1888: 76 (Piem.); Löw, 1888: 21 (Tr.A.A.); Bezzi, 1893: 114 (Tr.A.A.); Dalla Torre, 1893: 151 (Tr.A.A.: erroneous report as gall producing); ? Del Guercio, 1900: 276 (*Trioza* sp., noxious to *Rubus* in Em.R.); [Gräffe, 1911: 294 (Croatia, Istria: Voloska)]; Grandi, 1951: 820 (It.); [Burckhardt, 1983b: 76 (Tic.)]; Conci & Tamanini, 1984g: 249-261, figs 1-23 (Ven., Tr.A.A., Lomb., Piem., Lig.); Conci & Tamanini, 1986c: 93-100, figs 1-5 (Tr.A.A., Lomb., Lig.); Rapisarda, 1988b: 620 (Sic.); [Rapisarda & Conci, 1989: 632 (Croatia)]; Rapisarda, 1991: 43-44 (Sard.); Conci *et al.*, 1993: 35, n. 7 (It.).

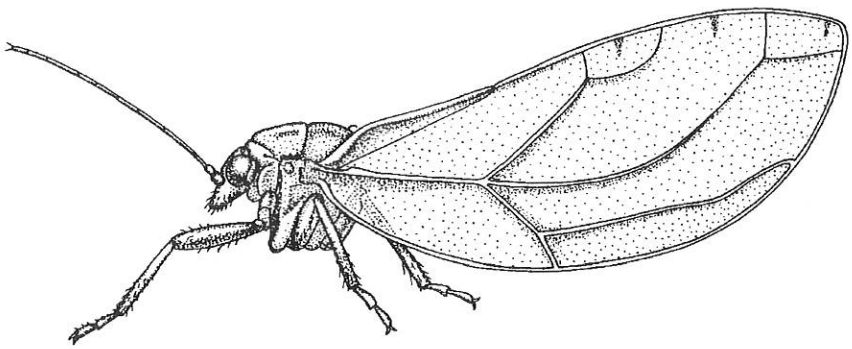


Fig. 25 - *Phylloplecta trisignata*, male, Trentino-Adige Adige. (Drawing R. Pace).

It. Dis. - Fairly common. Found by us and others in 11 Regions throughout Italy; more than 150 specimens in about 20 localities, with about 40 findings, between 70 and 900 m on the host plant (0-450 m on conifers).

Gen. Dis. - Mostly Mediterranean; not found in North Africa. Distribution map in Conci & Tamanini (1984g: fig. 23).

Biol. - Strictly oligophagous on *Rubus* spp. (Rosaceae Rosoideae). Life-history reported by Conci & Tamanini (1986c). Adults were collected by us on *Rubus* sp. of the complex *Rubi corylifolii* and on *Rubus*

sp. practically throughout the year and on conifers in October, December and January; nymphs in August-October. *P. trisignata* presumably has in North Italy one generation per year and overwinters as adult both on shelter (conifers) and on host (*Rubus*) plants. We never found overwintering males: it is possible that fecundation occurs in autumn. We never observed galls.

Genus *Lauritrioza* Conci & Tamanini, 1985

156. *Lauritrioza alacris* (Flor, 1861)

Trioza lauri Targioni Tozzetti, 1879; *Trioza alacris*; *Heterotrioza alacris*

Des. - Hodkinson & White, 1979b: 65, 73, figs 240, 258, 278, 295; Conci & Tamanini, 1985c: 240-244, figs 1-26; Ossiannilsson, 1992: 272.

It. Rep. - Malpighi, 1679: 23, lines 29-36 (galls; this is the first Italian report of a psyllid and the third one in the world); Malpighi, 1686; 18, lines 23-29 (g.); Malpighi, subsequent editions (1687 and following); Targioni [Tozzetti], 1879b: 19-20 (Tosc., *sub* «*Trioza lauri*», *nomen nudum*, g.); Löw, 1882b: 214 (It.); Costa, 1884: 40 (Sard.); Löw, 1886: 167 (Lig., Tosc., Sard., [Croatia: Istria]; g.); Ferrari, 1888: 77 (Lig., g.); [Löw, 1888: 22 (Croatia: Istria)]; Targioni Tozzetti, 1888: 412-414, fig. 50 (Tosc., g., noxious, *sub* «*Trioza Lauri* Lichtenst.»); Massalongo C., 1893a: 6 (Ven., g.); Massalongo C., 1893b: 263-265, plate 3, figs 1, 2 (Ven., g.); *Targioni, 1893 (It., noxious); Misciattelli Pallavicini, 1894: 276 (Laz., g.); Massalongo O., 1896: 188 (Ven., g.); [Horvath, 1897: 59 (Croatia: Istria)]; De Stefani, 1898a: 110-111 (Sic., g.), 1898c: 5 (Sic., g.); Massalongo C., 1898: 28 (It., g.); Cecconi, 1899: 165 (Tosc., g.); Baldrati, 1900: 31 (Tosc., g.); Del Guercio, 1900: 304 (Tosc.); Cecconi, 1901b: 138 (Sard., g.); Cecconi, 1901c: 737 (Mar., Laz.; g.); Leonardi, 1901: 176-177 (It., noxious); Trotter & Cecconi, 1901: 3, n. 69 (Tosc., g.); Cecconi, 1902a: 142 (Tosc., g.); 1902b: 625 (Camp., Sic.; g.); Corti, 1902: 226-227 (Lomb., g.); Del Guercio, 1902: 448-450, figs 256-257 (It., g.); Trotter, 1904a: 79 (It., g.); Cecconi, 1906: 42 (Tosc., g.); De Stefani-Perez, 1905: 113 (Sic., g.); Gräffe, 1911: 294 (Fr.V.G.); Cozzi, 1914: 525 (Lomb., g.); Borelli, 1920: 3-37, 7 figs (Em.R., g.); Leonardi, 1922: 34 (It., noxious); Boselli, 1928: 215 (It., n.); Salfi, 1928: 21-22 (symbiotic organ); Della Beffa, 1934: 733 (It., n.); Silvestri, 1934: 385-387, figs 335, 354 (It., g., noxious); Tarsia in Curia, 1934: 215-235, figs 1-4, plate 6-7 (symbiotic organ); Zangheri,

1934: 59 (Em.R.); DE STEFANI [junior], 1944: 54 (Sic., g.); DELLA BEFFA, 1949: 127 (It., noxious); GRANDI, 1951: 820 (It., g.); TAMANINI, 1955: 11 (Pu.); ZANGHERI, 1966: 800 (Em.R., g.); SAMPÒ, 1977: 79, 82-83, 9 figs (Piem., g.); TREMBLAY, 1981: 96 (It., g.); [BURCKHARDT, 1983b: 64 (Tic.)]; HODKINSON, 1983b: 279 (Fr.V.G.); CONCI & TAMANINI, 1985c: 237-256, 45 figs (It.); RAPISARDA, 1985a: 112 (Sic.); PELLIZZARI, 1988: 66-67, 1 col. photo (It., g.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA & CONCI, 1989: 630 (Fr.V.G.); RAPISARDA, 1991: 39 (Sard.); CONCI *et al.*, 1993: 35, n. 1 (It.).

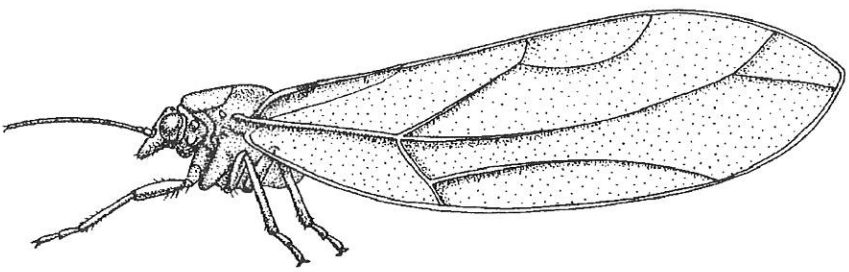


Fig. 26 - *Lauritrioza alacris*, male, Trentino-Alto Adige. (Drawing R. Pace).

It. Dis. - Common. Found by us and others in 16 Regions throughout Italy; hundreds of specimens in more than 30 localities, with many findings, between the sea level and 750 m on the host plant.

Gen. Dis. - Originally Mediterranean on wild *Laurus nobilis*. Subsequently introduced throughout Europe, on cultivated Laurel, in nurseries, greenhouses, gardens and parks. According to the literature, found from Caucasus, Anatolia and Crimea, to Southern Scandinavia, Southern England and Portugal. Introduced also in U.S.A. (California and New Jersey), Brazil, Chile and Argentina, on cultivated Laurel.

Biol. - Perhaps monophagous on *Laurus nobilis* L. (Lauraceae); records on other plants need to be verified. In particular, the report by FERRARI (1888) on *Laurus camphora* L. (now *Cinnamomum camphora*) is very doubtful; the report by FLOR (1861: 400) on *Prunus laurocerasus* L. is surely wrong and related to wandering adults. *L. alacris* normally has very active adults, intensively flying from the host plants and widely spreading around; thus, many specimens have been found by us and others on many occasional plants, in several gardens and parks. *L. alacris* overwinters as adult on the host plant. We collected adults throughout the year on *L. nobilis* and nymphs in May-September; we also found two adults in September, by sifting the mould. Number of generations

variable, according to climatic factors: we observed only one yearly generation in Trentino (NE Italy); Sampò (1977) reports two ones in Torino (Piemonte); while Borelli (1920) observed in Bologna (Emilia Romagna) up to 5 generations per year (in breeding). The latter datum is likely emphasized.

This species causes large galls, by rolling the leaf margins down to the lower surface. These galls are widely described and figured in the literature; see (f.e.) Malpighi (1679), Massalongo C. (1893b), Houard (1908), Ross & Hedicke (1927), Silvestri (1934), Buhr (1965), Sampò (1977), Conci & Tamanini (1985c).

Obs. - In case of strong infestations, the species may cause serious aesthetic damage to Laurel: in addition to the leaf deformation, the galls dry up, after they are abandoned by the nymphs, and become black.

Note - A very close species, *Trioza laurisilvae* Hodkinson, 1990, has been described from Canary Islands and Madeira on the base of material collected on unknown host plant.

Genus *Spanioza* Enderlein, 1926

157. *Spanioza galii* (Förster, 1848)
Trioza galii, Trioza velutina, Spanioza galii aspinovelutina

A polymorphic species, highly variable in size and life-history, that needs taxonomic revision and new ecological observations. Within this species, four «forms» have been discriminated by Sulc (1913a: 43-44) and only two ones (*typica* and *velutina*) by Hodkinson & White (1979b: 65, 75).

Des. - Boselli, 1929b: 14-17, figs I-II; Dobreanu & Manolache, 1962: 300-302, figs 212, 213; Klimaszewski, 1967b: 292-293, figs 94-96; Hodkinson & White, 1979b: 65, 75-76, figs 249, 266, 286, 303; Ossiannilsson, 1992: 279-280, figs 1188-1199.

It. Rep. - [Horvath, 1886: 316 (Croatia: Susak = Fiume)]; Ferrari, 1888: 76, 77 (Lig.); Löw, 1888: 22 (Fr.V.G.); Baldrati, 1900: 34, plate 1, figs 7-9 (Em.R., galls); Cecconi, 1902: 143 (Tosc., galls); Trotter, 1904b: 73 (Camp., galls); Gräffe, 1911: 294 (Fr.V.G.); Boselli, 1929b: 13-27, 8 groups of figs (Camp., galls); Zangheri, 1934: 59 (Em.R.); Grandi, 1951: 821 (It.); Zangheri, 1966: 600 (Em.R.); Minelli & Mannucci, 1979: 57 (Ven.); Hodkinson, 1983b: 279 (Fr.V.G.); Rapisarda, 1985a: 112 (Sic.); Rapisarda, 1988b: 620 (Sic.); Rapisarda & Conci, 1989: 631 (Fr.V.G.); Rapisarda, 1991: 40 (Sard.); Conci *et al.*, 1993: 36, n. 32 (It.).

It. Dis. - Common. Found by us and others in 17 Regions throughout Italy; more than 200 specimens in more than 50 localities, with about 100 findings, between the sea level and 1950 m on *Galium* spp. and on meadows; between the sea level and 400 m on *Rubia peregrina*. A biotope is illustrated in our fig. 39 at page 87.

Gen. Dis. - Holopalaearctic.

Biol. - According to the literature, widely oligophagous on *Asperula cynanchica* L., *Cruciata laevipes* Opiz (= *Galium cruciata* Scop.), *Galium* spp., *Rubia peregrina* L. and *Sherardia arvensis* L. (Rubiaceae). We collected adults on *Rubia peregrina*, *Galium anisophyllon* Vill., *G. lucidum* All. and *Galium* spp., but more frequently on meadows and occasional plants. In Italy, TROTTER (1904b) found galls on *Cruciata laevipes*, BALDRATI (1900) and CECCONI (1902) on *Sherardia arvensis*; BOSELLI (1929b) studied the life-history on *Rubia peregrina*.

We and others collected adults on meadows (with *Galium* spp.) from May to September (in addition to one specimen per each month in April and November), on *Galium lucidum* in June, on *G. anisophyllon* (at 1950 m) in July and August, on yellow water trays in April and June, on conifers (only one specimen) in November; no adults have been found on meadows in January-March and December. On the contrary, we found adults on *Rubia peregrina* in January-June, October and December; BOSELLI (1929b) found adults on this plant during the whole year. Eggs were found by us on *Galium anisophyllon* (at 1950 m) in July and August. We did not find nymphs. On *Galium* spp., *S. galii* perhaps overwinters as nymph on root-galls, thus being one of the very few Italian Triozidae which does not overwinter as adult. Probably one or two generations per year.

A highly different life-cycle is performed by *S. galii* on the evergreen, mediterranean bush *Rubia peregrina*, as it is reported (under the name of *S. galii aspinovelutina*) in the careful work by BOSELLI (1929b: 23-27). According to the above Author, in Southern Italy (Campania) the insect cycle is related to that one of this host plant, thus the psyllid has a summer and a winter diapausa, both spent in nymphal stage on the leaf galls, and performs not less than three spring-summer and one winter generations. In Liguria we found some times adults overwintering on *Rubia peregrina*.

On its host plants, *S. galii* causes deformations and galls of various aspects and different locations. The Italian reports may be synthetized as follows: 1. deformations on terminal leaves, that become convex, greater and shorter than usual, acquiring a reddish colour and forming a dense rosette (BALDRATI, 1900: 34, plate 1: 7-9, on *Sherardia arvensis*;

CECCONI, 1902: 143); 2. shortening of the internodes, with widening and spoon-shape deformations of terminal leaves, that form a subspherical cecidium (TROTTER, 1904b: 73, on *Cruciata laevipes*) (similar galls were reported on some species of *Galium*, outside of Italy); 3. rolling up of the leaf-margins, on *Rubia peregrina* (BOSELLI, 1929b: 25-27, fig. 8). In Holland, DOCTERS VAN LEEUWEN (1937: 78) reports hypogean cecidia on rhizomes of *Galium verum* L.. For galls caused by *S. galii*, see also HOUARD (1909), ROSS & HEDICKE (1927), BUHR (1964).

158. *Spanioza tamaninii* Conci, 1992

Des. - CONCI, 1992: 257-264, figs 1-20.

It. Rep. - CONCI, 1992: 257-264 (Tr.A.A., Province Trento, Commune Vigo di Fassa, loc. Ciampedie, near Refuge Negritella, m 1950, type locality); CONCI *et al.*, 1993: 39, n. 192 (It.).

It. Dis. - Very rare and localized. We found this orophilous species only on the Alps, in one Region of NE Italy (Trentino-Alto Adige). In addition to the material reported by CONCI (1992: 262), the same Author collected 3 males and 3 females in the type locality, the 6.VIII.1992; on the whole, we collected 16 specimens (9 males and 7 females) in two localities in Province Trento (the above reported and Commune Ruffré, loc. Mount Penegal, 1700 m), with 6 findings.

Gen. Dis. - NE Italy and one specimen in Northern Slovakia.

Biol. - Host plant unknown; in Italy probably monophagous on *Galium anisophyllon* Vill. (Rubiaceae). We collected only adults, in July and August: one specimen on meadow and the remaining ones in a few hundred square metres dolomitic steep slope, with grasses, stones and conifers; no specimens were found on conifers, in spite of our frequent and insistent researches on these plants. Nymphs unknown. Probably one generation per year; perhaps this species overwinters as nymph in root-galls.

Obs. - *S. tamaninii* is the only Italian psyllid with vestigial hindwings.

Genus *Heterotrioza* Dobreanu & Manolache, 1960

159. *Heterotrioza* (*Heterotrioza*) *chenopodii* (Reuter, 1876)
Trioza chenopodii

Des. - DOBREANU & MANOLACHE, 1962: 361-362, fig. 268; KLIMASZEWSKI, 1967b: 273-274, figs 62-64, HODKINSON & WHITE, 1979b:

65, 73, 75, figs 244, 245, 264, 282, 299; LAUTERER, 1982: 148-160, figs 1-19; OSSIANNILSSON, 1992: 224, figs 1400-1410.

It. Rep. - LÖW, 1888: 22 (Fr.V.G.); HESLOP-HARRISON, 1946: 37 (Sard.); HODKINSON, 1983b: 279 (Fr.V.G.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); RAPISARDA, 1991a: 41-42 (Sard.); CONCI *et al.*, 1993: 36, n. 50 (It.).

It. Dis. - Fairly common. Found by us and others in 15 Regions throughout Italy; hundreds of specimens in about 20 localities, with more than 30 findings, between the sea level and 1100 m on the host plants (very few specimens at 1550, 1600 and 2000 m on conifers). A collecting biotope is illustrated in our fig. 27 at page 55.

Gen. Dis. - Holopalaearctic.

Biol. - According to the literature, widely oligophagous on *Atriplex* spp., *Beta vulgaris* L. and *Chenopodium* spp. (Chenopodiaceae); two or three generations per year and overwintering as adult on the same host plants (not on conifers). We collected adults from February to October on *Atriplex latifolia* Wahlenb. (= *hastata* Auct. nec L.), *Beta vulgaris* L., *Chenopodium album* L., *C. ambrosioides* L., *C. bonus-henricus* L.; on accidental plants also in November and December; nymphs in May, July and October on *Atriplex latifolia*. We never observed leaf deformations, which are reported in the literature.

Obs. - *H. chenopodii* is a dimorphic species, with the forms *autumnalis* and *aestivalis* having been considered different species (respectively *H. chenopodii* and *H. obliqua*) until LAUTERER's (1982) experiments through breedings.

160. *Heterotrioza* (*Halotrioza*) *portulacoides* Conci & Tamanini, 1984
Trioza (*Halotrioza*) *portulacoides*

Des. - CONCI & TAMANINI, 1984b: 10-14, 20 figs; CONCI & TAMANINI, 1991: 46-49, figs 30-33.

It. Rep. - CONCI & TAMANINI, 1984b: 10-16, 20 figs (Em.R.); CONCI & TAMANINI, 1988a: 17 (It.); CONCI & TAMANINI, 1991: 46, 48-50, figs 1.5, 30-35 (Em.R., Tosc., Pu.); CONCI *et al.*, 1993: 37, n. 115 (It.).

It. Dis. - Locally common. Found by us in 4 Regions of North, Central and South Italy (Ven., Em.R., Tosc., Pu.); about 300 specimens in 9 localities, with 20 findings, only at the sea level, on the host plant. Collecting biotopes are shown by CONCI & TAMANINI (1991: figs 34-35) and in this work (fig. 27 at page 55).

Gen. Dis. - Found only in Italy up to now, but probably more widespread.

Biol. - Monophagous on *Halimione portulacoides* (L.) Aellen (Chenopodiaceae), a woody, halophilous, perennial plant, widely distributed along the littoral coasts of Europe, Western Asia, Africa, North America. Adults were collected by us from May to July and in September on the host plant. We never found nymphs. Life-cycle unknown.

BALDRATI (1900: 31-32) and the subsequent cecidological literature (DARBOUX & HOUARD, 1901: 55; KIEFFER, 1901: 266; HOUARD, 1908: 395) report pit galls caused by a psyllid on leaves of *Halimione portulacoides*, never found by us up to now.

161. *Heterotrioza* (*Halotrioza*) *sahlbergi* (Sulc, 1913)

Des. - BURCKHARDT, 1986b: 121-124, figs 1-9; CONCI & TAMANINI, 1988a: 20-23, figs 1-24; RAPISARDA, 1990a: 172-173, figs 8-10.

It. Rep. - CONCI & TAMANINI, 1988a: 17-26, figs 1-27 (Bas., Sard.); RAPISARDA, 1990a: 169-174, figs 8-10 (Bas., Sard.); RAPISARDA, 1991a: 42 (Sard.); CONCI *et al.*, 1993: 39, n. 167 (It.).

It. Dis. - Fairly rare. Found by us in two Regions of South Italy (Puglia, Province Foggia, Commune Cagnano Varano, Lake of Varano; Basilicata, Province Matera, Commune Pisticci, sides of River Cavone, near the sea) and in Sardinia (Province and Commune Cagliari, localities Stagnone and Stagno Santa Gilla; same Province, Commune Quartu Sant'Elena, Stagno Simbirizzi and Commune Iglesias, loc. San Benedetto); about hundred specimens in 6 localities, with 7 findings, all on the host plant, at the sea level, except the material from S. Benedetto (at 460 m).

Gen. Dis. - Israel, Southern Italy, Sardinia and Algeria; doubtfully in Tunisia.

Biol. - Strictly oligophagous on *Atriplex* spp. (Chenopodiaceae). We found only adults in May, June, August and September on *Atriplex halimus* L., a halophilous, stout and perennial shrub. Nymphs and life-cycle unknown. We did not observe galls. The cecidological literature - (f.e.) MARCHAL, 1897: 22; DARBOUX & HOUARD, 1901: 54; HOUARD, 1908: 392, figs 655, 656; HOUARD, 1912: 62-63, figs 128-131 - reports deformations on leaves of *Atriplex halimus* caused by a «psyllid». The real imputation to a jumping plant louse needs to be verified; in any case we do not know whether these deformations are caused by *H. sahlbergi* or by the following species *H. concii*.

162. *Heterotrioza* (*Halotrioza*) *concii* Rapisarda, 1990

Des. - Rapisarda, 1990a: 169-173, figs 1-7.

It. Rep. - Rapisarda, 1990a: 169-175, figs 1-7 (Sic.); Conci *et al.*, 1993: 39, n. 180 (It.).

It. Dis. - Very rare, localized. Found by us and A. Carapezza only in Sicily (Province Catania, Commune Aci Castello, loc. Cannizzaro (type locality) and Province Trapani, Commune Erice, loc. Pizzolungo); 22 specimens in two localities, with 4 findings, at the sea level, on the host plant. One of collecting biotopes is illustrated in our fig. 28.

Gen. Dis. - Only Sicily and Tunisia.

Biol. - Monophagous on *Atriplex halimus* L. (Chenopodiaceae). We found only adults, in June and October in Sicily and in August in Tunisia. Nymphs and life-cycle unknown. As to the possibility of gall-forming activity, see the previous species (*H. sahlbergi*).

Genus *Dyspersa* Klimaszewski, 1968

We consider here in the genus *Dyspersa* the species of «*Trioza apicalis* Förster complex», recently revised by Burckhardt (1986a); all the previous records of these taxa need to be controlled, according to the mentioned revision.

163. *Dyspersa apicalis* (Förster, 1848)
Trioza viridula Auct. nec Zetterstedt, *Trioza apicalis*

Des. - Burckhardt, 1986a: 418, figs 1, 9, 17, 25, 33, 41; Ossiannilsson, 1992: 315, figs 1355-1366.

It. Rep. - Ferrari, 1888: 77 (Piem., *sub T. viridula*, doubtful determination); Löw, 1888: 27 (Fr.V.G.); Sulc, 1910b: 34 (Fr.V.G.). Hodkinson, 1983b: 279 (Fr.V.G.); Burckhardt, 1986a: 418 (It.); Rapisarda & Conci, 1989: 630, 633 (Fr.V.G.); Conci *et al.*, 1993: 36, n. 60 (It.). The reports by Silvestri (1934: 387) and Grandi (1951: 820) of *Trioza viridula* noxious to Carrot do not regard Italy.

It. Dis. - Fairly rare. Found by us in 6 Regions of North Italy (Fr.V.G., Ven., Tr.A.A., Lomb., Piem., V. A.); less than hundred specimens in about 15 localities, with about 20 findings, between 450 and 2000 m on conifers; also at 150 m by traps.

Gen. Dis. - From Far East Russia to North and Central Europe.

Biol. - According to Burckhardt (1986a: 418), widely oligophagous on *Carvum* (= *Carum*) *carvi* L., *Daucus carota* L. and *Petroselinum*

Fig. 27 - Biotope of *Heterotrioza portulacoides* in NE Italy, Veneto, Venezia, Punta Sabbioni. *Halimione portulacoides* is frequent in the lagoon, on halophilous soil. *H. chenopodii* lives on *Atriplex latifolia* in similar localities. (Photo C. Conci, VI. 94).

Fig. 28 - Biotope (type locality) of *Heterotrioza concii*, Sicily, Aci Castello, Cannizzaro. Huge bushes of *Atriplex halimus* cover the lavic rocks along the coast. *Bactericera crithmi* has also been collected in this biotope, on *Crithmum maritimum.* (Photo C. Rapisarda, VII. 95).

sativum Hoffm. (= *crispus* A.W. Hill) (Umbelliferae). We collected only adults on conifers from January to April and from July to December. Probably one generation per year; overwintering as adult on conifers.

Obs. - In Northern and Central Europe, the species is reported as noxious to Carrot (*Daucus carota*), causing on these plants the «carrot leaf curl», with conspicuous leaf deformations; see (f.e.) LUNDBLAD (1929), SCHEWKET BEY (1931), LASKA (1974). In Italy, we never recorded such a damage.

164. *Dyspersa laserpitii* (Burckhardt & Lauterer, 1982)
Trioza sp., *Trioza laserpitii*

Des. - BURCKHARDT & LAUTERER, 1982: 145-147, figs 1-17; BURCKHARDT, 1986a: 419, figs 3, 11, 19, 27, 35, 43; CONCI & TAMANINI, 1989b: 63, figs 11-30; OSSIANNILSSON, 1992: 319, figs 1385-1395.

It. Rep. - MARIANI, 1907b: 64 (V.A., deformations on leaves of *Laserpitium marginatum* (= *L. krapfii*), caused by a *Trioza* sp.); MARIANI, 1908a: 301-302 (idem); BURCKHARDT, 1986a: 421 («Italy: Dolomites»); CONCI & TAMANINI, 1989b: 63-67, figs 1.11, 11-37 (Fr.V.G., Ven., Tr.A.A., V.A.); CONCI *et al.*, 1993: 38, n. 150 (It.).

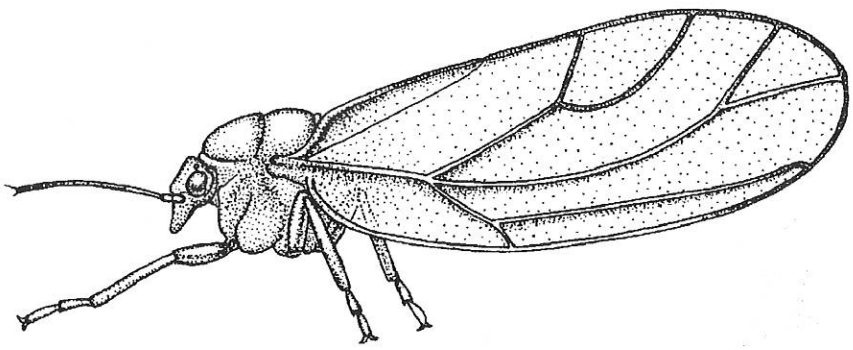


Fig. 29 - *Dyspersa laserpitii*, male, Trentino-Alto Adige. (Drawing R. Pace).

It. Dis. - Fairly common. Found by us in 4 Regions of North Italy; hundreds of specimens in about 20 localities, with more than 50 findings, between 950 and 1700 m on the host plants (1100-1700 m on conifers). One of our collecting biotopes is illustrated in fig. 33 at page 65.

Gen. Dis. - Sweden, Rumania, Central Europe, but certainly more widespread.

Biol. - According to BURCKHARDT (1986a: 419, 421), widely oligophagous on the genera *Laserpitium*, *Laser*, *Chaerophyllum* and *Pimpinella* (Umbelliferae). We collected adults and nymphs from July to September on *Laserpitium siler* L., *L. krapfii* ssp. *gaudinii* (Moretti) Thell. and *L. latifolium* L.; adults on conifers in January and from April to September. One generation per year and overwintering as adult on conifers.

This species sometimes causes maculations and decolourations of leaf areas, or ondulations and distorsions of the leaves.

165. *Dyspersa lautereriella* (Burckhardt, 1986)

Des. - BURCKHARDT, 1986a: 424, figs 7, 15, 23, 31, 39, 47.

It. Rep. - CONCI & TAMANINI, 1991: 46, figs 1.4, 23, 24 (Tosc.); CONCI *et al.*, 1993: 39, n.190 (It.).

It. Dis. - Very rare. Only three findings in Central Italy: Toscana, Province Pistoia, Commune Abetone, loc. Pian di Luce, 1550 m, 24-25.II.1990, 3 males on *Picea abies* (this collecting biotope is illustrated by CONCI & TAMANINI, 1991: figs 23-24); Abruzzo, Province L'Aquila, Commune Ovindoli, 1400 m, 9.V.1986, one male on *Picea abies*; idem, one male and one female on *Juniperus communis*, 30.IX.1991. The species is probably wider diffused, but since it is very close to other *Dyspersa* spp., a lot of our material needs to be revised.

Gen. Dis. - Slovakia, Switzerland, Central Italy and Eastern French Pyrenees.

Biol. - According to BURCKHARDT (1986a: 424), oligophagous on *Angelica sylvestris* L. and *Daucus carota* L. (Umbelliferae). We found the species only on shelter plants. One generation per year and overwintering as adult on conifers.

166. *Dyspersa mesembrina* (Burckhardt, 1986)

Des. - BURCKHARDT, 1986a: 421, 424, figs 6, 14, 22, 30, 38, 46.

It. Rep. - BURCKHARDT, 1986a: 424 (V.A.); CONCI *et al.*, 1993: 38, n. 151 (It.).

It. Dis. - Very rare. Found by Burckhardt (2 males) and by Conci (8 specimens) only in one locality of North Italy, Region Valle d'Aosta,

Province Aosta, Commune Saint Rhémy, 1500-1600 m. Such as *D. lautereriella*, also this species is probably more diffused in Italy.

Gen. Dis. - Bulgaria and Central Europe (Slovakia, Switzerland, North Italy).

Biol. - According to BURCKHARDT (1986a: 424), oligophagous on *Chaerophyllum hirsutum* spp. *villarsii* (Koch) Briquet and *Angelica sylvestris* L. (Umbelliferae). We found the species only on *Picea abies*, in December. One generation per year and overwintering as adult on conifers.

167. *Dyspersa pallida* (Haupt, 1935a)
Trioza pallida; *Trioza anthrisci* Burckhardt, 1986

Des. - BURCKHARDT, 1986a: 425, 427, figs 8, 16, 24, 32, 40, 48.

It. Rep. - HODKINSON, 1983b: 279 (Fr.V.G.); BURCKHARDT, 1986a: 427 (It.); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); CONCI & TAMANINI, 1991: 46 (Tosc.); CONCI *et al.*, 1993: 37, n. 104 (It.).

It. Dis. - Common on Eastern Alps, rare elsewhere. Found by us in 7 Regions, on the Alps and on the Tosco-Emiliano Apennine; hundreds of specimens in more than 30 localities, with more than 60 findings, between 800 and 1700 m on the host plant (600-2100 m on conifers; 130 m by traps). One of our collecting biotopes is illustrated in fig. 34 at page 65.

Gen. Dis. - Siberia and North, East, Central Europe.

Biol. - According to BURCKHARDT (1986a: 427), widely oligophagous on *Anthriscus sylvestris* (L.) Hoffm., *Angelica sylvestris* L., *Heracleum spondylium* L.; perhaps also on *Peucedanum obstruntium* (L.) Koch and *Pastinaca sativa* L. (Umbelliferae). We collected adults from May to September and nymphs from July to September on *Chaerophyllum hirsutum* subsp. *villarsii* (Koch) Briquet (Umbelliferae); but more frequently on conifers (practically during the whole year, except in June). One generation per year; overwintering as adult on conifers.

This species does not likely cause deformations to leaves.

Genus *Hippophaetrioza* Conci & Tamanini, 1984

Hippophaetrioza was described as subgenus of *Trioza* by CONCI & TAMANINI (1984f: 240) and elevated to generic rank by LI & YANG (1990: 39, 130).

168. *Hippophaetrioza binotata* (Löw, 1883)

Trioza (*Hippophaetrioza*) *binotata*

Des. - CONCI & TAMANINI, 1984f: 241-244, figs 1-15.

It. Rep. - CONCI & TAMANINI, 1984f: 239-248, figs 1-21 (Tr.A.A.); CONCI *et al.*, 1993: 38, n.143 (It.).

It. Dis. - Very localized. In Italy found only in Trentino-Alto Adige, Province Bolzano-Bozen, in a little zone of Val Venosta (Vinschgau), Commune Silandro-Schlanders, mouth of Val di Silandro, 750 m: 6 males, 4 females, 2 nymphs, 22.X.1975; 6 females, 2.VI.1984; some nymphs, 22.IX.1990; numerous nymphs and adults (about 150 specimens), 6.XI.1990. Moreover 3 nymphs have been found the 8.X.1976, in the close Commune Lasa-Laas, 900 m, about 5 km westward from the former locality.

Gen. Dis. - Austria (Tirol, Stubaital), Switzerland (Graubünden, Inn Tal, above Ramosch) and North Italy (distribution map in CONCI & TAMANINI, 1984f: fig. 21). Therefore, the species is known only from a little zone of the Alps, about 100 km wide, while its host plant, on the contrary, is very much widespread. Nevertheless, the NW Chinese species *Trioza thianshanica* Loginova, 1970 (collected in Thien-Shan on unknown host plant) is likely a synonymous of *H. binotata*. Moreover, LI & YANG (1990) recently described several new Chinese species of this genus, seven of which collected on *Hippophae rhamnoides*. Since some of the previous taxa may be conspecific with *H. binotata*, the latter species could have a very wide diffusion in the Palaearctic (and especially in China), with its most western extension in the Alps.

Biol. - Monophagous on *Hippophae rhamnoides* L. (Elaeagnaceae, a very isolated family in the plant system). We collected adults at beginning of June, in October and at early November; nymphs from September to November; no specimens have been found in summer. The species likely has one generation per year and overwinters as adult, but further researches are necessary on its life-cycle.

We observed in September and November that many apical leaves with nymphs of this species were strongly deformed, curled and irregularly rolled up. Other observations are necessary in order to define whether these deformations are caused by *H. binotata* or any other gall-forming agent.

Obs. - Conci & Tamanini (1984f: 241, fig. 8) erroneously reported for this species the occurrence of a short saltatorial spine at the apex of metabasitarsus; the following examen of many specimens showed that the supposed spine was only an accidental spot. Moreover, a deeper analysis of many specimens showed how the widening of the C+Sc vein (supposed to be a sort of pseudopterostigma) was emphasized, being it smaller than it was formerly reported (fig. 30).

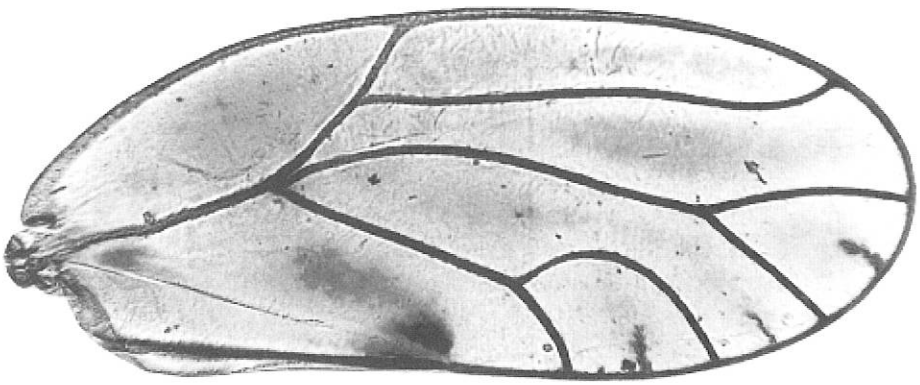


Fig. 30 - *Hippophaetrioza binotata*, male, forewing, Trentino-Alto Adige, Silandro-Schlanders, on *Hippophae rhamnoides*. (Photo F. Finotti, 94).

Genus *Trioza* Förster, 1848

A widely heterogeneous complex of highly different species, whose desirable correct division into genera or subgenera needs a deep revision on a world basis, carried out also through the examen of preimaginal stages.

169. *Trioza urticae* (Linnaeus, 1758)

Des. - Zangheri S., 1954: 259-263, figs I-V; Dobreanu & Manolache, 1962: 263-265, figs 179-181; Klimaszewski, 1967b: 246-247, figs 16-17; Hodkinson & White, 1979b: 67, 71, 77, figs 255, 272, 273, 275, 292; Ossiannilsson, 1992: 261-262, figs 1116-1126.

It. Rep. - Ferrari, 1888: 87 (Piem.); Löw, 1888: 23 (Fr.V.G.); Misciattelli-Pallavicini, 1894: 276 (Laz., galls); Cecconi, 1902: 143 (Tosc., galls); Mariani, 1909: 22 (V.A., galls); Gräffe, 1911: 294 (Fr.V.G.); Zangheri P., 1934: 59 (Em.R.); Castellani, 1953: 11 (Laz.); Grandi, 1953: 282 (Em.R.); Zangheri S., 1954: 257-273, 14 figs (Em.R.);

TAMANINI, 1955: 11 (Tr.A.A.); ZANGHERI P., 1966: 800 (Em.R.); LAUTERER, 1971: 198 (Sard.); SAMPÒ, 1975: 155-156, figs 1-2 (V.A., galls); TREMBLAY, 1981: 81 (It.); [BURCKHARDT, 1983b: 65 (Ticino)]; HODKINSON, 1983b: 279 (Fr.V.G.); RAPISARDA, 1985a: 112 (Sic.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); RAPISARDA, 1991a: 41 (Sard.); CONCI *et al.*, 1993: 36, n. 34 (It.).

It. Dis. - *T. urticae* is the most common and widespread Italian psyllid. We found this species in all the 20 Italian Regions; more than thousand specimens, in more than 130 localities, with more than 250 findings, between the sea level and 2200 m on the host plants (0-2100 m on conifers).

Gen. Dis. - Holopalaearctic, except Japan and Canary Islands.

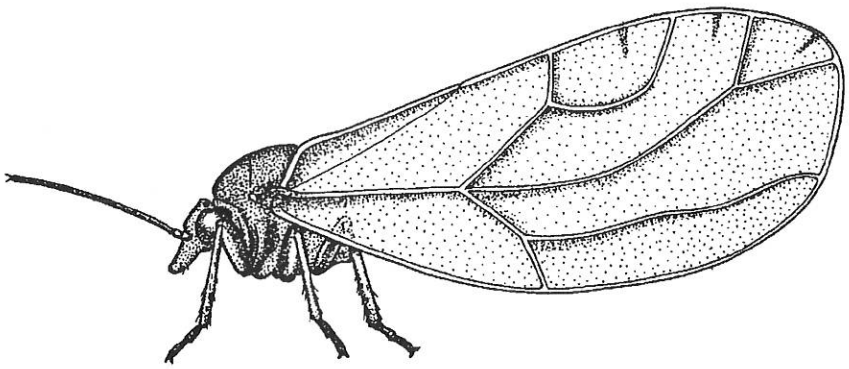


Fig. 31 - *Trioza urticae*, male, Trentino-Alto Adige. (Drawing R. Pace).

Biol. - Strictly oligophagous on *Urtica* spp. (Urticaceae). Adults were collected by us from April to December on *Urtica urens* L. and above all on *U. dioica* L., and throughout the year on conifers; nymphs from July to September. Different information is given by various Authors on the number of yearly generations: one (NGUYEN, 1963: 172-173); three (ZANGHERI, 1954: 269-272, on the Emilian Apennine; ONILLON, 1969: 61); four (LAL, 1934: 379-380; HODKINSON & WHITE, 1979b: 87); four or more (HESLOP HARRISON, 1936: 225). Overwintering as adult on conifers, but also elsewhere (f.e. on the barks of various trees or in the mould under nettles). According to ONILLON (1969: 61), also the IV-V instar nymphs may overwinter.

The species sometimes causes deformations, wrinklings or bubbles to the leaves; see (f.e.) HOUARD (1908); ROSS & HEDICKE (1927); ZANGHERI (1954); BUHR (1965); SAMPÒ (1975: figs 1, 2). Useful information on the

parasites of this psyllid is given by ZANGHERI (1954: 272) and ONILLON (1969).

170. *Trioza abdominalis* Flor, 1861

Des. - KLIMASZEWSKI, 1967b: 257, figs 37-38; HODKINSON & WHITE, 1979b: 71, 72, figs 238, 256, 276, 293; OSSIANNILSSON, 1992: 294-295, figs 1271-1280.

It. Rep. - CONCI & TAMANINI, 1984e: 266, fig. 1.21 (Ven., Tr.A.A., Piem.; erroneous reports from Lig. actually regard *T. chrysanthemi*); RAPISARDA, 1985a: 114 (Sic., *sub T. achilleae*, erroneous determination); RAPISARDA, 1988b: 620, 621 (Sic., *sub T. achilleae*, erroneous determination); CONCI *et al.*, 1993: 38, n. 137 (It.).

Fig. 32 - Biotope of *Trioza abdominalis*, Trentino-Alto Adige, Pozza di Fassa, Ciampedie, 2100 m. The host plant is the very common *Achillea millefolium*. In the back ground the «Dolomiti di Brenta». (Photo C. Conci, VIII. 89).

It. Dis. - Very common on the Alps; fairly rare elsewhere. We found this orophilous species in 9 Regions of North and South Italy and in Sicily; hundreds of specimens in about 50 localities, with more than hundred findings, at 1000-1300 m and 2050 m on the host plants (at

600 m and between 1000 and 2400 m on conifers). A collecting biotope is illustrated in fig. 32.

Gen. Dis. - From Eastern Asia (except Japan) to North and Central Europe, Great Britain and Italy.

Biol. - According to the literature, widely oligophagous on *Achillea millefolium* L., *Anthemis* sp., *Chrysanthemum* sp. (Compositae) and *Alchemilla* spp. (Rosaceae); yet controls are necessary, since records on *Alchemilla* very likely regard wandering or anyhow occasional specimens. OSSIANNILSSON (1992) reports only *Achillea millefolium*. We found adults throughout the year; in North Italy during all months (except June) on conifers and in June one time on *Achillea millefolium*; in Sicily in January-April and in October on conifers, in April and December on *Achillea ligustica* All. (new host plant). We never found nymphs or galls. One generation per year and overwintering as adult on conifers.

171. *Trioza agrophila* Löw, 1888

Des. - KLIMASZEWSKI, 1967b: 256, figs 33-36; OSSIANNILSSON, 1972 (with nymphs I-V); OSSIANNILSSON, 1992: 311, figs 1341-1350.

It. Rep. - CONCI & TAMANINI, 1984e: 267, fig. 1.22 (Tr.A.A.); CONCI *et al.*, 1993: 38, n. 138 (It.).

It. Dis. - Extremely rare. We found only one female (mixed with about 80 specimens of *Trioza abdominalis*) in Trentino-Alto Adige, Province Trento, Commune Folgaria, loc. Serrada, Fornaci, 1300 m, leg. Conci, 4.II.1983, on *Picea abies*, det. D. Burckhardt.

Gen. Dis. - *T. agrophila* is known from Caucasus to East, North and Central Europe, where it is presently rare; it may likely occur also in Central Asia.

Biol. - According to the literature (f.e. LAUTERER, 1991: 259), in Europe it is monophagous on *Cirsium arvense* L. (Compositae), performing one generation per year and overwintering as adult on conifers.

The nymphs of this species curl down the leaf-margins; see (f.e.) HOUARD (1908), BUHR (1964), LAUTERER (1991).

172. *Trioza* near *cirsii* Löw, 1881
Trioza cirsii s.l.

We include here the Italian material previously reported by CONCI & TAMANINI (1991: 92-94; Ven., Tr.A.A.) as *Trioza cirsii* (host plant *Cirsium herisithales* (Jacq.) Scop. and *C. carniolicum* Scop. - Compositae), since further studies let us now to ascribe these speci-

mens perhaps to a presently undescribed species, whose fifth instar nymphs dorsally have 6 truncate sectasetae per each side. Moreover, other Italian material of *T. cirsii* s.l. could also include some different specific taxa, which are presently under evaluation. The whole group is in course of revision by BURCKHARDT & LAUTERER (pers. comm.). Two of our collecting biotopes are illustrated in figs 33-34.

173. *Trioza munda* Förster, 1848

Des. - DOBREANU & MANOLACHE, 1962: 306-309, figs 218-220; KLIMASZEWSKI, 1967b: 259-260, figs 39-41; HODKINSON & WHITE, 1979b: 71, 76, figs 250, 267, 287, 304; OSSIANNILSSON, 1992: 302, figs 1299-1308.

It. Rep. - CONCI & TAMANINI, 1989a: 316, 318, fig. 1.7 (Tr.A.A., Tosc.); CONCI *et al.*, 1993: 39, n. 178 (It.). The report by SULC (1911: 26) from Messina (Sicily, leg. Heyden) is erroneous and probably due to a label exchange, since Heyden never collected in Sicily.

It. Dis. - Rare. We found this orophilous species only in three Regions of North and Central Italy; about 40 specimens with 8 findings, at 1500 m on the host plant and between 1250 and 1950 m on conifers, in the following 6 localities: Trentino-Alto Adige (Province Bolzano-Bozen: Commune Laces-Latsch, loc. San Martino al Monte, 1500 m; Province Trento: Commune Moena, loc. Passo S. Pellegrino, 1950 m; Commune Ruffré, M. Penegal, 1700 m; Commune Cavareno, M. Roen, 1500 m); Piemonte (Province Torino: Commune Pragelato, loc. Gran Puy, 1850 m); Toscana (Province Massa Carrara: Commune Carrara, loc. Campo Cecina, Refuge Belvedere, 1250 m). A collecting biotope is illustrated in fig. 33.

Gen. Dis. - Far East Russia, Mongolia, Caucasus, North and Central Europe; also in Great Britain.

Biol. - According to the literature, widely oligophagous on the genera *Knautia*, *Pentaphylloides*, *Scabiosa* and *Succisa* (Dipsacaceae). We found adults in January, May, August, September and October on conifers; a few males and females were also obtained in laboratory from nymphs collected on Mount Roen in August, on *Knautia drymeia* Heuffel (= *Scabiosa sylvatica*). One generation per year and overwintering as adult on conifers.

We sometimes observed little concavities caused by the nymphs on the lowerface of the leaves, where they settle.

Fig. 33 - Biotope of *Dyspersa laserpitii* on *Laserpitium krapfii*, *Trioza* near *cirsii* on *Cirsium erisithales, T. munda* on *Knautia drymeia*, *T. försteri* on *Mycelis muralis*, *T. schrankii* on *Astrantia major*. NE Italy, Trentino, Cavareno, Mount Roen, 1500 m. Glade in coniferous wood. (Photo C. Conci, VIII. 93).

Fig. 34 - Biotope of *Trioza senecionis* on *Senecio fuchsii*, *Dyspersa pallida* on *Chaerophyllum hirsutum* subsp. *villarsii*, *Trioza* near *cirsii* on *Cirsium erisithales*, and other commoner species. NE Italy, Trentino, Folgaria, Malga II Posta, 1450 m. Damp forest of conifers. (Photo C. Conci, VIII. 94).

174. *Trioza chrysanthemi* Löw, 1877

Des. - Dobreanu & Manolache, 1962: 303-306, figs 214-216; Ossiannilsson, 1992: 298-299, figs 1285-1294.

It. Rep. - Löw, 1888: 26 (Tr.A.A.); Dalla Torre, 1893: 116 (Tr.A.A.); Mancini, 1954: 35 (Um.); Conci & Tamanini, 1984e: 266 (Lig., *sub Trioza abdominalis*, erroneous determination); Conci & Tamanini, 1991: 50, 52, figs 1.6, 36-37 (Tr.A.A., Lig., Um.); Conci *et al.*, 1993: 36, n. 58 (It.).

It. Dis. - Fairly rare. Found by us and others in 5 Regions of North and Central Italy; about 70 specimens in 10 localities, with about 20 findings, between 1150 and 1400 m on the host plant and between 130 and 1500 m on conifers and occasional plants. In addition to the findings reported by Conci & Tamanini (1991: 50), we collected the species in the following localities: Trentino-Alto Adige, Province Trento, Commune Cavareno, Mount Roen, 1400 m, some nymphs; Lombardia, Province Pavia, Commune S. Margherita Stàffora, loc. Casale Stàffora, Pian dell'Armà, 1450 m, 1 male and 1 female; Piemonte, Province Alessandria, Commune Cabella Ligure, loc. Cosola, 1100-1200 m, numerous nymphs (within galls) and adults; Liguria, Province La Spezia, Commune Carro, Mount S. Nicolao, 800 m, 3 males and 2 females; same Region, Province Genova, Commune Casarza, loc. Bargone and Mount Zenone, Passo del Bocco, 400-900 m, 4 males and 5 females.

Gen. Dis. - North and Central Europe to Central Italy.

Biol. - According to the literature, strictly oligophagous on *Leucanthemum* (= *Chrysanthemum*) spp. and perhaps *Dendranthemum* sp. (Compositae). We found in North Italy nymphs and adults in October on *Leucanthemum* sp. complex *vulgare* Lam. and adults from October to April on conifers; we did not find adults in May-September.

The nymphs cause concavities on the underside of the basal leaves, to which little protuberances correspond on the upperside; sometimes more concavities flow together in one greater deformation, that appears as a little bubble at the upperside. The galls are reported (f.e.) by Houard (1909), Ross & Hedicke (1927), Dobreanu & manolache (1962: fig. 217), Buhr (1964).

175. *Trioza senecionis* (Scopoli, 1763)

Des. - Dobreanu & Manolache, 1962: 317-318, figs 226-228; Klimaszewski, 1967b: 266, figs 50-52.

It. Rep. - [Vondracek, 1953: 177 («Italia: Flitsch» = Plezzo, now Bovec in Slovenia)]; Conci & Tamanini, 1984e: 267-268, fig. 1.25 (Ven., Tr.A.A.); Conci & Tamanini, 1991: 43, figs 19-20 (Tr.A.A.); Conci *et al.*, 1993: 38, n. 141 (It.).

It. Dis. - Very localized. We found this orophilous species on its host plant, in one locality of Trentino-Alto Adige (Province Trento, Commune Folgaria, loc. Malga II Posta, 1400-1450 m), in a damp forest of conifers where it is abundant: hundreds of adults, eggs and nymphs, with 14 findings; this collecting biotope is reported by Conci & Tamanini (1991: figs 19-20). We also obtained many adults through breeding of the nymphs. Moreover, we found a few adults on the host plant and on conifers in a close locality in Veneto (Province Vicenza, Commune Lastebasse, loc. Fiorentini, Le Fratte, 1500 m). Our principal collecting biotope is illustrated in fig. 34 at page 65.

Gen. Dis. - Caucasus, East and Central Europe.

Biol. - According to the literature, widely oligophagous on *Senecio* spp. and *Adenostyles* sp. (Compositae). We found adults and eggs on *Senecio fuchsii* Gmelin at the end of June; only eggs and I-II instar nymphs at mid July; nymphs of various instars and newly hatched adults from August to October. In cases of great infestations, a few adults, eggs and nymphs have been also found on *Senecio cacaliaster* Lam. and *Adenostyles alliariae* (Gouan) Kerner. We collected a few adults in September on conifers. One generation per year; overwintering as adult on conifers. The eggs are laid vertically, especially at the leaf margins, but also a few on the leaves underface.

In Italy *T. senecionis* is not gall forming. Sometimes, in case of strong infestations, we noted small bubbles of various forms, protruding to the leaves upperface; see (f.e.) Haupt (1935a), Buhr (1965), Ross & Hedicke (1927).

176. *Trioza försteri* Meyer Dür, 1871
Trioza flavipennis sensu Löw, 1873

Des. - Dobreanu & Manolache, 1962: 287-290, figs 201-202; Klimaszewski, 1967b: 294, figs 97-99.

It. Rep. - Ferrari, 1888: 77 (Piem.); Trotter, 1907: 104 (Tosc., galls); Trotter & Cecconi, 1907: 17, n. 408 (Tosc., galls); Conci *et al.*, 1993: 36, n. 35 (It.).

It. Dis. - Fairly rare. Found by us and others in 4 Regions of North and Central Italy; about 100 specimens in the following 7 localities,

with 12 findings, at 600, 1200 and 1500 m on *Mycelis muralis* and between 1400 and 1500 m on conifers: Veneto, Province Belluno, Commune Arsiè, loc. Col Perer, Pramolin, 1200 m; Trentino-Alto Adige, Province Bolzano-Bozen, Commune Caldaro-Kaltern, loc. Mendola, 1220 m; Tr.-A.A, Province Trento, Communes Folgaria (loc. Malga II Posta, 1420 m), Sanzeno (600 m) and Cavareno (M. Roen, 1500 m); Piemonte, Province Alessandria, Commune Stazzano (FERRARI, 1888); Toscana, Province Firenze, Commune Reggello, loc. Foresta di Vallombrosa (TROTTER, 1907). One of our collecting biotope is illustrated in fig. 33 at page 65.

Gen. Dis. - From Turkey, Rumania and Greece to Central Europe; Spain, Algeria, Morocco.

Biol. - According to the literature, widely oligophagous on *Mycelis* (= *Lactuca*) *muralis* (L.) Dumont and *Prenanthes purpurea* L. (Compositae). We found nymphs and adults from July to September on *Mycelis muralis*; adults in April and late September on conifers. Probably one generation per year and overwintering as adult on conifers.

This species causes little pit-galls on the leaves, which are concave at the lowerface (where the nymphs settle) and protrude to the upperface; see (f.e.) TROTTER (1907); HOUARD (1909); ROSS & HEDICKE (1927); BUHR (1964).

The following 4 species (*Trioza proxima*, *T. dispar*, *T. tatrensis* and *T. megacerca*) build up an intricate group, recently revised by BURCKHARDT (1983b). The old determinations of species belonging to this group are partly doubtful or erroneous. Thus, a considerable part of our material still needs to be re-examined and is not comprised in this work.

177. *Trioza proxima* Flor, 1861

Des. - KLIMASZEWSKI, 1967b: 264, figs 48-49; HODKINSON & WHITE, 1979b: 71, 76, figs 251, 268, 288, 305; BURCKHARDT, 1983b: 67-68, figs 14, 18, 22, 26, 33-34, 38, 42.

It. Rep. - LÖW, 1888: 27 (Fr.V.G., Tr.A.A., galls); DALLA TORRE, 1893: 132 (Fr.V.G., Tr.A.A., galls); CORTI, 1902: 217 (Lomb., galls); MASSALONGO, 1913: 469, fig. 6 (Tr.A.A., galls); ZANGHERI, 1966: 80 (Em.R.); TAMANINI, 1977d: 116-117 (Tr.A.A.); CONCI & TAMANINI, 1989a: 316 (North Italy); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); CONCI *et al.*, 1993: 36, n. 61 (It.). Some of the above records (especially the oldest ones) may likely regard other close species.

Fig. 35 - Biotope of *Trioza proxima*, causing galls on *Hieracium pilosella*. Central-North Italy, Lombardia, Albaredo per S. Marco, 1100 m. Stony slope. (Photo C. Conci, VII. 94)

Fig. 36 - Biotope in NE Italy, Trentino, Rovereto, Mount Zugna, 1600 m. Here we found frequently *Aphalara longicaudata*, *Trioza tatrensis* and other commoner species, overwintering on plants of *Picea abies* sparse in the meadows. (Photo C. Conci, VIII. 95).

It. Dis. - Locally common. Found by us and others in 6 Regions of North Italy, throughout the Alpine Arc; more than 100 specimens in about 12 localities, with more than 15 findings, between 600 and 1200 m on the host plant and between 600 and 2450 m on conifers.

Gen. Dis. - From Caucasus to almost throughout Europe, except Scandinavia (in need of being confirmed, under the light of present taxonomy).

Biol. - According to the literature, strictly oligophagous on *Hieracium* spp. (Compositae). We found overwintering adults on conifers, mostly on *Juniperus communis* L., in August-January. Many nymphs have been also found by us in leaf-galls on *Hieracium pilosella* L., in Lombardia, Province Sondrio, Commune Albaredo per San Marco, about 1200 m, 15.VII.1994. This biotope is reported in fig. 35, at page 69. One generation per year. Overwintering as adult on conifers.

This species causes a particular type of distorsions and pit-galls on the leaves; see (f.e.) CORTI (1902), MASSALONGO (1913: 469, fig. 6); HOUARD (1908), ROSS & HEDICKE (1927), BUHR (1964) and page 150 of this work.

178. *Trioza dispar* Löw, 1878

Des. - KLIMASZEWSKI, 1967b: 261, figs 42-45; BURCKHARDT, 1983b: 68-69, figs 11, 15, 19, 23, 27-28, 35, 39; OSSIANNILSSON, 1992: 282, figs 1204-1214.

It. Rep. - MARIANI, 1909: 13 (V.A., galls); COBAU, 1912: 44 (Ven., galls); SAMPÒ, 1975: 170-171, fig. 15, col. plate II: 8 (V.A., galls; doubtful determination); HODKINSON, 1983b: 275 (Fr.V.G.); CONCI & TAMANINI, 1989a: 316 (North Italy); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); CONCI *et al.*, 1993: 37, n. 71 (It.). Part of these records are doubtful and likely regard other close species.

It. Dis. - Fairly rare. Found by us and others in 5 Regions of North Italy; more than 100 specimens in more than 6 localities, with more than 6 findings, between 1100 and 2000 m on conifers (at 150 and 900 m by traps).

Gen. Dis. - Reported from Mongolia, Caucasus and almost throughout Europe, except Great Britain and Iberian peninsula (in need of being confirmed).

Biol. - Literary references to *T. dispar* as widely oligophagous on *Aposeris foetida* (L.) Less, *Leontodon* spp. and *Taraxacum* spp. (Compositae) need to be confirmed. We only found overwintering adults on conifers, mostly on *Juniperus communis* L., in January, March, Au-

gust and September. Probably one generation per year. Overwintering as adult on conifers.

According to the literature, *T. dispar* causes little pit-galls on the young leaves, together with pimply leaves deformations; see (f.e.) Houard (1909), Mariani (1909), Cobau (1912), Sampò (1975: 170-171, fig. 15, col. pl. II: 8; on *Taraxacum officinale*).

179. *Trioza tatrensis* Klimaszewski, 1965

Des. - Dobreanu & Manolache, 1962: 290-293, figs 203-205 (*sub T. dispar*); Klimaszewski, 1967b: 262-263, figs 46-47; Burckhardt, 1983b: 69-70, figs 12, 16, 20, 24, 29-30, 36, 40; Ossiannilsson, 1992: 286, figs 1225-1236.

It. Rep. - Burckhardt, 1983b: 70 (Italy, [Ticino]); Hodkinson, 1983b: 279 (Fr.V.G.); Conci & Tamanini, 1989a: 316 (North Italy); Rapisarda & Conci, 1989: 631 (Fr.V.G.); Conci *et al.*, 1993: 37, n. 106 (It.).

It. Dis. - Fairly rare. This orophilous species was found by us and others in 6 Regions of North Italy, throughout the Alpine arc; more than hundred adults in more than 10 localities, with more than 20 findings, between 1400 and 2000 m on conifers (at 130 m, at Godia, and at 900 m by traps). One of our collecting biotope is illustrated in fig. 36 at page 69.

Gen. Dis. - Only Europe: Norway, Poland, Rumania, Austria, Switzerland, North Italy, France.

Biol. - According to the literature, strictly oligophagous on *Hieracium* spp. (Compositae); we only found overwintering adults on conifers, in April, May and July-November. Probably one generation per year; overwintering as adult on conifers, mostly on *Juniperus communis*. The literature does not report galls caused by this species.

180. *Trioza megacerca* Burckhardt, 1983

Des. - Burckhardt, 1983b: 70-72, figs 13, 17, 21, 25, 31-32, 37, 41.

It. Rep. - Conci & Tamanini, 1989a: 316, fig. 1.6 (Tr.A.A., Em.R.); Conci *et al.*, 1993: 39, n. 177 (It.).

It. Dis. - Fairly rare. Found by us in 5 Regions of North and Central Italy, on the Alps and Ligurian-Emilian Apennine; more than 50 specimens in about 7 localities, with more than 10 findings, at 400 m and

between 900 and 1700 m on conifers. In Croatia (at Rovinji) the species was found by Tamanini at the sea level.

Gen. Dis. - Reported up to now only from Croatia, Switzerland and North Italy; the species is surely more widespread in Europe.

Biol. - Host plant unknown, but probably some Compositae close to *Hieracium*. We found only adults in February-May and September-December, on *Juniperus communis*. Probably one generation per year. Overwintering as adult on conifers, especially on *Juniperus communis* L.

181. *Trioza remota* Förster, 1848

Des. - Dobreanu & Manolache, 1962: 284-287, figs 198-200; Klimaszewski, 1967b: 304-305, fig. 120; Hodkinson & White, 1979b: 65, 76, figs 252, 269, 289, 306; Conci & Tamanini, 1985b: 38, figs 10-17, 23-27, 32-35; Ossiannilsson, 1992: 266, figs 1132-1141.

It. Rep. - Mancini, 1954: 35 (Um.); [Burckhardt, 1983b: 64 (Tic.)]; Hodkinson, 1983b: 279 (Fr.V.G.); Conci & Tamanini, 1985b: 39 (Tr.A.A., Lomb., Tosc.); Rapisarda, 1988b: 620 (Sic.); Rapisarda & Conci, 1989: 630 (Fr.V.G.); Rapisarda, 1991b: 179-180 (It.); Viggiani, 1991: 173, col.pl. II: 5, 6 (It.); Conci *et al.*, 1993: 37, n. 78 (It.); Rapisarda, 1994a: 175, 183, 186, figs 21-23 (Tr.A.A., Sic.). Some of the above records may likely regard other close species.

It. Dis. - Very common. Found by us in 14 Regions throughout Italy (as to the Isles, not found in Sardinia); about thousand specimens in about 80 localities, with more than 150 findings. Nymphs between 250 and 1100 m on the host plants (adults between 50 and 1900 m on conifers).

Gen. Dis. - Perhaps holopalaearctic, but its presence in Far East and Central Asia needs to be confirmed. Throughout Europe.

Biol. - Strictly oligophagous on caducous *Quercus* spp. (Fagaceae). Lauterer (1991: 260) points out how in Moravia *T. remota* performs one yearly generation, overwintering as adult on conifers or other shelter plants; adults return on oaks in May and they mate; from May to late August the second instar nymphs «rest in a dormant state resembling parapause», rapidly completing their development in September; new adults emerge in October and migrate to winter hosts after a few weeks. Our observations confirm this life-cycle: we found adults only on conifers, from October to May and nymphs in galls on *Quercus petraea* (Matt.) Liebl. (= *sessilifolia* Salisb.), *Q. robur* L. (= *peduncolata* Ehrh.) and *Q. pubescens* Willd. from May to September.

This psyllid causes little pit-galls, about one mm wide, protruding

to the dorsal face of the leaves; the nymphs settle on the corresponding concavities at the lower leaf-surface; for galls see also HOUARD (1908), ROSS & HEDICKE (1927), BUHR (1965). As to the parasites, see VIGGIANI (1991).

182. *Trioza soniae* Rapisarda, 1994
Trioza sp., *Trioza remota*

Des. - RAPISARDA, 1994a: 177, figs 1, 3, 5, 7, 9, 11, 12.—V instar nymph: RAPISARDA, 1994a: 177-179, figs 15-17, 24; 27 (col. photos).

It. Rep. - CONCI *et al.*, 1993: 39, n. 195 (It.; *sub Trioza* sp. n. 1); RAPISARDA, 1994a: 175-188, figs 1, 3, 5, 7, 9, 11, 12, 15-17, 24; 27 (col. photos) (Camp., Mol., Pu., Cal., Sic.). The report by MASSALONGO (1895: 54) of galls caused by a *Trioza* sp. on *Quercus cerris* near Verona, and referred to *T. remota* by KIEFFER (1901: 469) and HOUARD (1908: 333), probably regards *T. soniae*.

It. Dis. - Fairly rare. Found by us in 5 Regions of Central-South Italy and in Sicily; about 35 adults and more than 50 nymphs in 12 localities, with 18 findings, between 500 and 1400 m on the host plant. In addition to the localities reported by RAPISARDA (1994a), we found nymphs of this species on *Quercus cerris*, in Molise (Province Isernia, Commune Vastogirardi, Monte La Penna, 900 m, 19.VI.1993), in several localities of Basilicata (Province Potenza) and in Puglia (Province Foggia, Commune Vico del Gargano, Foresta Umbra, 700 m, 28.IX.1991). The type locality is illustrated in fig. 37 at page 75.

Gen. Dis. - Only Italy up to now, but probably wider diffused also in other Countries, where *Quercus cerris* occurs.

Biol. - Monophagous on *Quercus cerris* L. (Fagaceae). Life-cycle as in *T. remota*: one generation per year and overwintering as adult on shelter plants (mostly on conifers); a long nymphal diapause occurs in summer; the adult emerge from middle September onwards and in a short time migrate to shelter plants. We found nymphs between June and November and adults on the host plant in September-October.

The species causes little pit-galls protruding to the upperface of the leaves; the nymphs live in the corresponding concavities at the lowerface.

Obs. - This species has been reported as «*Trioza* sp.n. 1» in the first part of this catalogue (page 39: n. 195).

183. *Trioza apulica* Rapisarda, 1994

Des. - Rapisarda, 1994a: 180-182, figs 2, 4, 6, 8, 10, 13, 14.—V instar nymph: Rapisarda, 1994a: 182, figs 18-20, 25.

It. Rep. - Conci *et al.*, 1993: 39, n. 196 (It.; *sub Trioza* sp. n. 2); Rapisarda, 1994a: 180-187, figs 2, 4, 6, 8, 10, 13, 14, 18-20, 25 (Pu.).

It. Dis. - Very rare. Found only three times, in the Region Puglia, Province Taranto: Commune Crispiano, 350 m, 1 male, 2 females, leg. S. Barbagallo, 2.XI.1990; Commune Martina Franca, 400 m, 15 third instar nymphs, leg. S. Barbagallo and C. Rapisarda, 4.VI.1991; same locality, 3 fifth instar nymphs, leg. S. Barbagallo and C. Rapisarda, 16.XI.1991.

Gen. Dis. - Endemic to South Italy (Puglia).

Biol. - Monophagous on *Quercus trojana* Webb (Fagaceae). Life-cycle unknown.

Obs. - This species has been reported as «*Trioza* sp.n. 2» in the first part of this catalogue (page 39: n. 196).

184. *Trioza ilicina* (De Stefani Perez, 1901)
Psylla ilicina, *Trioza* sp.

Des. - Conci & Tamanini, 1985b: 36-38, figs 1-9, 18-22.— V instar nymph: Conci & Tamanini, 1985b: 39, figs 28-31; Battaglia, 1992: 59-61, figs VIII-IX; Rapisarda, 1994a: 175, fig. 26.

It. Rep. - De Stefani Perez, 1901: 446-447 (Sic., galls); Kieffer, 1901: 469 (It., galls); Cecconi, 1902: 626 (Laz., galls); Trotter, 1902: 370 (Camp., galls); De Stefani-Perez, 1906: 163 (Sic., galls); Trotter & Cecconi, 1907: 18, n. 429 (Sic., galls); Houard, 1908: 286 (It., galls); [Houard, 1914: 122 (Corsica, galls)]; De Stefani [junior], 1944: 53 (Sic., galls); Viggiani, 1983: 141 (It., parasites); Conci & Tamanini, 1985b: 33-46 (Tr.A.A., Lig., Laz., Camp., Cal., Sic., [Corsica]); Viggiani, 1986: 87, 90 (Laz., Camp., Bas., parasites); Viggiani, 1988: 130 (Camp., parasites); Rapisarda, 1988b: 620 (Sic.); Rapisarda, 1991a: 40-41 (Sard.); Viggiani, 1991: 172-173, table II, col. plate II: 1-4 (It. parasites); Rapisarda, 1991b: 179-180 (Tr.A.A., Lig., Laz., Camp., Cal., Sic., Sard.); Battaglia, 1992: 51-61, 9 groups of figs (Camp.); Conci *et al.*, 1993: 37, n. 70 (It.); Rapisarda, 1994a: 175, 183, fig. 26 (Sic.).

It. Dis. - Fairly common. Found by us and others in 9 Regions throughout Italy: more than hundred adults and hundred nymphs, in about 20 localities, with more than 40 findings, between the sea level and 1100 m, on the host plant.

Fig. 37 - Biotope (type locality) of *Trioza soniae*, Sicily, Sant'Alfio, Mount Etna, 1350 m. *Quercus cerris* is the dominat oak in this area. *Arytaina adenocarpi* has been also collected in this biotope. (Photo C. Rapisarda, VII. 95).

Fig. 38 - Leaf galls caused by *Calophya rhois* on *Cotinus coggygria*. NE Italy, Trentino-Alto Adige, Arco, 200 m. (Photo C. Rapisarda, VI. 95).

Gen. Dis. - Reported from South Turkey, Italy, Corsica, Spain and Algeria.

Biol. - Monophagous on *Quercus ilex* L. (Fagaceae). The life-cycle of *T. ilicina* is different than those ones of both *T. remota* and *T. soniae*. According to VIGGIANI (1991: 172-173, table II), this species performs in South Italy one yearly generation (entirely on the host plant), overwintering in a diapausing second instar nymph; III-V instar nymphs occur in late February and in March, adults in April-June. The above data are mostly confirmed by our observations carried out in Liguria; but here we sometimes noted also III-IV instar overwintering nymphs.

Such as other oak-feeding psyllids, this species causes little pit-galls on the leaves, protruding to the upper face and very similar to those ones caused by the mite *Eryophyes ilicis* (Can.).

Studies on the parasites have been carried out by VIGGIANI (1983, 1986, 1988, 1991), with very interesting observations.

Obs. - No psyllid species are presently known to live in Italy on *Quercus suber* L. and other evergreen oaks.

185. *Trioza ramni* (Schrank, 1801)
Trioza rhamni (uncorrect)

Des. - DOBREANU & MANOLACHE, 1962: 322-324, figs 231-232; KLIMASZEWSKI, 1967b: 301-302, figs 112-113; HODKINOSN & WHITE, 1979b: 71, 76, figs 253, 270, 290, 307; OSSIANNILSSON, 1992: 268, 271, figs 1146-1155.

It. Rep. - LÖW, 1888: 23 (Fr.V.G., Tr.A.A.); DALLA TORRE, 1893: 148 (Tr.A.A., galls); COBAU, 1912: 55 (Ven., galls); ZANGHERI, 1934: 59 (Em.R.); ZANGHERI, 1966: 800 (Em.R.); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); CONCI *et al.*, 1993: 36, n. 53 (It.).

It. Dis. - Rare and sporadic. Found by us and others in 5 Regions of North Italy; more than 30 adults and 15 nymphs in more than 13 localities with more than 15 findings, between 800 and 900 m on the host plant, between 600 and 1400 m on conifers and at 70 m by traps.

Gen. Dis. - Caucasus, NE Turkey and nearly throughout Europe (except the extreme Northern and Southern regions).

Biol. - According to the literature, strictly oligophagous on *Rhamnus* spp. (Rhamnaceae). We found adults in June and September on *Rhamnus catharticus* L. and in February, April and November on conifers. Overwintering as adult on conifers. LAUTERER (1991: 260) observed in Czech Republic two generations per year.

This species produces little pit-galls on the leaves, caused by the egg deposition; see (f.e.) Löw (1888), Houard (1909), Cobau (1912), Ross & Hedicke (1927), Buhr (1965).

Obs. - The name «*Trioza rhamni*» (always reported in the literature) is uncorrect since Schrank (1801: 141) originally described this species as «*Chermes ramni*».

186. *Trioza marginepunctata* Flor, 1861
Trioza fraudatrix Horvath, 1897

Des. - Sulc, 1912a: 44-48, plate 31; Rapisarda, 1989a: 49-50, 54, figs 20, 22, 25, 27, 29, 31.— V instar nymph: Rapisarda, 1989a: 50-51, fig. 32.

It. Rep. - [Horvath, 1886: 317 (Croatia: Susak = Fiume); Löw, 1888: 23 (ibid.); Horvath, 1897a: 641-642 (*sub T. fraudatrix*, ibid.); Horvath, 1897b: 59 (ibid.); Massalongo, 1906b: 34 (France: Nizza = Nice, galls); Sulc, 1912a: 48 (Croatia: Susak = Fiume)]; Conci & Tamanini, 1984e: 267, fig. 1.23 (Lig.); Rapisarda, 1989a: 49-54, figs 20, 22, 25, 27, 29, 31, 32, col.photo 38 (Lig., galls); Conci *et al.*, 1993: 38, n. 139. The record from Sicily by Rapisarda (1985a: 112, 114) regards *Trioza kiefferi*.

It. Dis. - Rare and localized. Found by us only in two Regions of NW Italy, along all the Ligurian coast and in one locality of the Region Emilia-Romagna (Province Piacenza, Commune Zerba, loc. Capannette di Pei, 1450 m, on *Picea abies*). About 50 adults and some nymphs in about 12 localities, with 23 findings, between the sea level and 350 m on the host plant, but also more numerous between 600 and 1550 m on conifers (specimens accidentally transported by wind?).

Gen. Dis. - Only a few zones in Mediterranean Basin: Israel, Croatia, North Italy, South France, Spain.

Biol. - Monophagous on *Rhamnus alaternus* L. (Rhamnaceae). We collected adults on the host plant from January to March, in August-October and in December; nymphs within galls in March-April and July; adults on conifers from August to October. Therefore, *T. marginepunctata* probably has one generation per year and overwinters as adult on its host plant; during autumn the adults sometimes migrate to conifers, without returning to the host plant. Further biological observations are necessary.

The species produces leaf pit-galls, weakly protruding to the upperface: the nymphs inhabit the gall concavities, at the leaf underface; see (f.e.) Löw (1888), Massalongo (1906b: 34), Houard (1909: 703, figs 1008-1009), Rapisarda (1989a: col. photo 38).

187. *Trioza kiefferi* Giard, 1912
Asterolecanium rhamni Kieffer, 1898; and *Psylla* sp. (misinterpretations); *T. marginepunctata* Flor, 1861 (misidentification).

Des. - RAPISARDA, 1989a: 38-42, figs 19, 21, 23, 24, 26, 28, 30.—V instar nymph: RAPISARDA, 1989a: 42-43, figs 33-36.

It. Rep. - KIEFFER, 1898: 215 (Sic., galls by *Asterolecanium rhamni*); DE STEFANI, 1898b: 255-256 (Sic., galls); DE STEFANI, 1898c: 31-32 (Sic., galls); TROTTER & CECCONI, 1902: 6, n. 135 (Sic., galls); TROTTER, 1904a: 80 (Sic., galls); DE STEFANI-PEREZ, 1906: 182-183 (Sic., galls by *Psylla* sp.); HOUARD, 1909: 703 (Sic., galls); MASSALONGO, 1921: 4 (Camp., galls); RAPISARDA, 1985a: 112 (Sic., *sub T. marginepunctata*); RAPISARDA, 1988b: 618, 620 (Sic.); RAPISARDA, 1989a: 38-49, 54, figs 19, 21, 23, 24, 26, 28, 30, 33-36; color photo 37 (Sic., galls); CONCI *et al.*, 1993: 37, n. 66 (It.).

It. Dis. - Fairly rare and localized. Found by us and others in Campania and in Sicily, in the following 5 localities: Camp., Province Napoli, Commune Massa Lubrense, loc. Sant'Agata; Sic., Provinces Catania (Commune Paternò), Siracusa (Communes Brucoli and Noto) and Palermo (Commune Palermo). About 30 adults and 20 nymphs, in about 10 findings, between 100 and 550 m on the host plant.

Gen. Dis. - Sicily, Iberian peninsula and Algeria; records from Balcan peninsula and France need to be verified.

Biol. - According to the literature, strictly oligophagous on *Rhamnus* spp. (Rhamnaceae). In Sicily, adults, nymphs and galls were found by us on *R. alaternus* L. and by De Stefani-Perez also on *R. oleoides* L.. According to RAPISARDA (1989a: 46-49), *T. kiefferi* performs in Sicily one generation per year, spending the whole life-cycle on the host plant: mating and oviposition occur in spring; subsequent development of the nymphs is slow, with summer diapause; adults fly in September-October and overwinter.

This psyllid causes characteristic tube-like galls, protruding to the leaves upperface, about 3 mm long and with a diameter of about one mm; the apex of these galls is closed, slightly enlarged and curved. Each nymph lives on the opening of its own gall, at the underface of the leaf. For galls, see (f.e.): KIEFFER (1898: 215, figs 1-2), HOUARD (1902: 46, figs 20-22; 1909: 202, figs 1010-1012); RAPISARDA (1989a: 46, col. photo 37).

188. *Trioza flavipennis* Förster, 1848
Trioza aegopodii Löw, 1878

Des. - DOBREANU & MANOLACHE, 1962: 360-361, fig. 267; KLIMASZEWSKI, 1967b: 302, figs 114-117; HODKINSON & WHITE, 1979b: 71,

75, figs 248, 265, 285, 302; Ossiannilsson, 1992: 287, 289, figs 1225-1236.

It. Rep. - Löw, 1888: 25 (Tr.A.A., galls); Dalla Torre, 1893: 103 (Tr.A.A., galls); Cobau, 1912: 33 (Ven., galls); [Burckhardt, 1983b: 72 (Tic.)]; Conci *et al.*, 1993: 36, n. 57 (It.). Records of *T. flavipennis* given by Ferrari (1888), Trotter (1907) and * Trotter & Cecconi (1907) regard *T. försteri*.

It. Dis. - Fairly rare. Found by us and others in two Regions of NE Italy; about hundred specimens in the following 8 localities, with about 10 findings, between 700 and 1300 m on the host plant (two specimens on *Picea abies* at 1100 m and one specimen on *Juniperus communis* at 1950 m): Veneto (Province Vicenza, Commune Enego, galls, Cobau, 1912); Trentino-Alto Adige (Province Bolzano-Bozen, Commune Castelrotto-Kastelruth, loc. Bagni di Razzes-Bad Ratzes, Löw, 1888; same Province, Commune Ultimo-Ulten, loc. Valle Pracupola-Kuppelwies, 1950 m; Province Trento, Commune Ronzone, 1100 m; same Province, Commune Arco, loc. S. Barbara, 1050 m; same Province, Commune Villa Lagarina, loc. Nasupel, 1050 m; same Province, Commune Fiavé, 700 m); the species was found to be abundant in Fiavé.

Gen. Dis. - Far East Russia; East, North and Central Europe; Great Britain.

Biol. - Monophagous on *Aegopodium podagraria* L. (Umbelliferae). We found on the host plant nymphs in August and September and adults in September; we obtained in September more than hundred adults through rearing many nymphs. Probably one generation per year and overwintering as adult on conifers.

The species produces little pit-galls on the leaves of the host plant, each one having a hollow at the lowerface, where the nymph lives, and a corresponding protuberance at the upperface. In cases of strong infestations, we observed the coalescence of many galls at the leaf upperface, with formation of bumpy yellowish protuberances. See (f.e.) Löw (1880), Cobau (1912), Houard (1909), Ross & Hedicke (1927), Buhr (1964), Lauterer (1991). Similar cecidia (with eggs) have been observed by Lauterer (1992) on *Heracleum spondylium* L..

189. *Trioza rapisardai* Conci & Tamanini, 1984

Des. - Conci & Tamanini, 1984d: 201-204, figs 1-20; Conci & Tamanini, 1989b: figs 38-45.

It. Rep. - Conci & Tamanini, 1984d: 201-208, figs 1-27 (Piem.);

CONCI & TAMANINI, 1989b: 65, 69, figs 1.12, 38-45 (Piem., Lig.); CONCI *et al.*, 1993: 38, n. 118 (It.).

It. Dis. - Not rare. We found this orophilous species in three Regions of North Italy, on the Western Alps; more than hundred specimens in about 10 localities, with about 15 findings, between 1350 and 1850 m on its host plants (1500-1550 m on conifers).

Gen. Dis. - As far as presently known, endemic to Western Alps (Italy, France).

Biol. - Strictly oligophagous on *Laserpitium siler* L. and *L. gallicum* L. (Umbelliferae). The first species is also the host plant of the more common and widespread *Dyspersa laserpitii*, having yet a more eastern distribution. We collected nymphs in September and adults in June-September on the host plants and in May, September and December on conifers; females with mature eggs within the abdomen in June and July. Probably one generation per year and overwintering as adult on conifers. We never observed galls caused by this psyllid on its host plants.

190. *Trioza rotundata* Flor, 1861

Des. - DOBREANU & MANOLACHE, 1962: 296-300, figs 208-211; KLIMASZEWSKI, 1967b: 250-251, figs 25-27; CONCI & TAMANINI, 1987: 267-272, figs 1-25, 39-42; OSSIANNILSSON, 1992: 289, figs 1241-1250.

It. Rep. - CONCI & TAMANINI, 1984e: 267, fig. 1.24 (Fr.V.G., Tr.A.A.); CONCI & TAMANINI, 1987: 265-283, figs 1-43, 47-48 (Fr.V.G., Tr.A.A., Lomb., Piem.); RAPISARDA & CONCI, 1989: 631 (Fr.V.G.); CONCI & TAMANINI, 1991: 54-57, figs 1.8, 19-20, 38-39, 43, table I (Fr.V.G., Tr.A.A., Lomb., Piem., Lig., Tosc., Em.R.); CONCI *et al.*, 1993: 38, n. 140 (It.).

It. Dis. - Fairly common. We and others found this orophilous species in 8 Regions of North and Central Italy; hundreds of specimens in about 40 localities, with more than 50 findings, on the host plants between 1400 and 2200 m and on conifers between 950 and 2400 m. Details on collecting localities and biotopes are reported by CONCI & TAMANINI (1987: 278-280, fig. 47; 1991, figs 19, 20, 43).

Gen. Dis. - Caucasus, West and Central Europe; in Italy, down to the Tosco-Emiliano Apennine. Distribution map in CONCI & TAMANINI (1987: fig. 48).

Biol. - In North Italy, *T. rotundata* shows to be a polyphagous species. We found eggs, nymphs and adults on *Cardamine amara* L. (Cruciferae), nymphs and adults on *Stellaria nemorum* L. subsp. *nemorum* L. (Caryophyllaceae) and *Saxifraga aizoides* L. (Saxifragaceae).

Findings on other *Cardamine* spp. and on some shelter and occasional plants are reported in the literature. According to Conci & Tamanini (1991, table I), eggs are laid in May; nymphs occur from July to September, newly hatched adults in August and September; overwintering adults may be found on conifers from July to May; we lack findings in June. *T. rotundata* could probably have one generation per year, at least at high altitude. But this cycle may vary in some cases: in 1988, we observed eggs, nymphs and newly hatched adults on *Cardamine amara*, and also adults on conifers, all at the end of May, at 1600 m, in Val Malenco (Lombardia); therefore, it is possible that this species may also perform two generations per year. In Italy, this species is bound to damp and fresh localities, where the above plants occur.

We did not observe leaf galls.

Note. - Conci & Tamanini, (1987: 274-275, figs 44-47) found two fifth instar nymphs close to those of *T. rotundata*, on *Arabis hirsuta* (L.) Scop. (Cruciferae); these nymphs seem to belong to a different species, not described up to now.

191. *Trioza rumicis* Löw, 1880

Des. - Dobreanu & Manolache, 1962: 319-320, figs 229-230; Klimaszewski, 1967b: 298, figs 103-105.

It. Rep. - *Strasburger, 1879: 37-43, plate 7, figs 1-45 (Piem., galls); Massalongo, 1881: 229-234, plate 5, figs 1-22 (Fr.V.G., galls); Löw, 1888: 27 (Tr.A.A.); Dalla Torre, 1893: 148 (Tr.A.A., galls); Massalongo, 1906: 155 (Ven., galls); Trotter, 1908: 120 (Abr., galls); Massalongo, 1916: 114 (Ven., galls); Sampò, 1975: 156-158, figs 3-4, col. plate I: 1 (V.A., galls); [Burckhardt, 1983b: 73 (Tic.)]; Rapisarda & Conci, 1989: 631 (Fr.V.G.); Conci *et al.*, 1993: 35, n. 9 (It.).

It. Dis. - Common. Found by us and others in 11 Regions of North and Central Italy; more than 200 specimens in about 30 localities, with more than 50 findings, between 1000 and 1900 m and also one time at 125 m, on its host plants (between 800 and 1700 m on conifers).

Gen. Dis. - Far East Russia, Iran, Caucasus, East and Central Europe.

Biol. - Strictly oligophagous on *Rumex* spp. (Polygonaceae). Massalongo (1916) recorded galls on *Rumex acetosella* L.. We found adults on *Rumex acetosa* L., *R. alpestris* Jacq. (= *arifolius* All.) and *R. scutatus* L. from April to September; nymphs from June to September and adults on conifers from December to May. Probably two or more

generations per year; overwintering as adult on conifers. In the Region Valle d'Aosta, above 1650 m, SAMPÒ (1975) noted a summer generation on flower-galls on *Rumex scutatus* and supposed a second one on leaf-galls.

This species produces very large and peculiar deformations and flower-galls, already described before the first finding of the psyllid. In infested flowers, the ovaries become hypertrophic, sometime more than 20 mm long, apically opened or closed; see (f.e.) MASSALONGO (1881: 229-234, plate 5, figs 1-22), HOUARD (1902: 46-47, figs 23-26); MASSALONGO (1906: 155); HOUARD (1908: 380-381, figs 636-639); ROSS & HEDICKE (1927); BUHR (1965); SAMPÒ (1975: 156-158, figs 3-4, col. plate I: 1).

192. *Trioza saxifragae* Löw, 1888

Des. - KLIMASZEWSKI, 1967b: 295-296; CONCI & TAMANINI, 1986f: 160-161, figs 1-22.

It. Rep. - CONCI & TAMANINI, 1986f: 159-168, figs 1-31 (Tr.A.A.); CONCI *et al.*, 1993: 38, n. 155 (It.).

It.Dis. - Rare and very localized. We found this orophilous species only in two Regions of North Italy; about 80 adult specimens and 30 nymphs, with 12 findings in the following 5 localities: Tr.A.A., Province Trento (Dolomiti di Fassa), Commune Vigo di Fassa, Refuge Paolina, 2250 m; idem, Refuge Roda di Vael, 2300 m; idem, Ciampedie, Refuge Negritella, 1950-2000 m; Commune Pozza di Fassa, Ciampedie, Prà Martini, 2100 m. V.A., Provincie Aosta, Commune Gressan, loc. Pilaz, 1850 m; at 1850 and 2250 m on its host plant, between 1950 and 2300 m on conifers.

Gen. Dis. - Central Europe (South Poland, Slovakia, Austria, Switzerland and NE Italy). Distribution map in CONCI & TAMANINI (1986f: fig. 31), to be integrated by our recent finding in the Region Valle d'Aosta.

Biol. - According to the foreign literature, monophagous on *Saxifraga paniculata* Miller (= *aizoon* Jacq.) (Saxifragaceae). We found three IV instar nymphs and 6 adults the 2.IX.1985 (on Eastern Alps), one V instar nymph, 25 nymphal exuviae and 22 adults (some of which newly emerged) the 28. VIII. 1995 (on Western Alps) always on *Saxifraga aizoides* L. (= *autumnalis* L.); we also collected 50 adults from January to April and in September-October on conifers. In Slovakia, LAUTERER (1993: 155) observed eggs on leaves in June, III and IV instar nymphs

in July, IV instar nymphs in parapause (aestivation) in August-mid-September, nearly hatched adults at beginning of October. Similar phenology has been also noted in Italy, where the species has one generation per year and overwinters as adult on conifers.

193. *Trioza schrankii* Flor, 1861
Trioza schranki (uncorrect)

Des. - Dobreanu & Manolache, 1962: 294-296, figs 206-207; Klimaszewski, 1967b: 297, figs 101-102.

It. Rep. - [Burckhardt, 1983b: 73 (Tic.)]; Hodkinson, 1983b: 279 (Fr.V.G.); Rapisarda & Conci, 1989: 631 (Fr.V.G.); Conci *et al.*, 1993: 37, n. 105 (It.).

It. Dis. - Fairly common. We and others found this orophilous species on the whole Alpine Arc, in 7 Regions of North Italy; hundreds of specimens in about 30 localities, with about 50 findings, between 1400 and 1700 m on the host plant and from 900 to 2000 m on conifers. A collecting biotope is illustrated in our fig. 33 at page 65.

Gen. Dis. - Only Rumania and Central Europe; the record from Russian Transcarpathia needs to be confirmed.

Biol. - Monophagous on *Astrantia major* L. (Umbelliferae). We collected adults throughout the year on conifers and adults and nymphs in July and August on the host plant. One generation per year and overwintering as adult on conifers. We did not observe deformations on the host plant leaves.

194. *Trioza scottii* Löw, 1880
Trioza scotti (uncorrect)

Des. - Klimaszewski, 1967b: 307, figs 123-124.

It. Rep. - Löw, 1888: 23 (Tr.A.A.); Dalla Torre, 1893: 109-110 (Tr.A.A., galls); Massalongo, 1908: 29-30, *sub Coccidearum* sp. (Ven., galls); Cobau, 1912: 34 (Ven., galls); Zangheri, 1966: 800 (Em.R.); Sampò, 1975: 158, 160-161, figs 5-6, col. plate I: 2 (V.A., galls); Conci *et al.*, 1993: 36, n. 52 (It.).

It. Dis. - Common. Found by us and others in 6 Regions of North Italy; hundreds of specimens in about 35 localities, with about 50 findings, between 700 and 1850 m on the host plant (at 500-1100, 1750, 2200 and 2450 m on conifers).

Gen. Dis. - North India, Iran, Caucasus, Turkey, Central Europe, Algeria.

Biol. - According to the literature, strictly oligophagous on *Berberis* spp. (Berberidaceae). In Italy, it is monophagous on *Berberis vulgaris* L.. We found adults on the host plant from June to early November (one time at the end of April) and nymphs from July to October; adults have been found by us on conifers from September to March. We did not find the species in May and June. *T. scottii* overwinters as adult on conifers and probably has one (or two?) generation per year. In Valle d'Aosta, at 1350 m, SAMPÒ (1975: 158-161) noted a single generation per year; he also found eggs on the leaves starting from the end of May; nymphs between late June and the end of July; adults in September-October. Therefore, further biological observations are necessary to better define the life-cycle of this species.

This species frequently causes little pit-galls at the leaf underface, protruding to the upperface. These galls often occur in great number and were already described before the psyllid was discovered. According to the literature, the leaves of *Berberis vulgaris* inhabited by *T. scottii* are sometimes incresped, with folded margins; yet we never observed this kind of deformation. For galls, see (f.e.) HOUARD (1908), MASSALONGO (1908), COBAU (1912), ROSS & HEDICKE (1927), BUHR (1964), SAMPÒ (1975).

195. *Trioza thomasii* Löw, 1888

Trioza thomasi (erroneous), *Trioza thomassii* (missprint); *Heterotrioza* (*Dyspersa*) *thomasi*

Des. - LÖW, 1888: 37-39, fig. 5; SULC, 1911: 14-16, plate 15.

It. Rep. - LÖW, 1888: 28, 37-39 (Tirol, Bad Ratzes, type locality; presently Tr.A.A., Bagni di Razzes); DALLA TORRE, 1893: 133-134 (Tirol, idem, galls); SULC, 1911: 16 (Tirol); LOGINOVA, 1972d: 308 (Tirol); TAMANINI, 1977d: 116 (Tr.A.A.); KONOVALOVA, 1988: 535 (Tirol); CONCI *et al.*, 1993: 36, n. 62 (It.). The whole literature (including the cecidological one) reports *T. thomasii* from «Tirol, Austria»; nevertheless, according to TAMANINI (1977d: 116) the type locality of this species presently lies in Italy, in the Region Trentino-Alto Adige.

It. Dis. - Extremely rare. The only European finding is reported by LÖW (1888: 39): it was carried out by Prof. Friedrich Thomas in Tirol, near Bad Ratzes, 1300-1400 m, nearby the road to Gestansch (now Italy, Region Trentino-Alto Adige, Province Bolzano-Bozen, Commune Castelrotto-Kastelruth, loc. Razzes-Gstatsch). We never found this spe-

cies, in spite of some researches in the type locality. *T. thomasii* is the only Italian Triozidae which escaped our collecting researches up to now.

Gen. Dis. - According to LOGINOVA (1972b) and KONOVALOVA (1988): Far East Russia, Mongolia, Altai; Eastern Alps. It is perhaps an Oriental species, extremely rare in Western Palaearctic. The record by JAAP (1920: 13) from Oberbayern regards only galls on *Homogyne alpina* and could be referred to another taxon.

Biol. - Only a few notes by LÖW (1888: 28, 39) are available: the nymphs live on *Homogyne alpina* (L.) Cass. (Compositae); they cause swellings on the upperface of the leaves and change in adults from the end of June onwards.

196. *Trioza tripteridis* Burckhardt, Conci, Lauterer & Tamanini, 1991

Des. - BURCKHARDT *et al.*, 1991: 165-168, figs 1-14.

It. Rep. - BURCKHARDT *et al.*, 1991: 165-174, figs 1-26 (Tr.A.A.); CONCI & TAMANINI, 1991: 57-58, figs 1.9, 40-42, table II (Tr.A.A.); CONCI *et al.*, 1993: 39, n. 184 (It.).

It. Dis. - Fairly rare. We found this orophilous species in two Regions of NE Italy; about 70 specimens, with about 15 findings, between 1400 and 2000 m on the host plant (1700-2000 m on conifers; 2075 m on meadows), in the following 8 localities: Veneto, Province and Commune Belluno, loc. Col Visentin, 1700 m; Trentino-Alto Adige, Province Bolzano-Bozen, Commune Nova Levante-Welschnofen, 1400 m; same Region, Province Trento, Eastern Dolomites, Commune Vigo di Fassa, loc. Ciampedie, near Refuge Negritella, 1950-2000 m (type locality) and loc. Passo di Costalunga, 1700 m; same Region and Province, Commune Pozza di Fassa, loc. Ciampedie, Pra Martin, 2075 m, Commune Ruffré, M. Penegal, 1700 m, and Commune Rovereto, Mount Zugna, 1550 m.

Gen. Dis. - East and Central Europe: Rumania, Slovakia, Austria, North Italy and Switzerland.

Biol. - Strictly oligophagous on *Valeriana* spp. (Valerianaceae). In Italy, this species has been found only on *Valeriana montana* L.. We collected in June (in Ciampedie, at 1950 m) overwintered adults returned back to *V. montana* at beginning of flowering; eggs in July; nymphs in July and August; adults on conifers from September to May of the following year. From nymphs collected in August and bred in laboratory, adults flew in about a week. Therefore, *T. tripteridis* performs in Italy one generation per year and overwinters on conifers for a

8-9 months period; nymphal development occurs without diapause. The schematic life-cycle is reported by CONCI & TAMANINI (1991: table II). The nymphs mostly feed on stems and produce very little wax; they often rest on the branching of stems, with the head directed downwards. We did not observe galls.

197. *Trioza centranthi* (Vallot, 1829)
Psylla Neilreichii Frauenfeld, 1864

Des. - DOBREANU & MANOLACHE, 1962: 357, fig. 265; HODKINSON & WHITE, 1979b: 67, 73, figs 243, 263, 281, 298; OSSIANNILSSON, 1992: 275, figs 1174-1183.

It. Rep. - FRAUENFELD, 1869: 60 (Tr.A.A., galls); NICOTRA, 1880: 48-49 (Sic., g.); LÖW, 1882b: 214 (Tr.A.A.); LÖW, 1886: 166 (Tr.A.A., Lig., Sic.); DALLA TORRE, 1888: IV (Tr.A.A., g.); FERRARI, 1888: 76 (Lig.); LÖW, 1888: 21 (Tr.A.A., g.); BEZZI, 1893: 114 (Tr.A.A.); DALLA TORRE, 1893: 115, 169 (Tr.A.A., g.); DALLA TORRE, 1894: 22 (Tr.A.A., g.); MASSALONGO, 1895: 49 (Ven., g.); MASSALONGO O., 1896: 189 (Ven., g.); MASSALONGO, 1897: 97 (Ven., g.); DE STEFANI, 1898c: (Sic., g.); MASSALONGO & ROSS, 1898: 404-405, figs 5-10 (Sic., g.); BEZZI, 1899: 15 (Tr.A.A., g.); MASSALONGO, 1899: 146-148 (Ven., g.); CECCONI, 1900: 245 (Tosc., g.); CECCONI, 1901: 137 (Sard., g.); DE STEFANI PEREZ, 1902: 110 (Sic., g.); TROTTER & CECCONI, 1903: 7, n. 159 (Camp., g.); TROTTER, 1904a: 78 (It., g.); DE STEFANI-PEREZ, 1905: 105, 109 (Sic., g.); TROTTER, 1905: 103 (Camp., g.); CECCONI, 1906: 42 (Tosc., g.); MARIANI, 1908: 111 (Lomb., g.); DE STEFANI, 1909: 148 (Lig., g.); CORTI, 1911: 319, 348 (Lomb., g.); SULC, 1913a: 16 (Lig.); DE STEFANI [junior], 1944: 65 (Sic., g.); GRANDI, 1951: 820 (It., g.); GHESQUIÈRE, 1956: 702 (Lig., parasites); SAMPÒ, 1975: 169-170, figs 12-14, col. plate 2: 6-7 (V.A., g.); TREMBLAY, 1981: 96 (It., g.); HODKINSON, 1983b: 279 (Fr.V.G.); RAPISARDA, 1988b: 620 (Sic.); RAPISARDA & CONCI, 1989: 630 (Fr.V.G.); RAPISARDA, 1991: 39-40 (Sard.); CONCI *et al.*, 1993: 35, n. 5 (It.).

It. Dis. - Common. Found by us and others in 15 Regions throughout Italy; hundreds of specimens in more than 40 localities, with more than 60 findings, between the sea level and 900 m and between 1300 and 1900 m on its host plants (at 1200, 1700 and 1900 m on conifers).

Gen. Dis. - Caucasus, Turkey, Eastern and Central Europe (not in Russia and Ukraine), Great Britain, Mediterranean Basin.

Biol. - Widely oligophagous on *Centranthus* spp., *Valerianella* spp. and *Fedia cornucopiae* (Valerianaceae). We and others found in Italy galls

caused by this species on *Centranthus angustifolius* (Miller) DC., *C. ruber* (L.) DC., *Fedia cornucopiae* (L.) Gaertner, *Valerianella carinata* Loisel., *V. coronata* (L.) DC., *V. dentata* (L.) Pollich, *V. locusta* (L.) Laterrade (= *olitoria* (L.) Pollich) and *V. rimosa* Bastard (= *auricula* DC). Adults were collected by us practically throughout the year and nymphs in galls from

Fig. 39 - Biotope of *Trioza centranthi* on *Centranthus ruber* (with many red galls), *Agonoscena cisti* and *A. targionii* on *Pistacia lentiscus*, and *Spanioza galii* on *Rubia peregrina*. NE Italy, Liguria, Camporosso, 300 m, in the Mediterranean maquis. (Photo C. Conci, V. 94).

February to November. In mountain environments, *T. centranthi* showed to perform one generation per year, overwintering as adult on conifers; but in warmer zones, it proved to overwinter in all stages, with a still undefined number of yearly generations.

This species frequently causes showy deformations on both leaves and flowers, above all to the common *Centranthus ruber*. The leaf margins are rolled upwards, forming irregular, turgid, pale green or red galls. Flowers and inflorescences may be also deformed in various ways, as through hypertrophies or atrophies of the stamens; apical flowers may be distorted, to form a subglobular complex. Thus, *T. centranthi* causes the greatest variety of galls among the European psyllids. All these galls were described and figured many times, starting from BAUHIN (1623: 165; the second, though indirect, record in the world of a psyllid, after *Livia juncorum*) and following with (f.e.) ANDRÉ (1878), MASSALONGO (1897), HOUARD (1909), SAMPÒ (1975). See also our fig. 39 at page 87.

198. *Trioza cerastii* (Linnaeus, 1758)

Des. - DOBREANU & MANOLACHE, 1962: 310-312, figs 221-222; KLIMASZEWSKI, 1967b: 299, figs 106-108; OSSIANNILSSON, 1992: 291, figs 1255-1266.

It. Rep. - LÖW, 1888: 26 (Tr.A.A.); DALLA TORRE, 1893: 115-116 (Tr.A.A., galls); CECCONI, 1901a: 62 (Tosc., galls); CORTI, 1902: 196-197 (Lomb., galls); MASSALONGO, 1904: 116 (Ven., galls); TROTTER, 1908: 117 (Abr., galls); MARIANI, 1908a: 297 (V.A., galls); TAMANINI, 1977d: 117 (Tr.A.A., Lomb.); CONCI *et al.*, 1993: 36, n. 53 (It.).

It. Dis. - Very common on the Alps. We and others found this orophilous species in 11 Regions of North and Central Italy; hundreds of specimens in about 60 localities, with one hundred of findings, between 900 and 2530 m, on conifers; only one finding on *Cerastium* sp., at 1300 m. The quotes of cecidological findings are not available, since they have not been reported in the related literature. Our highest finding has been carried out in Piemonte, Province Torino, Commune Pragelato, Mount Geneveis.

Gen. Dis. - Almost throughout Europe, except Great Britain; a few records from Asia need to be confirmed.

Biol. - According to the literature, strictly oligophagous on *Cerastium* spp. (Caryophyllaceae). Adults were collected by us throughout the year on conifers; we did not find nymphs. One generation per year and overwintering as adult on conifers.

This species produces characteristic deformations: strongly shortened internodes, in apical parts of the stems; enlarged, bent and approached leaves, forming a subspherical mass, up to 20 mm wide, which the nymphs develop in; chloranthic flowers. For galls see (f.e.) CECCONI (1901a), CORTI (1902), MASSALONGO (1904), HOUARD (1908), TROTTER (1908), ROSS & HEDICKE (1927); BUHR (1964). In Italy, such kind of galls were found by other Authors (but not by us) on *Cerastium arvense* L. and *C. holostenoides* Fries (*sub C. triviale* Link and *C. vulgatum* L.).

Genus *Eutrioza* Loginova, 1964

199. *Eutrioza opima* Loginova, 1964

Des. - BURCKHARDT *et al.*, 1990: 68-69, figs 1-18.

It. Rep. - BURCKHARDT *et al.*, 1990: 67-73, figs 1-18 (Ven.); CONCI *et al.*, 1993: 39, n. 181 (It.).

It. Dis. - Very rare. Found only in a very restricted zone in the Italian PreAlps: Region Veneto, Province Belluno, Commune Arsié, loc. Col Perer, Pramolin, 1200 m; one finding by Prof. G. Pellizzari (31 specimens, VII.1979, on ?*Tragopogon* sp.) and one by C. Conci (1 male, 10.VII.1988, on *Picea abies* L.).

Gen. Dis. - Caucasus, Turkey, Ukraine (Crimea), North Italy, France and Tunisia.

Biol. - The host plant of this species is unknown. Some specimens were collected on shelter plants (conifers); most of the Italian material may have been found on *Tragopogon* sp. (Compositae), but samples may have been mixed up, so that this record is doubtful. HODKINSON (1984b: 59) surprisingly reports *E. opima* as developing on conifers. Probably one generation per year and overwintering as adult on conifers.

Table III - DISTRIBUTION OF THE SPECIES IN THE 20 ITALIAN REGIONS, 2

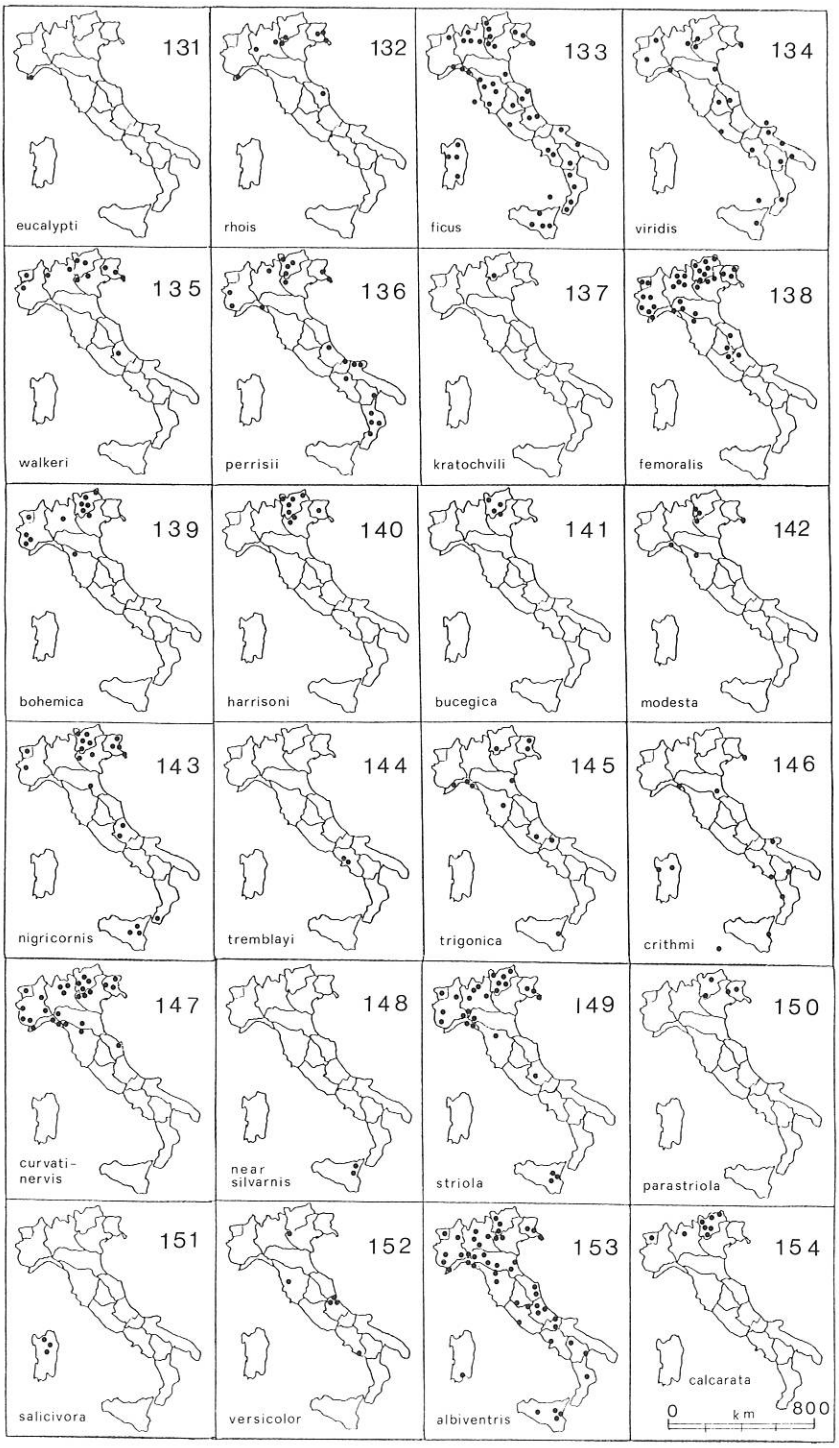
! = Specimens collected or examined by us, or reliable bibliographical records
° = Only bibliographical record, without recent control

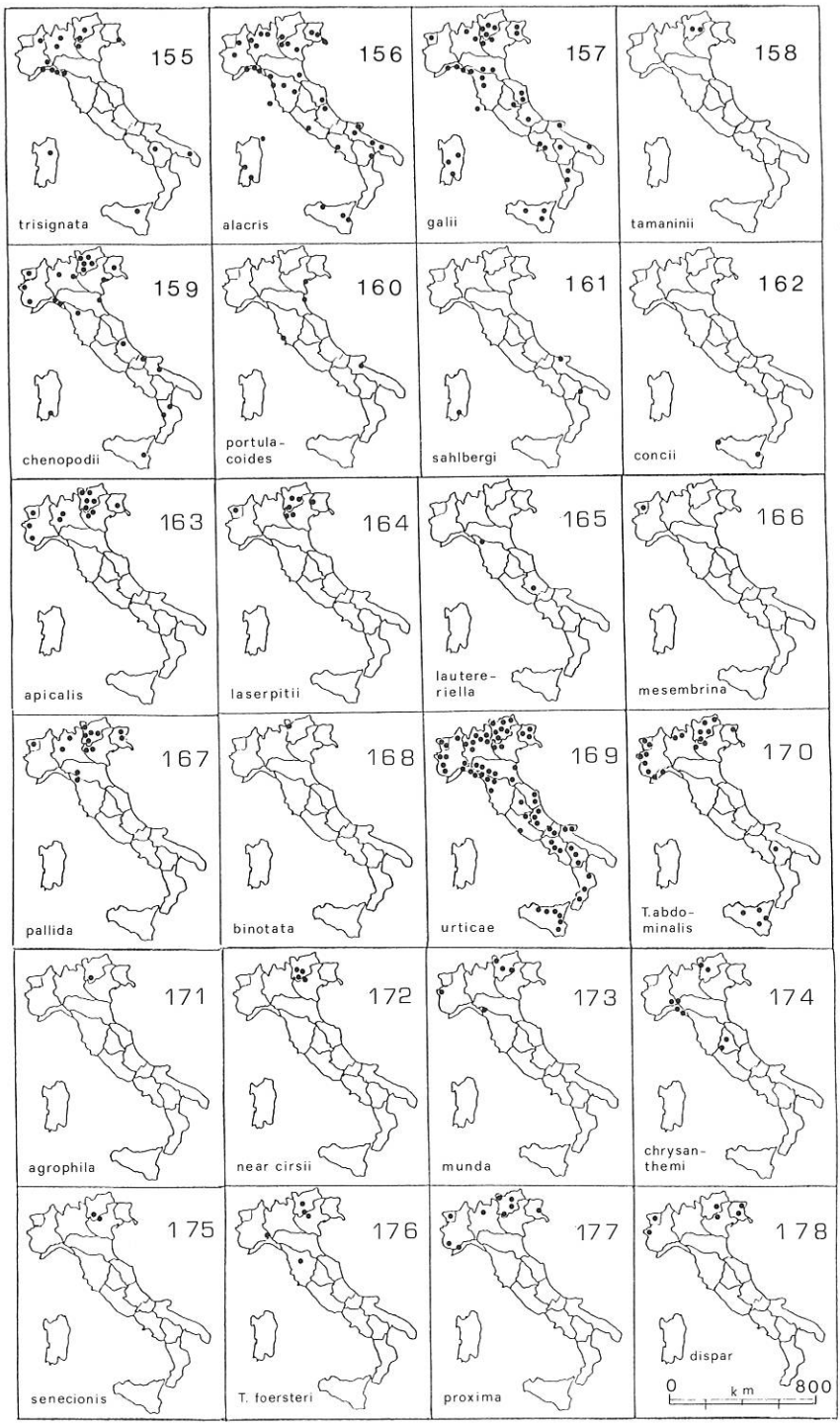
	Friuli - Ven. G.	Veneto	Trentino - A. A.	Lombardia	Piemonte	Valle d'Aosta	Liguria	Emilia - Romagna	Toscana	Umbria	Marche	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria	Sicilia	Sardegna
131. *Ctenarytaina eucalypti*							!													
132. *Calophya rhois*	!	!	!	!			!				!									
133. *Homotoma ficus*	!	!	!	!	!		!	°	!	!	!	!	!	!	!	!	!	!	!	!
134. *H. viridis*	!	!	!	!	!		!	!		!	!	!			!	!	!	!		
135. *Trichochermes walkeri*	!	!	!	!	!	!							!							
136. *Bactericera perrisii*	!	!	!	!	!		!						!	!	!	!	!	!		
137. *B. kratochvili*			!																	
138. *B. femoralis*	!	!	!	!	!	!	!	!	!	!	!	!	!							
139. *B. bohemica*		!	!	!	!	!			!											
140. *B. harrisoni*	°	!	!																	
141. *B. bucegica*		!	!																	
142. *B. modesta*	!	!	!				!		!											
143. *B. nigricornis*	!	!	!		!	!		!					!					!	!	
144. *B. tremblayi*														!	!					
145. *B. trigonica*	!		!		!		!	!					!	!					!	
146. *B. crithmi*	!						!	°							!	!	!	!	!	!
147. *B. curvatinervis*	!	!	!	!	!	!	!	!	!		!									
148. *B.* near *silvarnis*																			!	
149. *B. striola*	!		!	!	!	!	!	!	!				!						!	
150. *B. parastriola*	!		!																	
151. *B. salicivora*																				!
152. *B. versicolor*		!							!				!							
153. *B. albiventris*	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!			!	!	!
154. *B. calcarata*			!	!		!														
155. *Phyllopl. trisignata*	!	!	!	!	!		!		!							!	!		!	!
156. *Lauritrioza alacris*	!	!	!	!	!		!	!	!		!	!	!		!	!	!		!	!
157. *Spanioza galii*	!	!	!	!		!	!	!	!	!	!		!		!	!	!	!	!	!
158. *S. tamaninii*			!																	
159. *Heterotr. chenopodii*	!	!	!	!	!	!	!	!	!				!	!		!		!	!	!
160. *H. portulacoides*		!						!	!							!				
161. *H. sahlbergi*																!	!			!
162. *H. concii*																			!	
163. *Dyspersa apicalis*	!	!	!	!	!	!														
164. *D. laserpitii*	!	!	!			!														
165. *D. lautereriella*									!				!							
166. *D. mesembrina*						!														
167. *D. pallida*	!	!	!	!		!		!	!											

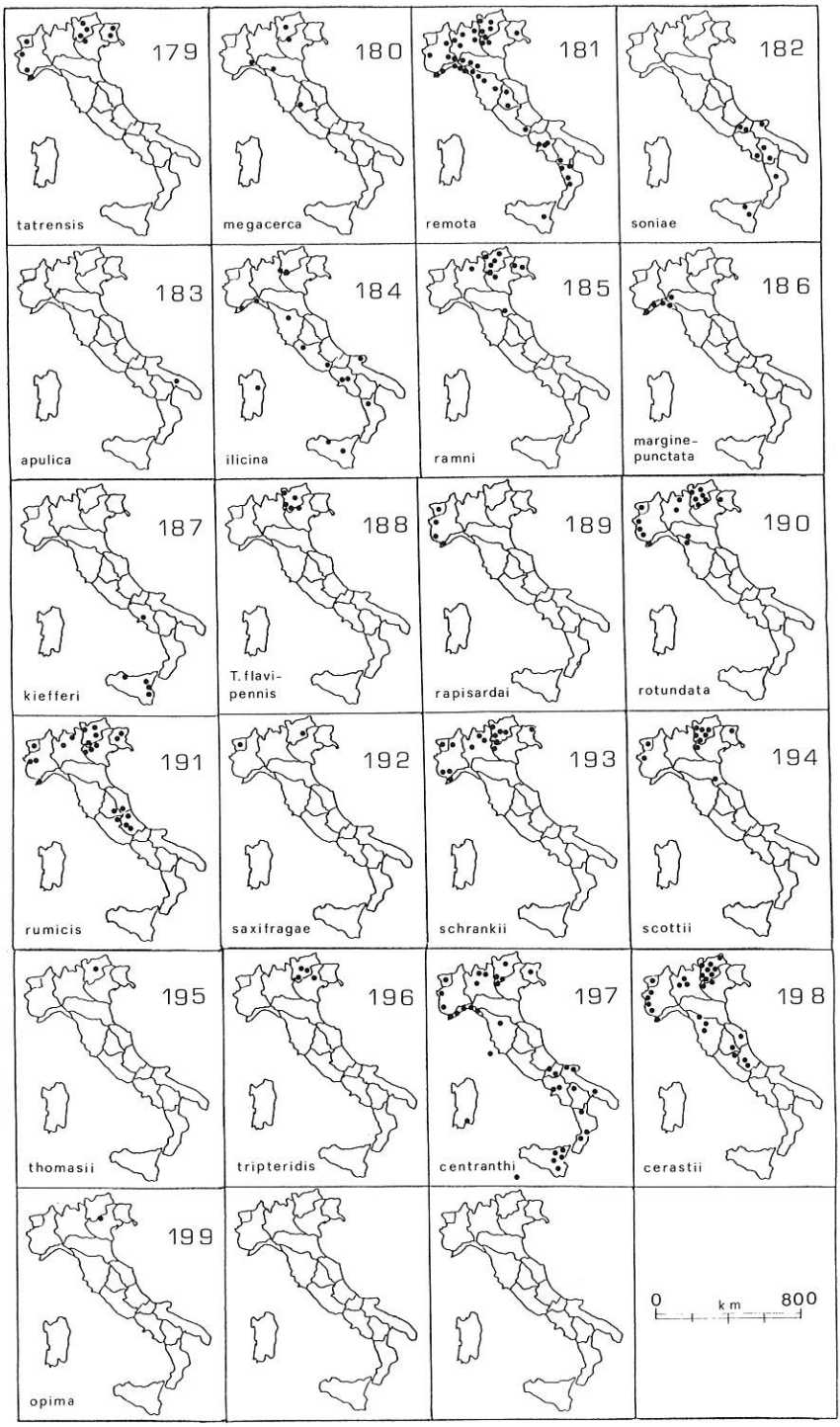
Table III

	Friuli - Ven. G.	Veneto	Trentino - A. A.	Lombardia	Piemonte	Valle d'Aosta	Liguria	Emilia - Romagna	Toscana	Umbria	Marche	Lazio	Abruzzo	Molise	Campania	Puglia	Basilicata	Calabria	Sicilia	Sardegna
168. *Hippophaetr. binotata*			!																	
169. *Trioza urticae*	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
170. *T. abdominalis*	!	!	!	!	!	!	!													
171. *T. agrophila*			!																	
172. *T.* near *cirsii*		!	!																	
173. *T. munda*			!		!				!											
174. *T. chrysanthemi*			!	!	!		!			!										
175. *T. senecionis*		!	!																	
176. *T. försteri*		!	!		°				°											
177. *T. proxima*	°		!	!	!	!	!													
178. *T. dispar*	°	°	!		!	!	!													
179. *T. tatrensis*	!	!	!		!	!	!													
180. *T. megacerca*		!	!		!			!		!										
181. *T. remota*	!	!	!	!	!		!	!	!	!		!			!		!	!		
182. *T. soniae*														!	!	!	!	!		
183. *T. apulica*																!				
184. *T. ilicina*			!				!		!			!			!	!		!	!	!
185. *T. ramni*	!	!	!	!				°												
186. *T. marginepunctata*							!	!												
187. *T. kiefferi*															°				!	
188. *T. flavipennis*		°	!																	
189. *T. rapisardai*					!	!	!													
190. *T. rotundata*	!		!	!	!	!	!	!	!											
191. *T. rumicis*	!	!	!	!	!	!	!			!	!	!	!							
192. *T. saxifragae*			!			!														
193. *T. schrankii*	!	!	!	!	!	!	!													
194. *T. scottii*	!	!	!		!	!		°												
195. *T. thomasii*			!																	
196. *T. tripteridis*		!	!																	
197. *T. centranthi*	!	!	!	!	!	!	!		!					!	!	!	!	!	!	!
198. *T. cerastii*		!	!	!	!	!	!		!	!	!	!	!							
199. *Eutrioza opima*		!																		
Total	34	40	52	28	32	27	30	21	23	11	11	10	16	8	15	15	13	13	20	12
Total of I Part	50	49	70	50	57	32	51	48	44	20	21	25	43	33	32	36	27	42	48	40
General total	84	89	122	78	89	59	81	69	67	31	32	35	59	41	47	51	40	55	68	52

ORIENTATIVE MAPS OF THE ITALIAN DISTRIBUTION OF SPONDYLIASPIDAE, CALOPHYIDAE, HOMOTOMIDAE AND TRIOZIDAE




155
trisignata
156
alacris
157
galii
158
tamaninii
159
chenopodii
160
portula-
coides
161
sahlbergi
162
concii
163
apicalis
164
laserpitii
165
lautere-
riella
166
mesembrina
167
pallida
168
binotata
169
urticae
170
T.abdo-
minalis
171
agrophila
172
near cirsii
173
munda
174
chrysan-
themi
175
senecionis
176
T. foersteri
177
proxima
178
dispar
0
km
800


179
tatrensis
180
megacerca
181
remota
182
soniae
183
apulica
184
ilicina
185
ramni
186
margine-
punctata
187
kiefferi
188
T. flavi-
pennis
189
rapisardai
190
rotundata
191
rumicis
192
saxifragae
193
schrankii
194
scottii
195
thomasii
196
tripteridis
197
centranthi
198
cerastii
199
opima
0 km 800

GENERAL CONSIDERATIONS

The huge amount of data on Italian psyllids which have been acquired through our researches allow to trace out some considerations on chorological and biological aspects of the Italian psyllid fauna. General information on these topics is summarized in the following pages.

1. DISTRIBUTION IN ITALY

In their geographical distribution, Psylloidea are strictly linked to their host plants, but some exceptions may occur to this general rule.

For instance, each Italian species often shows a more restricted diffusion, compared to its host plants, appearing to be frequent only in areas where its hosts abundantly grow, and slightly becoming unlikely to be collected towards the distribution edges of the same plants. Exceptions are given by psyllids whose host plants diffusion has been dramatically reduced in recent times by various (mainly anthropic) causes and consequently are in danger of extintion in some areas. In the latter cases, the psyllid and the host plant distribution mostly appear to coincide each other.

But on the contrary, psyllids may also be found outside the areas where their host plants occur and not seldom far away from the latter ones. This is due to occasional transport of adults by wind or other causes, as well as to migrations (as to the latter aspect, see chapter 3.2.5.).

1.1. **Chorological distribution**

1.1.1. General remarks

In this catalogue, the presently known Italian distributions are dealt with under each psyllid species and summarized in table II of the first part and in table III of the second part; moreover, they are graphically reported in the orientative maps of both parts.

Summing up the all above data, the Italian Regions may be listed as

follows, on the base of a decreasing number of psyllid species which have been collected in:

Trentino - Alto Adige, 122
Veneto, 89
Piemonte, 89
Friuli - Venezia Giulia, 84
Liguria, 81
Lombardia, 78
Emilia - Romagna, 69
Sicilia, 68
Toscana, 67
Valle d'Aosta, 59
Abruzzo, 59
Calabria, 55
Sardegna, 52
Puglia, 51
Campania, 47
Molise, 41
Basilicata, 40
Lazio, 35
Marche, 32
Umbria, 31

The presently available knowledge on psyllid fauna is not uniform for all 20 Regions; in fact, if a reliable number of species has been collected in well investigated Regions (such as Trentino - Alto Adige, Liguria and Sicily), further researches are necessary in other ones, where the number of psyllids is liable to even sensibly increase in the future. However, a general trend emerges to a richest fauna in more northern Regions, reaching its highest expression in Trentino - Alto Adige (with the peak value of 122 species), while a relatively poorer composition is shown by central and southern Regions. This fact reflects a wide tendency occurring in nearly all zoological groups and is mostly to be related to both differences in environmental variety and floristic wealth (the latter one particularly important in determining the faunistic composition of strictly phytophagous insects).

1.1.2. Species occurring throughout Italy

Only the following 21 species (which are a bit more than 10% out of the total) have been found throughout all continental Italy, Sicily and Sardinia: *Livia juncorum, Euphyllura olivina, Euphyllura phillyreae, Strophingia cinereae* [2], *Psyllopsis fraxinicola, Baeopelma colorata, Baeopelma försteri, Cacopsylla peregrina, Cacopsylla crataegi, Cacopsylla pulchra, Cacopsylla pyri, Homotoma ficus, Bactericera crithmi* (mainly along the sea coasts), *Bactericera albiventris, Phylloplecta trisignata, Lauritrioza alacris, Spanioza galii, Heterotrioza chenopodii, Trioza urticae, Trioza ilicina, Trioza centranthi.*

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[2] Found in North Italy also in Veneto (on the Euganean Hills), in addition to the localities already reported in the first part of this catalogue.

1.1.3. Localized species

In spite of the wide field researches which have been carried out by us all over the Italian territory, some species (totally 24, i.e. the 12% out of the total) have been found up to now only in very small areas, apparently showing a highly localized diffusion.

Among these psyllids, we can list *Aphalara calthae*, *Cacopsylla costalis*, *C. intermedia*, *C. parvipennis*, *Bactericera kratochvili*, *Trioza agrophila*, *T. thomasii*, *Eutrioza opima*, all of them found up to now only on Eastern Alps; *Chamaepsylla hartigii*, found only on Central Alps; *Arytaina torifrons*, *Livilla pyrenaea*, *Cacopsylla propinqua*, *Dyspersa mesembrina*, found only on Western Alps; *Pseudaphorma astigma* and *Cacopsylla ulmi*, respectively found in the plains of Piemonte and Lombardia; *Diaphorina chobauti*, found only in Liguria; *Xanioptera* near *alevtinae* and *Trioza apulica*, respectively found in small areas of the Regions Abruzzi and Puglia; *Acizzia hollisi*, *Arytaina adenocarpi*, *Arytainilla barbagalloi*, *A. incuba* and *Livilla retamae*, all of them found only in Sicily; *Strophingia* sp., found only in Sardinia.

1.1.4. Endemic species

At moment, only the following 11 species (the 5% of the total) may be considered endemic to Italy: *Magnaphalara santolinae*, *Pseudaphorma astigma*, *Arytainilla barbagalloi*, *Livilla siciliensis*, *L. hollisi*, *L. magna*, *L. poggii*, *Psylla cordata*, *Heterotrioza portulacoides*, *Trioza soniae* and *T. apulica*. A further group of 4 species (*Xanioptera* near *alevtinae*, *Magnaphalara* near *pontica*, *Bactericera* near *silvarnis* and *Trioza thomasii*) needs to be taxonomically better understood, before being included among Italian endemisms.

1.2. **Altimetrical distribution**

1.2.1. Introductory notes

Up to now, detailed altimetrical observations on psyllids within a considerably wide territory have been carried out in Europe only in a few Countries; thus, synthetic tables are available only for 95 Swiss species (Schäfer, 1949a: 78-79, tab. II) and 85 Rumanian ones (Dobreanu & Manolache, 1962: 45-47, tab. III). Our present analysis, based on the Italian psyllid fauna, involves a higher number of species (197) and findings.

As a basic rule, since psyllids are a group of strictly phytophagous insects showing a specialized linkage to the host plants, also their altimetrical distribution is strongly related to the orographic levels of vegetation.

But in contrast with other groups of sap-feeder insects, numerous psyllids show seasonal migrations and spend the coldest months on shelter plants, usually conifers (see chapter 3.2.5.). In Italy, this kind of behaviour is performed by nearly 74 (37%) of the presently known species. Both active flights (usually limited within a few tens of metres) and passive ones (mainly due to the wind and covering a longer distance, up to tens of kilometres) allow the above psyllid migrations. Obviously, when the wind action prevails in favourishing a psyllid species to migrate, the latter one shows an overall altimetrical distribution which is sensibly wider, compared to the one evaluated on its primary host plants (see, for instance, *Cacopsylla pulchella* and *Cercis siliquastrum*).

On the other hand, as it has been already evidenced for the «horizontal spreading», psyllids often show a more restricted altimetrical distribution than their primary host plants (see, for example, *Cyamophila prohaskai* and *Anthyllis vulneraria* subsp. *alpestris*).

Clima and vegetation have a wide variety in Italy, owing to the large latitudinal range of this Country. Moreover, ecological variety may sometimes occur also at the same latitude and within the same orographic region, as in the case of the Alps. In these mountains, for instance, the altimetrical bounds of vegetation are sensibly lower (up to 200-300 m) in Eastern Alps (above all in Carnia, Friuli) than in Central ones; on the contrary, they are higher (up to 200-300 m) in Western- than in Central Alps. Therefore, each species may show a well marked altimetrical difference between the more Eastern (Friuli-Venezia Giulia) and Western (Piemonte) Alpine Regions.

Altimetrical data which are synthesized in table IV and circumstantially reported in the following pages mostly derive from personal collections. Unfortunately, they are almost incomplete up to now and deep changes may derive to information reported in the following pages as a consequence of further researches, especially in South Italy and the Islands. Moreover, all these considerations on the altimetrical distribution of Italian psyllids should be elastically accepted, as a consequence of the ecological peculiarities reported above.

Due to recent controls or new findings, some data already published in the first part of this catalogue are here presented with little variations.

1.2.2. Levels, horizons and subhorizons of Italian vegetation

Owing to the relevant ecological diversity throughout the peninsula, Italian vegetation is not easy to be sorted into groups of altitudinal zones. To this aim, an appreciable analysis has been made by Giacomini & Fenaroli (in «La Flora», 1950) and by Dalla Fior (1981), whose scheme we mostly follow in this catalogue. Obviously, such a division of the Italian flora has only an orientative value, since it is reliable in some areas (i.e. Northern Italy) but less exact in other ones. According to the above Authors, the Italian vegetation may be altimetrically split as follows.

1. Basal level, 0-1000 m.
   - 1.1. Mediterranean horizon, 0-400 m and sometimes more.
     - 1.1.1. Litoranean subhorizon, 0 m: litoranean alophilous plants.
     - 1.1.2. Mediterranean (*sensu stricto*) subhorizon, 0-400 m and sometimes more: mediterranean maquis.
   - 1.2. Submediterranean horizon, 100-400 m.
   - 1.3. Submontain horizon, 400-1000 m; up to the upper limit of Chestnut, Oak and coppice.
2. Mountain level, 1000-1900 m.
   - 2.1. Lower mountain horizon, 1000-1500 m: up to the upper limit of cultivations and the woods of Beech.
   - 2.2. Upper mountain horizon, 1500-1900 m; up to the upper limit of conifers.
3. Top level, 1900 m and above.
   - 3.1. Subalpine horizon, 1900-2200: up to the upper limit of contorted shrubs and most part of the pastures.
   - 3.2. Alpine horizon, above 2200 m.

1.2.3. Groups of psyllid species according to their altimetrical distribution

All data deriving from our findings (see table IV) are organized in the following list, where the Italian species are tentatively split in 9 altimetrical groups, roughly based on the floristic prospect reported above. In each one of these groups, psyllids are listed in systematic order.

For each species, we indicate the altimetrical bounds, as these ones derive from our collections on the host plants; to this aim, altitudes are mostly reported with 100 m intervals (in some cases, small interpolations have been applied in order to simplify nearly sure intervals). For

species showing seasonal migrations, data drawn from collections on shelter or occasional plants are reported between brackets. The latter way is also used to indicate captures by traps, when these ones highly diverge from the usual altimetry of the species.

As to this aspect, it is particularly worth of being mentioned the record of some typically orophilous species (i.e. *Bactericera femoralis*, *B. harrisoni*, *B.* near *striola* (in the case it corresponds to *B. parastriola*), *Dyspersa pallida*, *Trioza dispar*, *T. tatrensis*, *T. schrankii*) in plain areas of Friuli-Venezia Giulia (Province Udine: Godia, 128 m; Moimacco, 118 m; Udine, 113 m) (HODKINSON, 1983b). All of them were collected by yellow water trays during 1979-1981, by P.G. Coceano, and have been probably transported in the area by a special wind (called «bora»), which usually blows from the Julian Alps down to the Friulian plain.

Altitudes of collections on occasional plants are not reported for species usually performing the entire life-cycle on the primary host plants.

I group - Species exclusively living on alophilous plants growing at the sea level. It is related to the basal level, mediterranean horizon, litoranean subhorizon of the adopted botanic scheme (1.1.1.).

Rhodochlanis bicolor, 0
Rhodochlanis salsolae, 0
Livilla retamae, 0
Heterotrioza portulacoides, 0
Heterotrioza concii, 0.

II group - Species living on plants of Mediterranean maquis and found from the sea level to a few hundreds metres (but up to more than 1000 m in South Italy). It is related to the basal level, mediterranean horizon, mediterranean subhorizon (1.1.2.).

Euphyllura olivina, 0-700
Euphyllura phillyreae, 0-600
Crastina loginovae, 0 and 600
Stigmaphalara tamaricis, 0-70
Colposcenia aliena, 0 and 300
Strophingia cinereae, 0-1000
Strophingia proxima, 0-800
Strophingia sp., 900
Agonoscena targionii, 0-700
Agonoscena succincta, 0-300
Agonoscena cisti, 0-700
Lisronia varicicosta, 0-800
Diaphorina lycii, 0-570
Diaphorina putonii, 0-130
Diaphorina continua, 0 and 1300
Diaphorina chobauti, 400
Arytainilla hakani, 400-900
Arytainilla incuba, 160
Arytainilla cytisi, 0-1000
Livilla siciliensis, 650-750
Livilla hollisi, 30 and 200
Livilla bimaculata, 0-1000
Livilla poggii, 100 and 850-1000
Livilla spectabilis, 0-1200
Cacopsylla alaterni, 0-850
Cacopsylla myrthi, 0-800 (1300; up to 1800 on various Sicilian mounts)
Cacopsylla notata, 0-1300
Ctenarytaina eucalypti, 0-300
Homotoma ficus, 0-900

Homotoma viridis, 0-800
Bactericera tremblayi, 0-300
Lauritrioza alacris, 0-750
Heterotrioza sahlbergi, 0 and 450
Trioza apulica, 350-400
Trioza ilicina, 0-1100
Trioza marginepunctata, 0-350 (600-1550).
Trioza kiefferi, 100-550

III group - Species living on plants of plains and hills, found between the sea level and moderate heights (up to about 1000 m). It is related to the basal level, from mediterranean to submountain horizons (from 1.1.2. to 1.3.).

Xanioptera conspersa, 0-1000
Tetrafollicula omissa, 200-1000
Camarotoscena speciosa, 50-500 and 1000 (1000 and 1200)
Camarotoscena subrubescens, 0-550
Psyllopsis meliphila, 100-950
Psyllopsis discrepans, 0 and 650-700
Acizzia acaciaebaileyanae, 0-600
Acizzia uncatoides, 0-700 (1500 and 1800)
Acizzia hollisi, about 25
Asphagidella buxi, 0-950
Cacopsylla ulmi, 130
Cacopsylla pulchella, 0-500 (150-1800)
Spanioneura fonscolombii, 0-900
Calophya rhois, 50-1000
Bactericera perrisii, 0-1000 (600-1000, 1700 and 1850)
Bactericera kratochvili, 350-380
Bactericera modesta, (80-1000)
Bactericera trigonica, 0-700, 1200
Bactericera crithmi, 0, 200 and 850 (430 and 1080)
Bactericera near *silvarnis*, 0, 350, 550, 900
Bactericera salicivora, 350, 550, 850 and 1100
Bactericera versicolor, 0-120
Phylloplecta trisignata, 70-900 (0-450)
Heterotrioza chenopodii, 0, 300-650, 1000-1100 (1550, 1600 and 2000)

IV group - Species whith a wide altimetrical range and found from the sea level (or slightly above) to even more than 2200 m. It is related to nearly the whole range of the adopted botanic scheme, from the basal to the top level (from 1.1.2. to 3.2.).

Livia juncorum, 0-1950 (300-1950)
Livia mediterranea, (0-1600)
Aphalara borealis, (120, 900, 1500-1600)
Aphalara polygoni, 0-1400 (0-1800)
Aphalara avicularis, 0-400, 1000 and 1450
Xanioptera carinthica, 280-1600 (650-1700)
Aphorma lichenoides, (0-1600)
Strophingia ericae, 300-1800
Rhinocola aceris, 0-1500
Psyllopsis fraxinicola, 0-1400 and 1700
Psyllopsis fraxini, 0-1700
Arytaina genistae, 250-1400
Arytaina africana, 240-1300
Arytainilla spartiophila, 300-1400
Livilla horvathi, 0 and 700-1450
Livilla vittipennella, 150, 600 and 850-1900
Livilla variegata, 120-1700
Psylla alni, 100-1300
Baeopelma colorata, 150-1300
Baeopelma försteri, 0-1300
Cacopsylla mali, 250 and 700-1500 (150 by trap)
Cacopsylla peregrina, 50-1600 (700-1800)
Cacopsylla pyrisuga, 0-1200 (300-1400)
Cacopsylla affinis, (100-1800)
Cacopsylla melanoneura, 100-1400 (100-1750)
Cacopsylla crataegi, 100-1400 (0-1850)
Cacopsylla breviantennata, 900-1600 (150-1900)
Cacopsylla pruni, 150-1300 (250-1700)
Cacopsylla ambigua, 0-1400 and 1900
Cacopsylla abdominalis, 0-1700 and 2270
Cacopsylla pulchra, 150-1900 (0-2000)
Cacopsylla brunneipennis, 250, 700-1900 and 2230 (150-2000 and 2550)

Cacopsylla saliceti, 0-350, 1000-1500 and 2150 (70-2100)
Cacopsylla iteophila, 60-500 and 1600 (250-550 and 1000)
Cacopsylla pyricola, 0-1350
Cacopsylla bidens, 270 (erroneously indicated as 170 in the first part of this catalogue), 950, 1100
Cacopsylla pyri, 0-1300
Cacopsylla hippophaes, 0-1800
Cacopsylla viburni, 300-1700
Bactericera nigricornis, 70-200, 800-1600 and 2200 (50-2100 on occasional plants, rarely on conifers)
Bactericera curvatinervis, 0-1700 (200-2000)
Bactericera striola, 0-1750 (50-1750)
Bactericera albiventris, 0-1500 (0-1900)
Spanioza galii, 0-1400, 1950 (0-1950 on meadows)
Trioza urticae, 0-2200 (0-2100)
Trioza remota, 250-1100 (50-1600 and 1900)
Trioza rumicis, 125 and 1000-1900 (800-1700)
Trioza centranthi, 0-900 and 1300-1900 (1200, 1700 and 1900)

V group - Species with a wide altimetrical range on hills and mountains, found from about 400 to 2200 m. It is related to the submountain horizon of the basal level, up to the mountain and top levels (from 1.3. to 3.2.).

Aphalara sauteri, 300-1600 (400-1800)
Aphalara rumicicola, 1300 (400-1800)
Aphalara calthae, (probably about 900, only by trap)
Craspedolepta malachitica, 650-1900
Magnaphalara bulgarica, 550-1700
Magnaphalara santolinae, 800-850
Rhinocola fusca, 600-1200
Pseudaphorma astigma, (420, only by trap)
Arytaina maculata, 600-1200
Arytaina torifrons, (950)
Arytainilla spartiicola, 600-750
Arytainilla barbagalloi, 550-1800
Livilla ulicis, 600-650 (600-800, 1600)
Livilla vicina, 600 and 850-1900
Livilla cognata, 600-1600
Livilla radiata, 700-1450
Livilla magna, 500-1900
Psylla cordata, 500-1550
Psylla fusca, 700-1300
Psylla alpina, 850-2200
Cacopsylla costalis, (1000)
Cacopsylla rhamnicola, 400-1500 (1700)
Cacopsylla zetterstedti, 750-1900
Cacopsylla visci, 250-950
Trichochermes walkeri, 450-1350
Bactericera calcarata, 550-1250 (1700)
Dyspersa apicalis (150 by trap; 450-2000)
Dyspersa pallida, 800-1700 (130 by trap; 600-2100)
Hippophaetrioza binotata, 750, 900
Trioza försteri, 600, 1200, 1500 (1400-1500)
Trioza proxima, 600-1200 (600-1850 and 2450)
Trioza megacerca, (400, 1000-1700)
Trioza soniae, 500-1400
Trioza ramni, 800-950 (70 by trap; 600-1400)
Trioza flavipennis, 700-1300 (1100, 1950)
Trioza scottii, 700-1850 (500-1100, 1750, 2200, 2450)

VI group - Mountain and orophilous species, found from about 1000 to more than 2200 m. It is related to the whole mountain and top levels of the adopted botanic scheme (from 2.1. to 3.2.).

Aphalara maculipennis, (1250, 1900 and 2100)
Aphalara longicaudata, (900 by trap; 1400-2240)
Xanioptera near *alevtinae*, 1100
Magnaphalara flavipennis, 1000-2000
Magnaphalara nervosa, 950-2000
Magnaphalara near *pontica*, 1000-1400

Neocraspedolepta subpunctata, 1250-1700
Paracraspedolepta nebulosa, 1250-2000
Arytaina adenocarpi, 1350
Livilla pyrenaea, 1150-1900
Chamaepsylla hartigii, 1000-1150
Cacopsylla sorbi, 1000-1900
Cacopsylla albipes, 1350 and 1650 (930-1800)
Cacopsylla limbata, 1100-1850 (700-1600)
Cacopsylla nigrita, 1000, 1500-2400 (500, 1000-2000 and 2550)
Cacopsylla elegantula, 1100-1200 (1000-1700)
Cacopsylla rhododendri, 1400- 2550
Cacopsylla myrtilli, 1450-1950
Bactericera femoralis, 1200-2200 (150 by trap; 900-2550)
Bactericera bohemica, 1450, 2000-2100 and 2520 (1100-2550)
Bactericera harrisoni, (130 by trap; 1400-2450)
Bactericera bucegica, 1420 (1450 and 1950-2200)
Bactericera parastriola, 1300-1900 (1300-1800)
Dyspersa laserpitii, 950-1700 (1100-1700)
Dyspersa lautereriella, (1400, 1550)
Trioza abdominalis, 1000-1300 and 2050 (600 and 1000-2400)
Trioza agrophila, (1300)
Trioza near *cirsii*, 1000-1550
Trioza munda, 1500 (1250-1950)
Trioza chrysanthemi, 1150-1400 (130-1500)
Trioza senecionis, 1400-1500 (1400-1500)
Trioza dispar, (150 and 900 by traps; 1100-2000)
Trioza tatrensis, (130 and 900 by traps; 1400-2000)
Trioza rapisardai, 1350-1850 (1500-1550)
Trioza rotundata, 1400-2200 (950-2400)
Trioza thomasii, 1300-1400
Trioza tripteridis, 1400-1700 and 2000 (1700-2075)
Trioza cerastii, 1300 (900-2530)
Eutrioza opima, (1200)

VII group - Orophilous species, found from 1500 to 1900 m. It is related to the mountain level, upper mountain horizon (2.2.).

Aphalara exilis, 1700-1800 (1700-2100)
Psylla betulae, 1550 (1400 and 2100)
Spanioza tamaninii, 1950 (1700, 1950)
Dyspersa mesembrina, (1500-1600)
Trioza schrankii, 1400-1700 (900-2000)

VIII group - Orophilous species, found from 1900 to 2200 m. It is related to the top level, subalpine horizon (3.1.).

Cyamophila prohaskai, 1950-2000 (1800-2300)
Trioza saxifragae, 1850, 2250 (1950-2300)

IX group - Orophilous species, found above 2200 m. It is related to the top level, alpine horizon (3.2.).

Cacopsylla propinqua, 2300 and 2500 (2000)

X group - Species without known altimetrical data.

Cacopsylla intermedia
Cacopsylla parvipennis

Table IV - PRESENT KNOWN ALTIMETRICAL DISTRIBUTION IN ITALY
Explanation of this table at page 111

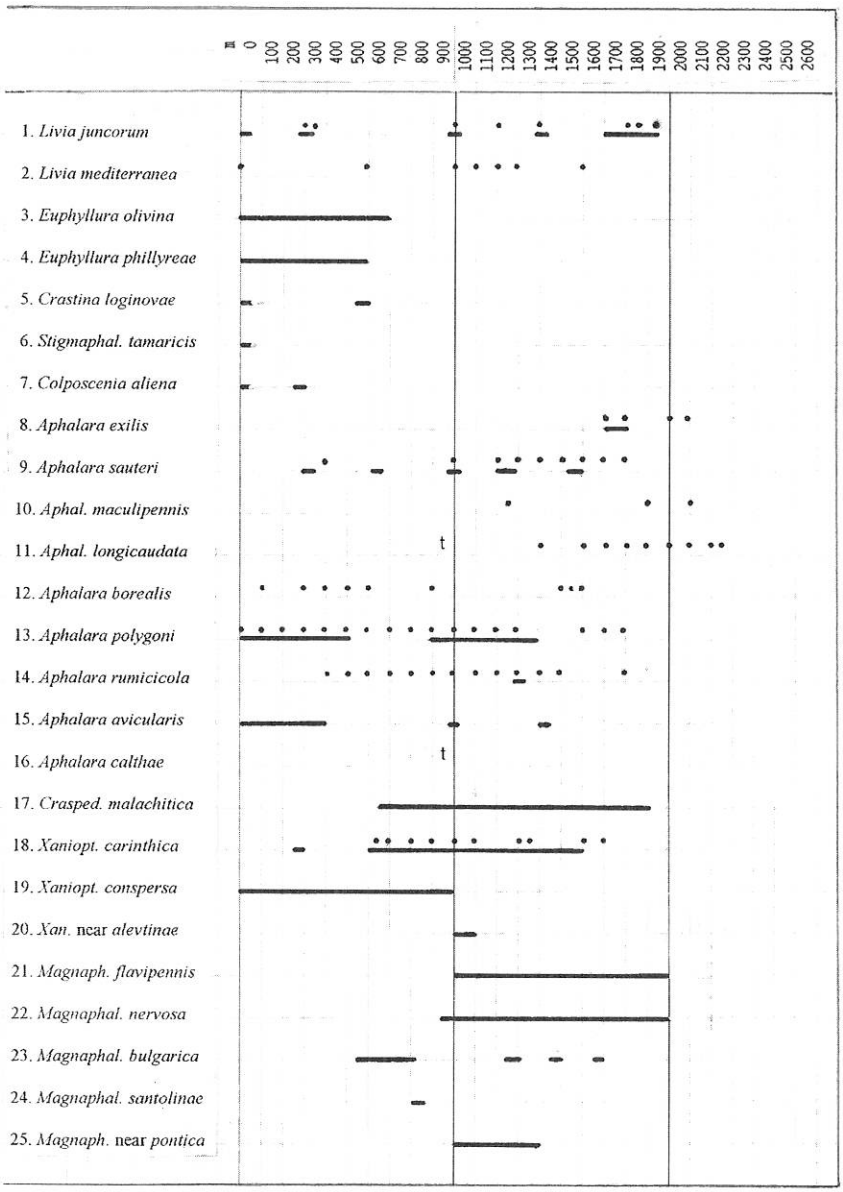
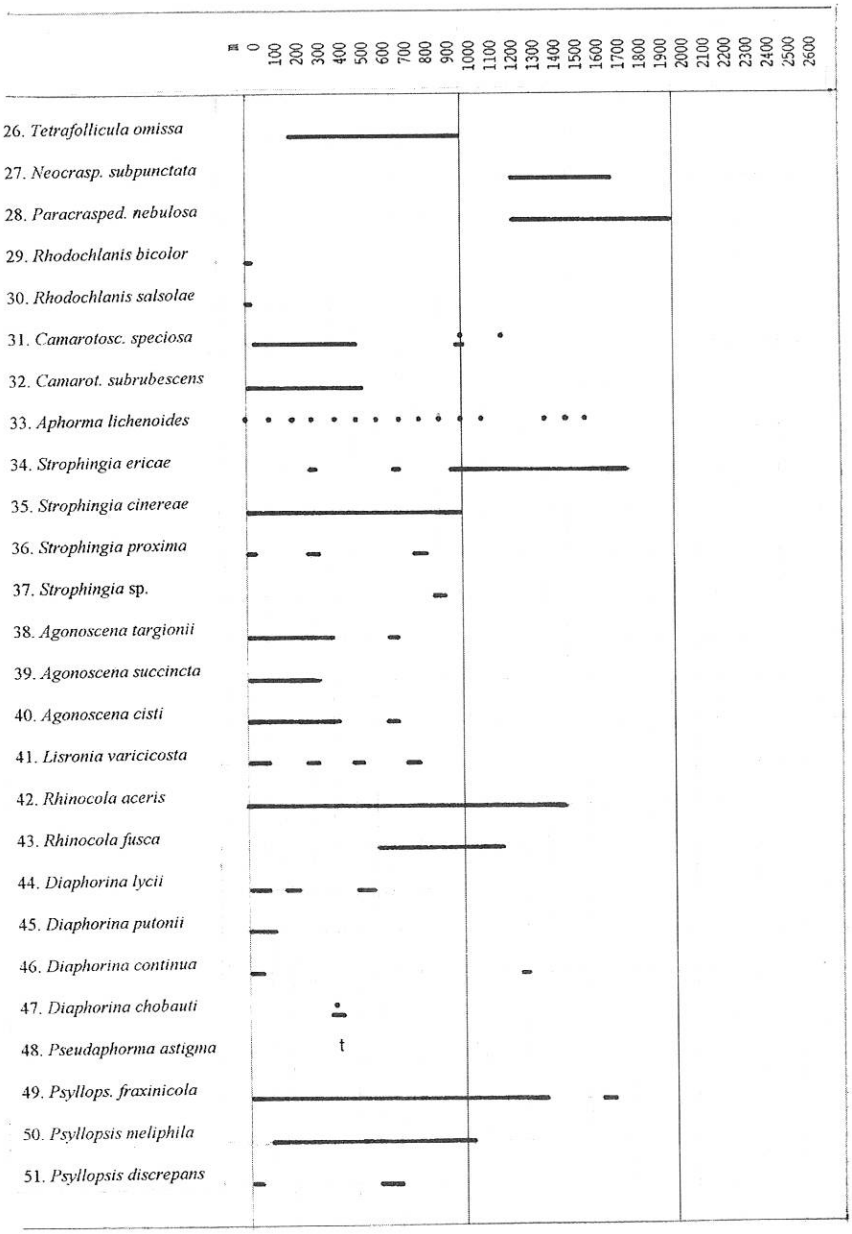


Table IV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2500
2600
26. Tetrafollicula omissa
27. Neocrasp. subpunctata
28. Paracrasped. nebulosa
29. Rhodochlanis bicolor
30. Rhodochlanis salsolae
31. Camarotosc. speciosa
32. Camarot. subrubescens
33. Aphorma lichenoides
34. Strophingia ericae
35. Strophingia cinereae
36. Strophingia proxima
37. Strophingia sp.
38. Agonoscena targionii
39. Agonoscena succincta
40. Agonoscena cisti
41. Lisronia varicicosta
42. Rhinocola aceris
43. Rhinocola fusca
44. Diaphorina lycii
45. Diaphorina putonii
46. Diaphorina continua
47. Diaphorina chobauti
48. Pseudaphorma astigma
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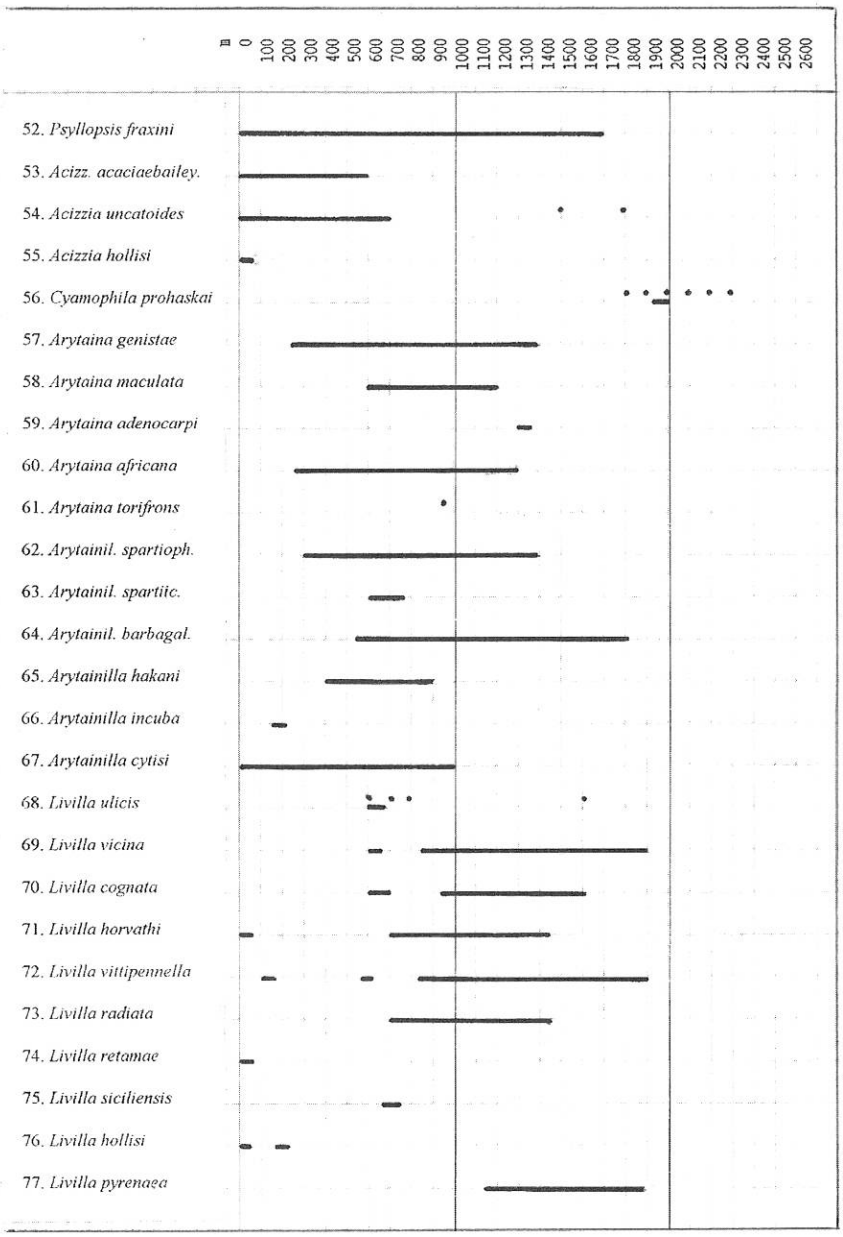
49. Psyllops. fraxinicola
50. Psyllopsis meliphila
51. Psyllopsis discrepans

Table IV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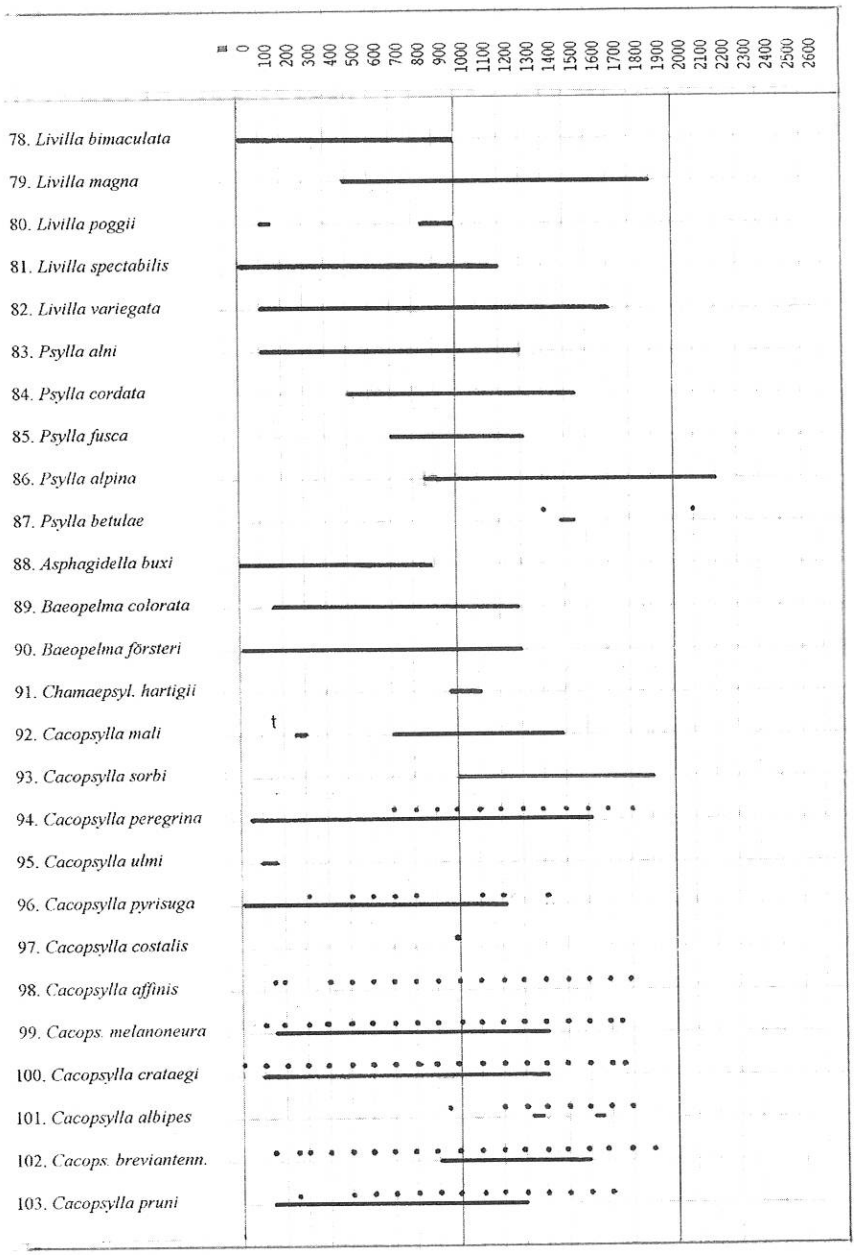
2600
52. Psyllopsis fraxini
53. Acizz. acaciaebailey.
54. Acizzia uncatoides
55. Acizzia hollisi
56. Cyamophila prohaskai
57. Arytaina genistae
58. Arytaina maculata
59. Arytaina adenocarpi
60. Arytaina africana
61. Arytaina torifrons
62. Arytainil. spartioph.
63. Arytainil. spartitc.
64. Arytainil. barbagal.
65. Arytainilla hakani
66. Arytainilla incuba
67. Arytainilla cytisi
68. Livilla ulicis
69. Livilla vicina
70. Livilla cognata
71. Livilla horvathi
72. Livilla vittipennella
73. Livilla radiata
74. Livilla retamae
75. Livilla siciliensis
76. Livilla hollisi
77. Livilla pyrenaea

Table IV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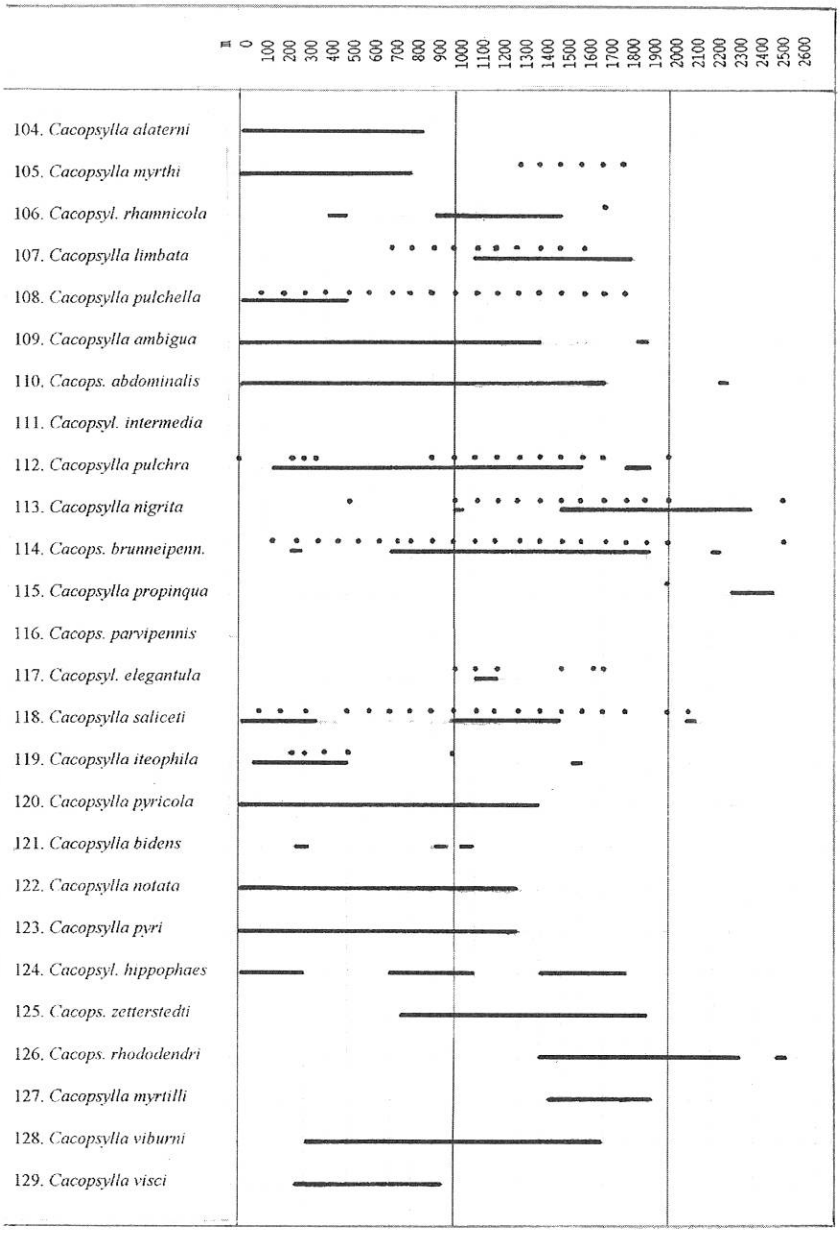
78. Livilla bimaculata
79. Livilla magna
80. Livilla poggii
81. Livilla spectabilis
82. Livilla variegata
83. Psylla alni
84. Psylla cordata
85. Psylla fusca
86. Psylla alpina
87. Psylla betulae
88. Asphagidella buxi
89. Baeopelma colorata
90. Baeopelma försteri
91. Chamaepsyl. hartigii
92. Cacopsylla mali
t
93. Cacopsylla sorbi
94. Cacopsylla peregrina
95. Cacopsylla ulmi
96. Cacopsylla pyrisuga
97. Cacopsylla costalis
98. Cacopsylla affinis
99. Cacops. melanoneura
100. Cacopsylla crataegi
101. Cacopsylla albipes
102. Cacops. breviantenn.
103. Cacopsylla pruni

Table IV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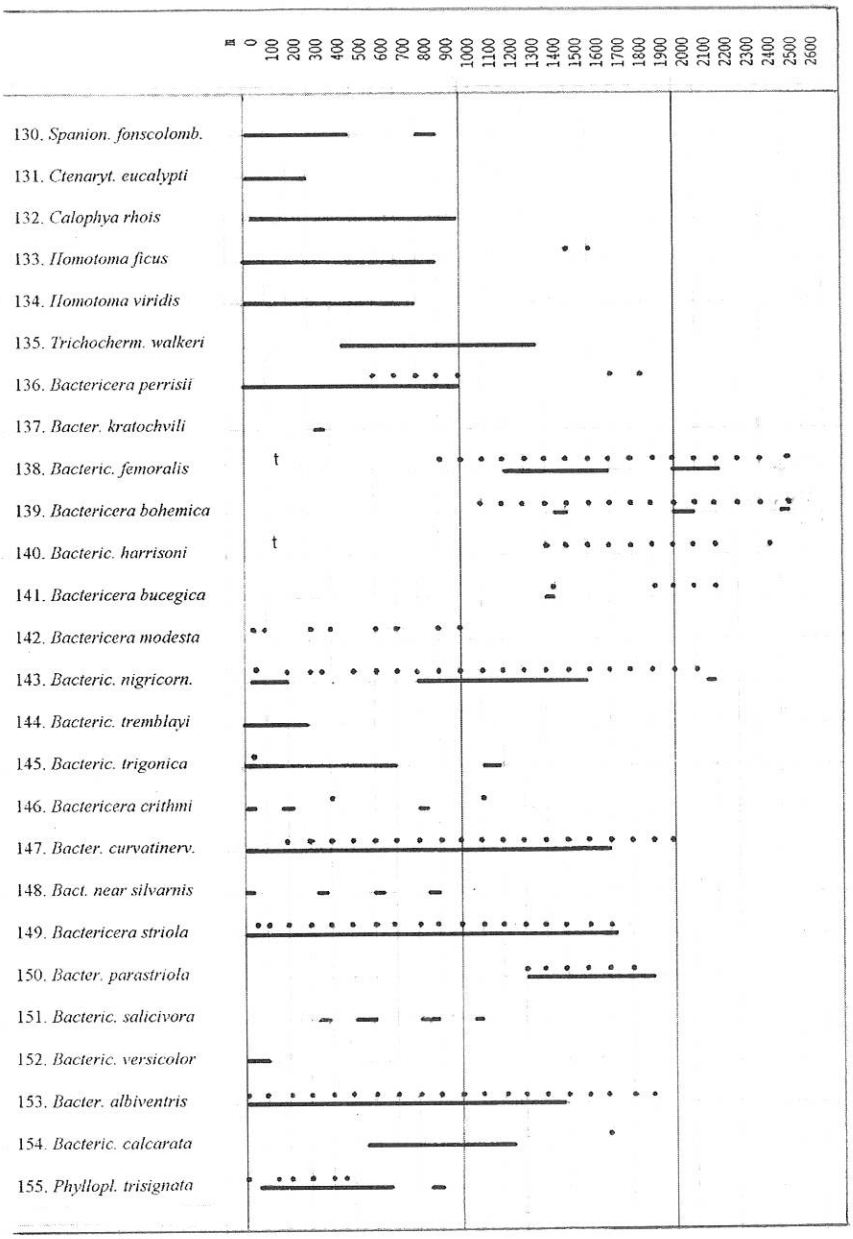
104. Cacopsylla alaterni
105. Cacopsylla myrthi
106. Cacopsyl. rhamnicola
107. Cacopsylla limbata
108. Cacopsylla pulchella
109. Cacopsylla ambigua
110. Cacops. abdominalis
111. Cacopsyl. intermedia
112. Cacopsylla pulchra
113. Cacopsylla nigrita
114. Cacops. brunneipenn.
115. Cacopsylla propinqua
116. Cacops. parvipennis
117. Cacopsyl. elegantula
118. Cacopsylla saliceti
119. Cacopsylla iteophila
120. Cacopsylla pyricola
121. Cacopsylla bidens
122. Cacopsylla notata
123. Cacopsylla pyri
124. Cacopsyl. hippophaes
125. Cacops. zetterstedti
126. Cacops. rhododendri
127. Cacopsylla myrtilli
128. Cacopsylla viburni
129. Cacopsylla visci

Table IV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130. Spanion. fonscolomb.
131. Ctenaryt. eucalypti
132. Calophya rhois
133. Homotoma ficus
134. Homotoma viridis
135. Trichocherm. walkeri
136. Bactericera perrisii
137. Bacter. kratochvili
138. Bacteric. femoralis
139. Bactericera bohemica
140. Bacteric. harrisoni
141. Bactericera bucegica
142. Bactericera modesta
143. Bacteric. nigricorn.
144. Bacteric. tremblayi
145. Bacteric. trigonica
146. Bactericera crithmi
147. Bacter. curvatinerv.
148. Bact. near silvarnis
149. Bactericera striola
150. Bacter. parastriola
151. Bacteric. salicivora
152. Bacteric. versicolor
153. Bacter. albiventris
154. Bacteric. calcarata
155. Phyllopl. trisignata
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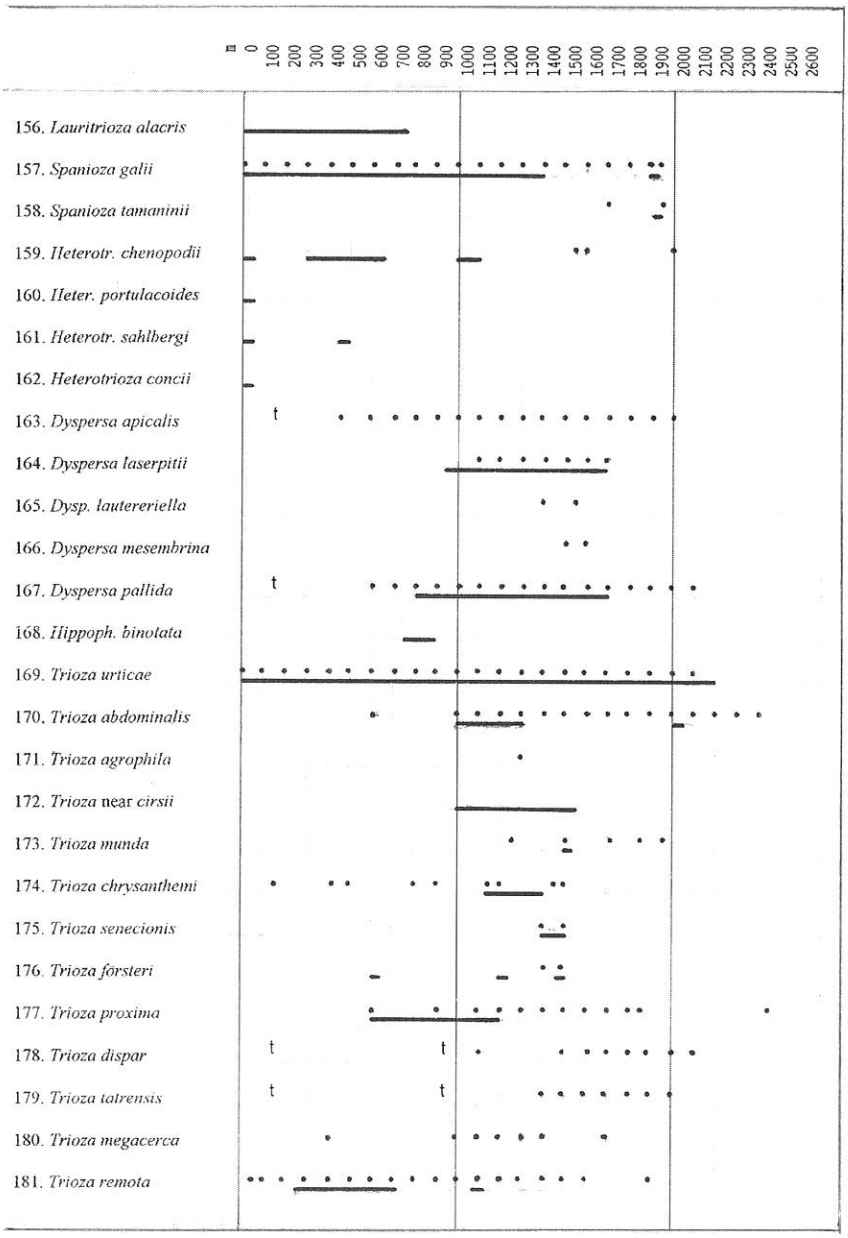
Table IV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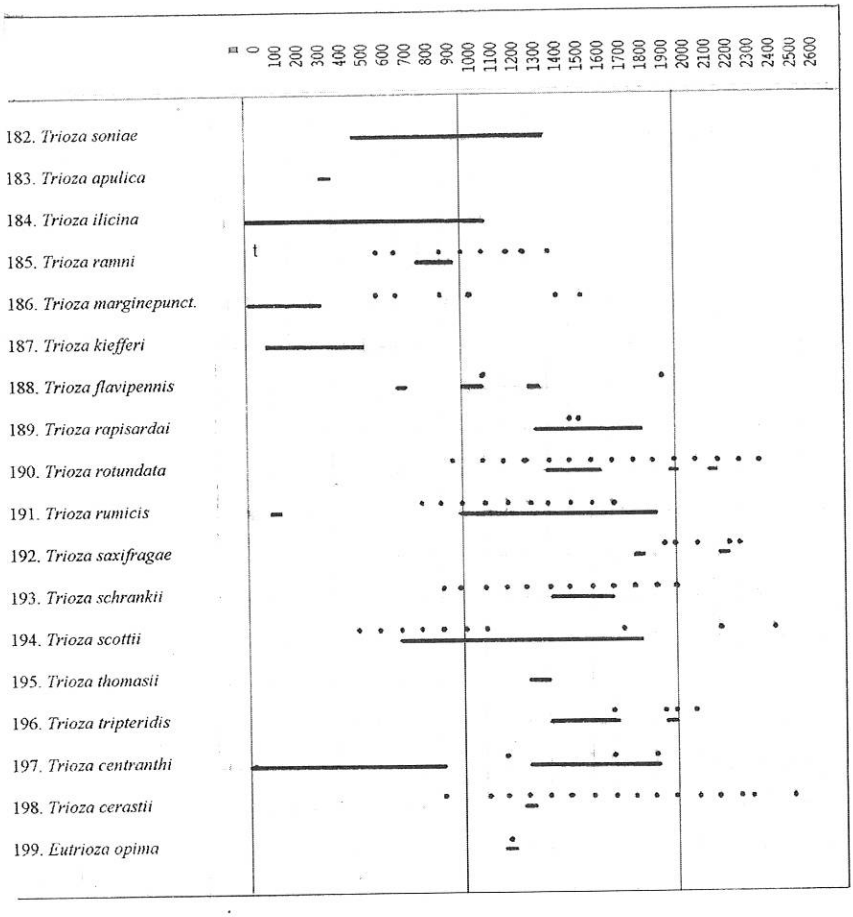
156. Lauritrioza alacris
157. Spanioza galii
158. Spanioza tamaninii
159. Heterotr. chenopodii
160. Heter. portulacoides
161. Heterotr. sahlbergi
162. Heterotrioza concii
163. Dyspersa apicalis
164. Dyspersa laserpitii
165. Dysp. lautereriella
166. Dyspersa mesembrina
167. Dyspersa pallida
168. Hippoph. binotata
169. Trioza urticae
170. Trioza abdominalis
171. Trioza agrophila
172. Trioza near cirsii
173. Trioza munda
174. Trioza chrysanthemi
175. Trioza senecionis
176. Trioza försteri
177. Trioza proxima
178. Trioza dispar
179. Trioza tatrensis
180. Trioza megacerca
181. Trioza remota
t

Table IV



Explanation of table IV

... = specimens collected on conifers or occasional plants
—— = specimens collected on the host plants
t = aberrant collections made by traps.

Single collecting data widely differing from the average are omitted.
Altimetrical data for a few species reported in the first part are updated in this table, as a consequence of more recent findings and controls.

2. FREQUENCY

Orientative and approximate comments on frequency of Italian Psylloidea have been given in both first and second part of this catalogue, within the discussion on each species. In order to provide the above data, the following four elements have been considered: total number of collected specimens; number of Regions where a certain species has been found in; total number of collecting localities; number of findings. This allowed us to provisionally discern 8 species groups, whose terms are briefly defined below.

Of course, such a rough methodology involves an unavoidable inaccuracy or incompleteness, which is yet partially offset by the huge amount (tens of thousands) of available collecting data. The latter ones mostly derive from our direct field researches, since most of literary reports are almost lacking under this aspect and have not been considered here. Nevertheless, not a uniform level of activity has been carried out by us over the territory, having been North Italy and Sicily better investigated than all remaining areas.

The mentioned species groups are here listed in a frequency order: from the most common species to the rarest ones; the systematic order is followed for listing all psyllids within each group. As result of recent researches, some data reported below may slightly differ from those ones published in the first part of this catalogue.

1. **Very common species** (14): hundreds of specimens, found in 15-20 Regions, in more than 100 localities, with more than 100 findings. This group may be divided in the following three subgroups.

1.1. Very common on the whole Italy
Euphyllura olivina
Psyllopsis fraxinicola
Cacopsylla peregrina
Cacopsylla crataegi
Cacopsylla pulchella
Bactericera albiventris
Trioza urticae
Trioza remota

1.2. Very common in North Italy
Arytaina genistae
Cacopsylla melanoneura
Cacopsylla breviantennata
Bactericera femoralis
Trioza cerastii

1.3. Very common in Central-South Italy and in the Isles
Agonoscena targionii

2. **Common species** (44): hundreds of specimens, found in 10-15 Regions, in 40-100 localities, with 40-100 findings. This group may be divided in the following three subgroups.

2.1. Common on the whole Italy
Euphyllura phillyreae
Rhinocola aceris
Psyllopsis meliphila
Psyllopsis fraxini
Baeopelma colorata

Cacopsylla pyrisuga
Cacopsylla affinis
Cacopsylla saliceti
Cacopsylla pyri
Homotoma ficus
Homotoma viridis
Bactericera nigricornis
Lauritrioza alacris
Spanioza galii
Trioza centranthi

2.2. Common in North Italy
Aphalara polygoni
Aphalara rumicicola
Livilla vicina
Livilla vittipennella
Livilla variegata
Psylla alni
Psylla alpina
Asphagidella buxi
Baeopelma försteri
Cacopsylla pruni
Cacopsylla ambigua
Cacopsylla pulchra
Cacopsylla brunneipennis
Cacopsylla pyricola
Cacopsylla rhododendri
Spanioneura fonscolombii
Calophya rhois
Bactericera curvatinervis
Bactericera striola
Dyspersa pallida
Trioza abdominalis
Trioza rumicis
Trioza scottii

2.3. Common in Central-South Italy and in the Isles
Strophingia cinereae
Agonoscena cisti
Arytainilla cytisi
Livilla spectabilis
Cacopsylla alaterni
Cacopsylla myrthi

3. **Fairly common species** (22): hundreds of specimens, found in 5-10 Regions, in 20-40 localities, with 20-40 findings.

Aphalara sauteri
Craspedolepta malachitica
Magnaphalara flavipennis
Strophingia ericae
Arytainilla spartiophila
Psylla fusca
Cacopsylla sorbi
Cacopsylla limbata
Cacopsylla abdominalis
Cacopsylla nigrita
Cacopsylla notata
Trichochermes walkeri
Bactericera perrisii
Bactericera bohemica
Bactericera trigonica
Bactericera crithmi
Phylloplecta trisignata
Heterotrioza chenopodii
Dyspersa laserpitii
Trioza ilicina
Trioza rotundata
Trioza schrankii

4. **Locally common species** (31): hundreds of specimens, found in 1-5 Regions, in 10-20 localities, with 10-20 findings.

Livia juncorum
Colposcenia aliena
Aphalara longicaudata
Xanioptera carinthica
Xanioptera conspersa
Magnaphalara nervosa
Magnaphalara bulgarica
Magnaphalara near *pontica*
Tetrafollicula omissa
Paracraspedolepta nebulosa
Rhodochlanis salsolae
Lisronia varicicosta
Rhinocola fusca
Diaphorina lycii
Diaphorina putonii
Acizzia acaciaebaileyanae
Acizzia uncatoides
Cyamophila prohaskai
Livilla radiata
Livilla pyrenaea

Livilla bimaculata
Livilla magna
Psylla cordata
Cacopsylla mali
Cacopsylla rhamnicola
Cacopsylla iteophila
Cacopsylla hippophaes
Cacopsylla zetterstedti
Cacopsylla viburni
Heterotrioza portulacoides
Trioza proxima

5. **Fairly rare or rather scarce species** (29): 50-100 specimens, found in 1-5 Regions, in 5-10 localities, with 5-20 findings.

Livia mediterranea
Stigmaphalara tamaricis
Aphalara avicularis
Neocraspedolepta subpunctata
Camarotoscena speciosa
Camarotoscena subrubescens
Aphorma lichenoides
Strophingia proxima
Arytaina africana
Arytainilla hakani
Livilla ulicis
Livilla cognata
Livilla horvathi
Cacopsylla myrtilli
Bactericera harrisoni
Bactericera modesta
Bactericera calcarata
Heterotrioza sahlbergi
Dyspersa apicalis
Trioza near *cirsii*
Trioza chrysanthemi
Trioza försteri
Trioza dispar
Trioza tatrensis
Trioza megacerca
Trioza soniae
Trioza kiefferi
Trioza rapisardai
Trioza tripteridis

6. **Rare or very localized species** (31): 20-50 specimens, found in 1-3 Regions, in 2-4 localities, with 3-5 findings.

Crastina loginovae
Aphalara exilis
Aphalara borealis
Rhodochlanis bicolor
Agonoscena succincta
Psyllopsis discrepans
Arytaina maculata
Arytaina adenocarpi
Arytainilla spartiicola
Arytainilla barbagalloi
Livilla siciliensis
Livilla poggii
Cacopsylla albipes
Cacopsylla propinqua
Cacopsylla elegantula
Cacopsylla bidens
Cacopsylla visci
Ctenarytaina eucalypti
Bactericera kratochvili
Bactericera bucegica
Bactericera tremblayi
Bactericera parastriola
Bactericera salicivora
Bactericera versicolor
Hippophaetrioza binotata
Trioza munda
Trioza senecionis
Trioza ramni
Trioza marginepunctata
Trioza flavipennis
Trioza saxifragae

7. **Very rare or localized species** (20): 2-20 specimens, found in 1-2 Regions, in 1-3 localities, with 2-3 findings.

Aphalara maculipennis
Xanioptera near *alevtinae*
Magnaphalara santolinae
Strophingia sp.
Diaphorina continua
Diaphorina chobauti

Acizzia hollisi
Arytainilla incuba
Livilla retamae
Livilla hollisi
Psylla betulae
Chamaepsylla hartigii
Cacopsylla ulmi
Bactericera near *silvarnis*
Spanioza tamaninii
Heterotrioza concii
Dyspersa lautereriella
Dyspersa mesembrina
Trioza apulica
Eutrioza opima

8. **Extremely rare species** (8): Only one specimen found by us or data deriving from literary reports not confirmed by our field researches.

Aphalara calthae
Pseudaphorma astigma
Arytaina torifrons
Cacopsylla costalis
Cacopsylla intermedia
Cacopsylla parvipennis
Trioza agrophila
Trioza thomasii

3. BIOLOGY

Psyllids are all phytophagous on Angiosperms and exclusively live as sap-suckers, mostly on leaves but sometimes also on other organs (i.e. stems or roots).

They are oviparous and in the greatest part bisexual. As to the latter aspect, *Cacopsylla myrtilli* is the only known exception; in fact, this species shows a parthenogenetic behaviour at least in part of its distribution area (including the Alps), where only its females may be found.

Post-embryonal development occurs through five nymphal stages, whose phenology is often linked with biological rhythms of the primary host plants.

For some characters, psyllids are biologically similar to the Aphids.

A world-wide review on the biology of Psylloidea is reported by Hodkinson (1974). Italian data on some biological aspects are given below.

3.1. **Host, shelter and occasional plants**

3.1.1. General remarks

Trophic relationships with the plants are highly variable within this insect group and differences may be noted even in the same species, between its biological stages; thus, eggs and nymphs are usually host plant specific, while a wider host range may be shown by the adults. As to this aspect, plants may play a different role in hosting psyllid species and this allows us to define the following categories:

- «*host plant*»: the one on which a psyllid species lays its eggs and is able to complete its life-cycle;
- «*shelter plant*»: the one (usually a conifer) which the adults of many psyllids compulsery migrate to in autumn, for spending winter in a reduced trophic activity;
- «*occasional plant*»: a species where a psyllid may be accidentally transported by wind or other causes (these plants normally have no importance for biological studies on psyllids).

In relation to the «host plant» range, psyllids may be divided in the following four categories:

a) *monophagous species*, whose young stages exclusively live on one botanic species;
b) *strictly oligophagous species*, living on some congeneric plants;
c) *widely oligophagous species*, living on plants belonging to kindred genera of the same family;
d) *polyphagous species*, living on plants of different families.

Obviously, a psyllid species may be differently assigned to one or another of the above categories if respectively only its Italian findings or its global behaviour within its entire distribution area are considered. This because, for example, a psyllid which lives in Italy on a plant species, may be found in other regions on different plants of the same or even related genera, which means to consider the insect as monophagous in Italy but strictly or widely oligophagous in its whole area. For this reason, host plants data have been separately considered, in this catalogue, and divided according to the Italian (deriving from our collections or local literature) and the general (mostly deriving from foreign literature) situation (table V).

As to Italy, the 199 known species may be divided as follows: monophagous, 108 (= 54%); strictly oligophagous, 55 (= 28%); widely oligophagous, 10 (= 5%); polyphagous, only 5 (= 2.5%) (*Bactericera bucegica*, *B. nigricornis*, *B. tremblayi*, *B. trigonica* and *Trioza rotundata*); species whose host plant is still unknown or doubtful, 21 (= 10.5%). If their whole distribution area is considered, the same 199 species may be divided as follows: monophagous, 56 (= 28%); strictly oligophagous, 106 (= 53%); widely oligophagous, 24 (= 12%); polyphagous, 6 (= 3%); species whose host plant is still unknown, 7 (= 3%).

Table V - RELATIONS BETWEEN ITALIAN PSYLLIDS AND THEIR HOST PLANTS

1 n = total number of psyllid species in Italy.
2 mI = monophagous species in Italy, according to our researches.
3 mL = monophagous species, according to the literature and if their whole distribution area is considered.
4 soI = strictly oligophagous species in Italy, according to our researches.
5 soL = strictly oligophagous species, according to the literature and if their whole distribution area is considered.
6 woI = widely oligophagous species in Italy, according to our researches.
7 woL = widely oligophagous species, according to the literature and if their whole distribution area is considered.
8 pI = polyphagous species in Italy, according to our researches.
9 pL = polyphagous species, according to the literature and if their whole distribution area is considered.
10 uI = species whose host plants have never been detected in Italy.
11 uL = species whose host plants have never been detected all over their whole distribution area.

	1 n	2 mI	3 mL	4 soI	5 soL	6 woI	7 woL	8 pI	9 pL	10 uI	11 uL
1. *Livia juncorum*				soI	soL						
2. *Livia mediterranea*										uI	uL
3. *Euphyllura olivina*		mI	mL								
4. *Euphyllura phillyreae*				soI			woL				
5. *Crastina loginovae*				soI	soL						
6. *Stigmaphal tamaricis*				soI	soL						
7. *Colposcenia aliena*				soI	soL						
8. *Aphalara exilis*		mI			soL						
9. *Aphalara sauteri*		mI	mL								
10. *Aphal. maculipennis*					soL					uI	
11. *Aphal. longicaudata*			mL							uI	
12. *Aphalara borealis*					soL					uI	
13. *Aphalara polygoni*				soI	soL						
14. *Aphalara rumicicola*				soI	soL						
15. *Aphalara avicularis*				soI	soL						
16. *Aphalara calthae*			mL							uI	
17. *Crasped. malachitica*		mI	mL								
18. *Xaniopt. carinthica*				soI	soL						
19. *Xaniopt. conspersa*		mI	mL								
20. *Xan.* near *alevtinae*		mI	mL								
21. *Magnaph. flavipennis*						woI	woL				
22. *Magnaphal. nervosa*		mI			soL						
23. *Magnaphal. bulgarica*				soI	soL						
24. *Magnaphal. santolinae*		mI	mL								
25. *Magnaph.* near *pontica*		mI	mL								
26. *Tetrafollicula omissa*		mI	mL								
27. *Neocrasp. subpunctata*		mI	mL								
28. *Paracrasped. nebulosa*		mI	mL								
29. *Rhodochlanis bicolor*		mI					woL				

	1 n	2 mI	3 mL	4 soI	5 soL	6 woI	7 woL	8 pI	9 pL	10 uI	11 uL
30. *Rhodochlanis salsolae*		mI	mL								
31. *Camarotosc. speciosa*		mI			soL						
32. *Camarot. subrubescens*				soI	soL						
33. *Aphorma lichenoides*										uI	uL
34. *Strophingia ericae*		mI	mL								
35. *Strophingia cinereae*		mI			soL						
36. *Strophingia proxima*				soI	soL						
37. *Strophingia* sp.		mI	mL								
38. *Agonoscena targionii*		mI			soL						
39. *Agonoscena succincta*		mI			soL						
40. *Agonoscena cisti*		mI			soL						
41. *Lisronia varicicosta*						woI	woL				
42. *Rhinocola aceris*		mI			soL						
43. *Rhinocola fusca*		mI			soL						
44. *Diaphorina lycii*		mI			soL						
45. *Diaphorina putonii*		mI	mL								
46. *Diaphorina continua*		mI	mL								
47. *Diaphorina chobauti*		mI			soL						
48. *Pseudaphorma astigma*										uI	uL
Total Aphalaridae	48	27	17	12	24	2	4	0	0	7	3
49. *Psyllops. fraxinicola*				soI	soL						
50. *Psyllopsis meliphilia*		mI	mL								
51. *Psyllopsis discrepans*		mI			soL						
52. *Psyllopsis fraxini*		mI			soL						
53. *Acizzia acaciaebailey.*				soI	soL						
54. *Acizzia uncatoides*				soI	soL						
55. *Acizzia hollisi*		mI			soL						
56. *Cyamophila prohask.*		mI	mL								
57. *Arytaina genistae*		mI			soL						
58. *Arytaina maculata*		mI			soL						
59. *Arytaina adenocarpi*		mI			soL						
60. *Arytaina africana*		mI	mL								
61. *Arytaina torifrons*					soL					uI	
62. *Arytainilla spartioph.*		mI	mL								
63. *Arytainilla spartiic.*		mI			soL						
64. *Arytainilla barbag.*		mI	mL								
65. *Arytainilla hakani*		mI	mL								
66. *Arytainilla incuba*										uI	uL
67. *Arytainilla cytisi*				soI	soL						
68. *Livilla ulicis*		mI					woL				
69. *Livilla vicina*		mI	mL								
70. *Livilla cognata*						woI	woL				
71. *Livilla horvathi*				soI			woL				
72. *Livilla vittipennella*		mI	mL								
73. *Livilla radiata*						woI	woL				
74. *Livilla retamae*		mI			soL						
75. *Livilla siciliensis*		mI	mL								

	1 n	2 mI	3 mL	4 soI	5 soL	6 woI	7 woL	8 pI	9 pL	10 uI	11 uL
76. *Livilla hollisi*		mI	mL								
77. *Livilla pyrenaea*		mI			soL						
78. *Livilla bimaculata*		mI	mL								
79. *Livilla magna*		mI	mL								
80. *Livilla poggii*		mI	mL								
81. *Livilla spectabilis*		mI	mL								
82. *Livilla variegata*				soI	soL						
83. *Psylla alni*				soI	soL						
84. *Psylla cordata*		mI	mL								
85. *Psylla fusca*		mI			soL						
86. *Psylla alpina*		mI	mL								
87. *Psylla betulae*		mI			soL						
88. *Asphagidella buxi*		mI			soL						
89. *Baeopelma colorata*		mI	mL								
90. *Baeopelma försteri*				soI	soL						
91. *Chamaepsyl. hartigii*		mI			soL						
92. *Cacopsylla mali*				soI	soL						
93. *Cacopsylla sorbi*		mI	mL								
94. *Cacopsylla peregrina*		mI			soL						
95. *Cacopsylla ulmi*		mI			soL						
96. *Cacopsylla pyrisuga*		mI			soL						
97. *Cacopsylla costalis*					soL					uI	
98. *Cacopylla affinis*					soL					uI	
99. *Cacops. malanoneura*						woI	woL				
100. *Cacopylla crataegi*		mI			soL						
101. *Cacopsylla albipes*		mI			soL						
102. *Cacops. breviantenn.*		mI			soL						
103. *Cacopsylla pruni*		mI			soL						
104. *Cacopsylla alaterni*		mI	mL								
105. *Cacopsylla myrthi*		mI			soL						
106. *Cacopyl. rhamnicola*				soI	soL						
107. *Cacopsylla limbata*				soI	soL						
108. *Cacopsylla pulchella*		mI	mL								
109. *Cacopsylla ambigua*				soI	soL						
110. *Cacops.abdominalis*				soI	soL						
111. *Cacopsyl. intermedia*				soI	soL						
112. *Cacopsylla pulchra*				soI	soL						
113. *Cacopsylla nigrita*				soI	soL						
114. *Cacops. brunneipenn.*				soI	soL						
115. *Cacopsylla propinqua*		mI			soL						
116. *Cacopsylla parvipennis*				soI	soL						
117. *Cacopsyl. elegantula*				soI	soL						
118. *Cacopsylla saliceti*				soI	soL						
119. *Cacopsylla iteophila*				soI	soL						
120. *Cacopsylla pyricola*		mI			soL						
121. *Cacopsylla bidens*		mI			soL						
122. *Cacopsylla notata*				soI	soL						
123. *Cacopsylla pyri*		mI			soL						
124. *Cacopsyl. hippophaes*		mI	mL								

	1 n	2 mI	3 mL	4 soI	5 soL	6 woI	7 woL	8 pI	9 pL	10 uI	11 uL
125. *Cacops. zetterstedti*		mI	mL								
126. *Cacops. rhododendri*				soI	soL						
127. *Cacopsylla myrtilli*		mI			soL						
128. *Cacopsylla viburni*		mI			soL						
129. *Cacopsylla visci*		mI			soL						
130. *Spanion. fonscolombii*		mI			soL						
Total Psyllidae	82	52	22	23	54	3	5	0	0	4	1
131. *Ctenaryt. eucalypti*				soI	soL						
Tot. Spondyliaspid.	1			1	1						
132. *Calophya rhois*		mI	mL								
Total Calophyidae	1	1	1								
133. *Homotoma ficus*		mI	mL								
134. *Homotoma viridis*		mI	mL								
Total Homotomidae	2	2	2								
135. *Trichocherm. walkeri*		mI			soL						
136. *Bactericera perrisii*				soI	soL						
137. *Bacteric. kratochvili*		mI							pL?		
138. *Bacteric. femoralis*				soI	soL						
139. *Bactericera bohemica*				soI	soL						
140. *Bacteric. harrisoni*										uI	uL
141. *Bactericera bucegica*								pI	pL		
142. *Bactericera modesta*			mL							uI	
143. *Bacteric. nigricornis*								pI	pL		
144. *Bacteric. tremblayi*								pI	pL		
145. *Bacteric. trigonica*								pI	pL		
146. *Bacteric. crithmi*						woI	woL				
147. *Bacter. curvatineris*				soI	soL						
148. *Bact.* near *silvarnis*				soI	soL						
149. *Bactericera striola*				soI	soL						
150. *Bacteric. parastriola*		mI			soL						
151. *Bacteric. salicivora*				soI	soL						
152. *Bacteric. versicolor*				soI	soL						
153. *Bacteric. albiventris*				soI	soL						
154. *Bacteric. calcarata*		mI	mL								
155. *Phyllopl. trisignata*				soI	soL						
156. *Lauritrioza alacris*		mI					woL?				
157. *Spanioza galii*						woI	woL				
158. *Spanioza tamaninii*		mI	mL								
159. *Heterotr. chenopodii*						woI	woL				
160. *Heter. portulacoides*		mI	mL								
161. *Heterotr. sahlbergi*		mI			soL						

	1 n	2 mI	3 mL	4 soI	5 soL	6 woI	7 woL	8 pI	9 pL	10 uI	11 uL
162. *Heterotrioza concii*		mI	mL								
163. *Dyspersa apicalis*							woL			uI	
164. *Dyspersa laserpitii*				soI			woL				
165. *Dysper. lautereriella*							woL			uI	
166. *Dyspersa mesembrina*							woL			uI	
167. *Dyspersa pallida*		mI					woL				
168. *Hippoph. binotata*		mI	mL								
169. *Trioza urticae*				soI	soL						
170. *Trioza abdominalis*				soI			woL				
171. *Trioza agrophila*			mL							uI	
172. *Trioza* near *cirsii*				soI	soL						
173. *Trioza munda*		mI					woL				
174. *Trioza chrysanthemi*		mI			soL						
175. *Trioza senecionis*						woI	woL				
176. *Trioza försteri*		mI					woL				
177. *Trioza proxima*		mI			soL						
178. *Trioza dispar*							woL			uI	
179. *Trioza tatrensis*					soL					uI	
180. *Trioza megacerca*										uI	uL
181. *Trioza remota*				soI	soL						
182. *Trioza soniae*		mI	mL								
183. *Trioza apulica*		mI	mL								
184. *Trioza ilicina*		mI	mL								
185. *Trioza ramni*		mI			soL						
186. *Trioza marginepunct.*		mI	mL								
187. *Trioza kiefferi*				soI	soL						
188. *Trioza flavipennis*		mI	mL								
189. *Trioza rapisardai*				soI	soL						
190. *Trioza rotundata*								pI	pL		
191. *Trioza rumicis*				soI	soL						
192. *Trioza saxifragae*		mI			soL						
193. *Trioza schrankii*		mI	mL								
194. *Trioza scottii*		mI			soL						
195. *Trioza thomasii*		mI	mL								
196. *Trioza tripteridis*		mI			soL						
197. *Trioza centranthi*						woI	woL				
198. *Trioza cerastii*				soI	soL						
199. *Eutrioza opima*										uI	uL
Total Triozidae	65	26	14	19	27	5	15	5	6	10	3
General total	**199**	**108**	**56**	**55**	**106**	**10**	**24**	**5**	**6**	**21**	**7**

3.1.2. Host plant groups and related number of Italian Psylloidea

Italian psyllids primarily live on usually perennial (but also on a few biennial and very few annual) Dicotyledons, except four species (*Livia juncorum*, *L. mediterranea*, *Bactericera kratochvili* and *B. tremblayi*) which live on Monocotyledons.

Nearly all kinds of plants (arboreal, shrubby and herbaceous) are infested by these insects. More precisely, members of the family Psyllidae mainly live on trees and shrubs, while Triozidae mostly occur on grasses; an intermediate position is shown by the Aphalaridae, according to the genera.

As to plant families, some of them are showy preferred by psyllids, while other ones are only moderately chosen or even neglected by these insects. As far as presently known, a list of the plant families with the corresponding number of hosted Italian psyllids, may be arranged as follows: Leguminosae, 31 species; Compositae, 26; Salicaceae and Rosaceae, 20; Umbelliferae, 11; Polygonaceae, 9; Rhamnaceae, 8; Betulaceae and Chenopodiaceae, 7; Ericaceae and Oleaceae, 6; Fagaceae, 4; Cruciferae, Anacardiaceae, Elaeagnaceae, Tamaricaceae and Solanaceae, 3; Moraceae, Caryophyllaceae, Ranunculaceae, Saxifragaceae, Aceraceae, Buxaceae, Thymelaeaceae, Onagraceae, Rubiaceae, Valerianaceae and Liliaceae, 2; Corylaceae, Ulmaceae, Urticaceae, Loranthaceae, Berberidaceae, Lauraceae, Rutaceae, Cistaceae, Myrtaceae, Convolvulaceae, Caprifoliaceae, Dipsacaceae, Juncaceae and perhaps also Cyperaceae, 1.

Highly differentiated host preference may be noted in Psylloidea also as regards plant genera, and those ones hosting more than one Italian psyllid may be listed as follows: *Salix*, 18 species; *Genista*, 12; *Rhamnus*, 8; *Artemisia*, 7; *Alnus*, *Polygonum*, *Pyrus* and *Cytisus*, 5; *Quercus*, *Rumex*, *Crataegus*, *Daucus*, *Fraxinus* and *Achillea*, 4; *Atriplex*, *Acacia*, *Chamaecytisus*, *Hippophae*, *Tamarix*, *Erica* and *Solanum*, 3; *Populus*, *Betula*, *Ficus*, *Chenopodium*, *Suaeda*, *Brassica*, *Saxifraga*, *Malus*, *Sorbus*, *Lembotropis*, *Pistacia*, *Acer*, *Buxus*, *Thymelaea*, *Epilobium*, *Angelica*, *Laserpitium*, *Rhododendron*, *Galium*, *Cirsium*, *Homogyne*, *Leontodon*, *Hieracium* and *Allium*, 2. Other 67 plant genera host one psyllid species per each.

If single plant species are considered, they usually host only one or sometimes two psyllids species per each, though a higher susceptibility is shown by some plants, such as *Salix elaeagnos* (9 species), *S. purpurea* (8), *S. caprea* and *Pyrus communis* (5), *Salix pedicellata*, *S. atrocinerea*, *Crataegus monogyna* and *Rhamnus alaternus* (4); moreover, most of the

previous data may be sensibly increased in the future, through further investigations.

Summing up, psyllids variously parasitize only 41 (= 29%) among the nearly 141 families of Angiosperms recognized in Italy by Pignatti (1982); in particular, it is to point out how psyllids totally avoid to feed on plants of very huge and ecologically important families, such as Labiatae or Graminaceae. As regards plant genera, only a bit more than 110 (= 10%), out of the nearly 1090 which are known in the Italian Angiosperms, may host psyllid species. A still lower percentage may be found at specific level, since only about 140 plant species (= about 2.5%), out of nearly 5,600 ones, are infested by psyllids. Trophic behaviour of Psylloidea is therefore highly restricted, in comparison with other related insect groups, such as, for instance, the Aphidoidea.

3.1.3. Systematic list of host plants of the Italian Psylloidea

We report here all the host plants of psyllids detected in Italy up to now, as results from the local literature and above all our field researches.

The 13 psyllid species found in Italy up to now only on shelter or occasional plants (see page 132), but whose true host plants are known from foreign literature and occur in the Italian flora, are reported between brackets. The host plants of other 5 species may be only supposed (see page 131); in these cases a question mark precedes the botanic name and the psyllid is reported between brackets. On the contrary, no mention is given here to 3 species, whose host plant is completely unknown at present.

The list of botanic families, genera and species follows the systematic arrangement proposed by Pignatti (1982).

The total number of psyllids found per each plant family is indicated between brackets and follows the same family name.

Salicaceae (20)

Salix fragilis L.
Cacopsylla iteophila
Salix alba L.
Bactericera albiventris
Salix babylonica L.
Bactericera albiventris
Salix triandra L.
Bactericera albiventris
Salix retusa L.
Cacopsylla saliceti
Salix apennina Skvortsov
Cacopsylla pulchra
Salix glabra Scop.
Cacopsylla brunneipennis
Bactericera curvatinervis
Salix pedicellata Desf.
Cacopsylla brunneipennis
Cacopsylla saliceti
Bactericera near *silvarnis*
Bactericera salicivora

Salix appendiculata Vill.
Cacopsylla elegantula
Cacopsylla saliceti
Bactericera curvatinervis
Salix cinerea L.
Cacopsylla brunneipennis
Salix atrocinerea Brot.
Cacopsylla ambigua
Cacopsylla pulchra
Cacopsylla brunneipennis
Bactericera salicivora
Salix aurita L.
Cacopsylla brunneipennis
Bactericera albiventris
Salix caprea L.
Cacopsylla ambigua
Cacopsylla abdominalis
Cacopsylla nigrita
Cacopsylla brunneipennis
Bactericera curvatinervis
Salix repens L.
Cacopsylla parvipennis
Salix rosmarinifolia L.
Cacopsylla parvipennis
Salix foetida Schleicher
Cacopsylla pulchra
Cacopsylla nigrita
Salix waldsteiniana Willd.
Cacopsylla nigrita
Bactericera parastriola
Salix helvetica Vill.
Cacopsylla nigrita
Cacopsylla propinqua
Salix viminalis L.
Bactericera albiventris
Salix elaeagnos Scop.
Cacopsylla ambigua
Cacopsylla abdominalis
Cacopsylla pulchra
Cacopsylla nigrita
Cacopsylla iteophila
Bactericera curvatinervis
Bactericera striola
Bactericera versicolor
Bactericera albiventris
Salix purpurea L.
Cacopsylla ambigua
Cacopsylla abdominalis
Cacopsylla pulchra
Cacopsylla elegantula
Bactericera curvatinervis
Bactericera striola
Bactericera versicolor
Bactericera albiventris
Salix spp.
Cacopsylla ambigua
Cacopsylla intermedia
Cacopsylla iteophila
Bactericera near *silvarnis*
Bactericera parastriola
Bactericera salicivora
Bactericera versicolor
Populus nigra L.
Camarotoscena speciosa
Camarotoscena subrubescens
Populus alba L.
Camarotoscena subrubescens

BETULACEAE (7)

Betula pendula Roth
Chamaepsylla hartigii
Betula sp.
Psylla betulae
Alnus viridis (Chaix) DC.
Psylla alpina
Alnus glutinosa (L.) Gaertner
Psylla alni
Baeopelma försteri
Alnus incana (L.) Moench
Psylla alni
Psylla fusca
Baeopelma försteri
Alnus cordata (Loisel.) Desf.
Psylla cordata

CORYLACEAE (1)

Ostrya carpinifolia Scop.
Baeopelma colorata

FAGACEAE (4)

Quercus ilex L.
Trioza ilicina
Quercus trojana Webb
Trioza apulica

Quercus cerris L.
Trioza soniae
Quercus petraea (Matt.) Liebl.
Trioza remota
Quercus robur L.
Trioza remota
Quercus pubescens Willd.
Trioza remota

Ulmaceae (1)

Ulmus laevis Pallas
Cacopsylla ulmi

Moraceae (2)

Ficus carica L.
Homotoma ficus
Homotoma viridis

Urticaceae (1)

Urtica dioica L.
Trioza urticae
Urtica urens L.
Trioza urticae

Loranthaceae (1)

Viscum album L.
Cacopsylla visci

Polygonaceae (9)

Polygonum aviculare L.
Aphalara avicularis
Polygonum rurivagum Jordan
Aphalara avicularis
Polygonum arenastrum Boreau
Aphalara avicularis
Polygonum hydropiper L.
Aphalara polygoni
P. lapathifolium L.
Aphalara polygoni
Polygonum bistorta L.
(Aphalara longicaudata)
Polygonum sp.
Aphalara polygoni
Polygonum spp.
(Aphalara maculipennis)
(Aphalara borealis)
Rumex scutatus L.
Aphalara exilis
Aphalara sauteri
Trioza rumicis
Rumex alpestris Jacq.
Trioza rumicis
Rumex acetosa L.
Trioza rumicis
Rumex sp.
Aphalara rumicicola

Chenopodiaceae (7)

Beta vulgaris L.
Heterotrioza chenopodii
Chenopodium ambrosioides L.
Heterotrioza chenopodii
Chenopodium bonus-henricus L.
Heterotrioza chenopodii
Chenopodium album L.
Heterotrioza chenopodii
Chenopodium sp.
Bactericera nigricornis
Atriplex halimus L.
Heterotrioza sahlbergi
Heterotrioza concii
Atriplex latifolia Wahlenb.
Heterotrioza chenopodii
Halimione portulacoides (L.) Aellen
Heterotrioza portulacoides
Suaeda fruticosa (L.) Forsskal (= *Suaeda vera* J.F. Gmelin)
Rhodochlanis salsolae
Suaeda maritima (L.) Dum.
Rhodochlanis bicolor

Caryophyllaceae (2)

Stellaria nemorum L. subsp. *nemorum*
Trioza rotundata

Cerastium arvense L.
Trioza cerastii
Cerastium holostenoides Fries
Trioza cerastii

RANUNCULACEAE (2)

Caltha palustris L.
(Aphalara calthae)
Ranunculus aconitifolius L.
Bactericera bucegica

BERBERIDACEAE (1)

Berberis vulgaris L.
Trioza scottii

LAURACEAE (1)

Laurus nobilis L.
Lauritrioza alacris

CRUCIFERAE (3)

Rorippa sp.
Bactericera nigricornis
Cardamine amara L.
Trioza rotundata
Arabis hirsuta (L.) Scop.
Trioza sp.
Brassica oleracea L.
Bactericera nigricornis
Bactericera tremblayi
Brassica rapa L.
Bactericera nigricornis
Rhaphanus sativus L.
Bactericera nigricornis

SAXIFRAGACEAE (2)

Saxifraga aizoides L.
Trioza rotundata
Trioza saxifragae

ROSACEAE (20)

Rosoideae

Rubus sp. complex *Rubi Corylifolii*
Phylloplecta trisignata
Rubus sp.
Phylloplecta trisignata
Sanguisorba minor Scop.
(Bactericera modesta)
Geum montanum L.
Bactericera bohemica
Geum rivale L.
Bactericera bohemica
Alchemilla spp. group *alpina*
Bactericera femoralis
Alchemilla spp. group *vulgaris*
Bactericera femoralis
? Rosoideae gen. sp.
(Bactericera harrisoni)

Maloideae

Pyrus pyraster Burgsd.
Cacopsylla notata
Pyrus amygdaliformis Vill.
Cacopsylla pyrisuga
Cacopsylla notata
Pyrus communis L.
Cacopsylla pyrisuga
Cacopsylla pyricola
Cacopsylla bidens
Cacopsylla notata
Cacopsylla pyri
Malus sylvestris Miller
Cacopsylla mali
(Cacopsylla costalis)
Malus domestica Borckh.
Cacopsylla mali
(Cacopsylla costalis)
Sorbus aucuparia L.
Cacopsylla sorbi
Sorbus aria (L.) Crantz
Cacopsylla albipes
Cacopsylla breviantennata
Crataegus monogyna Jacq.
Cacopsylla peregrina

(Cacopsylla affinis)
Cacopsylla melanoneura
Cacopsylla crataegi

Prunoideae

Prunus spinosa L.
Cacopsylla pruni

Leguminosae (31)

Cesalpinioideae

Cercis siliquastrum L.
Cacopsylla pulchella

Mimosoideae (introduced)

Acacia decurrens Willd.
Acizzia acaciaebaileyanae
Acacia podalyriaefolia Cunn.
Acizzia acaciaebaileyanae
Acacia dealbata Link
Acizzia uncatoides
Acacia longifolia (Andrews) Willd.
Acizzia uncatoides
Acacia pycnantha Bentham
Acizzia uncatoides
Acacia sp.
Acizzia hollisi

Faboideae Genisteae Genistinae

Laburnum anagyroides Medicus
Livilla variegata
Laburnum alpinum (Miller) Bercht. & Presl.
Livilla variegata
Calicotome spinosa (L.) Link
Arytainilla cytisi
Calicotome villosa (Poiret) Link
Arytainilla cytisi
Lembotropis nigricans (L.) Griseb
Livilla cognata
Livilla radiata
Cytisus villosus Pourret
Arytaina africana
Livilla radiata
Cytisus decumbens (Durande) Spach
Arytainilla spartiicola
Cytisus scoparius (L.) Link
Arytaina genistae
Arytainilla spartiophila
Chamaecytisus spinescens (Presl.) Rothm.
Arytaina maculata
Chamaecytisus hirsutus (L.) Link
Livilla cognata
Livilla radiata
Teline monspessulana (L.) Koch
Arytainilla hakani
Genista tinctoria L.
Livilla horvathi
Livilla radiata
Genista cinerea (Vill.) DC.
Livilla pyrenaea
Genista sericea Wulfen
Livilla horvathi
Genista salzmannii DC.
Livilla bimaculata
Genista corsica (Loisel.) DC.
Livilla poggii
Genista germanica L.
Livilla ulicis
Genista radiata (L.) Scop.
Livilla vicina
Livilla vittipennella
Genista ephedroides DC.
Livilla siciliensis
Livilla hollisi
Genista aetnensis (Biv.) DC.
Arytainilla barbagalloi
Livilla magna
Retama raetam subsp. *gussonei* (Webb) Heywood
Livilla retamae
Spartium junceum L.
Livilla spectabilis
Adenocarpus complicatus (L.) Gay
Arytaina adenocarpi
Genistinae gen. sp.
(Arytaina torifrons)
(Arytainilla incuba)

Faboideae Loteae

Anthyllis vulneraria L.
subsp. *alpestris* (Kit.) Asch. & Gr.
Cyamophila prohaskai

RUTACEAE (1)

Ruta graveolens L.
Agonoscena succincta

ANACARDIACEAE (3)

Cotinus coggygria Scop.
Calophya rhois
Pistacia lentiscus L.
Agonoscena targionii
Agonoscena cisti

ACERACEAE (2)

Acer campestre L.
Rhinocola aceris
Acer obtusatum W. & K.
Rhinocola fusca

BUXACEAE (2)

Buxus sempervirens L.
Asphagidella buxi
Spanioneura fonscolombii

RHAMNACEAE (8)

Rhamnus alaternus L.
Cacopsylla alaterni
Cacopsylla myrthi
Trioza marginepunctata
Trioza kiefferi
Rhamnus oleoides L.
Trioza kiefferi
Rhamnus saxatilis Jacq.
Cacopsylla rhamnicola
Rhamnus catharticus L.
Cacopsylla rhamnicola
Trichochermes walkeri
Trioza ramni
Rhamnus alpinus L.
Cacopsylla limbata
Trichochermes walkeri
Rhamnus pumilus Turra
Cacopsylla limbata

THYMELAEACEAE (2)

Thymelaea hirsuta (L.) Endl.
Diaphorina putonii
Thymelaea tartonraira (L.) All.
Diaphorina continua

ELAEAGNACEAE (3)

Hippophae rhamnoides L.
Cacopsylla hippophaes
Cacopsylla zetterstedti
Hippophaetrioza binotata

CISTACEAE (1)

Cistus incanus L.
Lisronia varicicosta
Cistus salvifolius L.
Lisronia varicicosta
Tuberaria lignosa (Sweet) Samp.
Lisronia varicicosta

TAMARICACEAE (3)

Tamarix gallica L.
Crastina loginovae
Stigmaphalara tamaricis
Colposcenia aliena
Tamarix africana Poiret
Crastina loginovae
Stigmaphalara tamaricis
Colposcenia aliena

MYRTACEAE (introduced) (1)

Eucalyptus globulus Labill.
Ctenarytaina eucalypti
Eucalyptus cinerea Müll.
Ctenarytaina eucalypti
Eucalyptus rostrata Schlecht.
Ctenarytaina eucalypti

Onagraceae (2)

Epilobium angustifolium L.
Neocraspedolepta subpunctata
Paracraspedolepta nebulosa

Umbelliferae (11)

Astrantia major L.
Trioza schrankii
Chaerophyllum hirsutum subsp. *villarsii* (Koch) Briquet
Dyspersa pallida
(Dyspersa mesembrina)
Aegopodium podagraria L.
Trioza flavipennis
Crithmum maritimum L.
Bactericera crithmi
Seseli bocconi Guss.
Bactericera crithmi
Petroselinum sativum Hoffm.
(Dyspersa apicalis)
Carum carvi L.
(Dyspersa apicalis)
Angelica sylvestris L.
(Dyspersa lautereriella)
(Dyspersa mesembrina)
Ferulago campestris (Besser) Grec.
Bactericera trigonica
Laserpitium siler L.
Dyspersa laserpitii
Trioza rapisardai
Laserpitium latifolium *L.*
Dyspersa laserpitii
Laserpitium krapfii subsp. *gaudinii* (Moretti) Thell.
Dyspersa laserpitii
Laserpitium gallicum L.
Trioza rapisardai
Daucus carota L.
Bactericera nigricornis
Bactericera trigonica
(Dyspersa apicalis)
(Dyspersa lautereriella)

Ericaceae (6)

Erica arborea L.
Strophingia cinereae
Erica multiflora L.
Strophingia proxima
Erica scoparia L.
Strophingia sp.
Calluna vulgaris (L.) Hull
Strophingia ericae
Rhododendron ferrugineum L.
Cacopsylla rhododendri
Rhododendron hirsutum L.
Cacopsylla rhododendri
Vaccinium myrtillus L.
Cacopsylla myrtilli

Oleaceae (6)

Fraxinus ornus L.
Psyllopsis meliphila
Fraxinus excelsior L.
Psyllopsis fraxini
Psyllopsis fraxinicola
Fraxinus angustifolia subsp. *oxycarpa* (Willd.) Franco et Rocha Lima
Psyllopsis fraxinicola
Psyllopsis discrepans
Olea europaea L. var. *europaea* and var. *sylvestris* Brot.
Euphyllura olivina
Phillyrea angustifolia L.
Euphyllura phillyreae
Phillyrea latifolia L.
Euphyllura phillyreae

Rubiaceae (2)

Sherardia arvensis L.
Spanioza galii
Galium anisophyllon Vill.
Spanioza galii
? Spanioza tamaninii
Galium lucidum All.
Spanioza galii
Galium spp.
Spanioza galii
Cruciata laevipes Opiz
Spanioza galii

Rubia peregrina L.
Spanioza galii

CONVOLVULACEAE (1)

Convolvulus cantabrica L.
Diaphorina chobauti

SOLANACEAE (3)

Lycium europaeum L.
Diaphorina lycii
Solanum tuberosum L.
Bactericera nigricornis
Bactericera tremblayi
Capsicum annuum L.
Bactericera tremblayi

CAPRIFOLIACEAE (1)

Viburnum lantana L.
Cacopsylla viburni

VALERIANACEAE (2)

Valerianella coronata (L.) DC.
Trioza centranthi
Valerianella pumila (L.) DC.
Trioza centranthi
Valerianella rimosa Bastard
Trioza centranthi
Valerianella dentata (L.) Pollich
Trioza centranthi
Valerianella locusta (L.) Laterrade
Trioza centranthi
Valerianella carinata Loisel
Trioza centranthi
Fedia cornucopiae (L.) Gaertner
Trioza centranthi
Valeriana montana L.
Trioza tripteridis
Centranthus ruber (L.) DC.
Trioza centranthi
Centranthus angustifolius (Miller) DC.
Trioza centranthi

DIPSACACEAE (1)

Knautia drymeia Heuffel (= *Scabiosa sylvatica* L.)
Trioza munda

COMPOSITAE (26)

Adenostyles alliariae (Gouran) Kerner
Trioza senecionis
Buphthalmus salicifolium L.
Magnaphalara flavipennis
Santolina corsica Jordan & Fourr.
Magnaphalara santolinae
Anthemis tinctoria L.
Magnaphalara near *pontica*
Achillea millefolium L.
Magnaphalara nervosa
Magnaphalara bulgarica
Trioza abdominalis
Achillea ligustica All.
Magnaphalara bulgarica
Bactericera trigonica
Trioza abdominalis
Leucanthemum spp. complex *vulgare* Lam.
Trioza chrysanthemi
Artemisia vulgaris L.
Xanioptera conspersa
Tetrafollicula omissa
Bactericera calcarata
Artemisia absinthium L.
Craspedolepta malachitica
Artemisia alba Turra
Xanioptera carinthica (3)
Bactericera perrisii
Artemisia campestris L.
Xanioptera carinthica (3)
Bactericera perrisii
Artemisia sp.
Xanioptera near *alevtinae*
Homogyne alpina (L.) Cass.
Bactericera bucegica
Trioza thomasii

Senecio fuchsi Gmelin
Trioza senecionis
Senecio cacaliaster Lam.
Trioza senecionis
Cirsium arvense (L.) Scop.
(Trioza agrophila)
Cirsium erisithales (Jacq.) Scop.
Trioza near *cirsii*
Cirsium carniolicum Scop.
Trioza near *cirsii*
Cichorium intybus L.
Bactericera nigricornis
Aposeris foetida (L.) Less
(Trioza dispar)
Hypochoeris sp.
Magnaphalara flavipennis
Leontodon sp.
Bactericera nigricornis
(Trioza dispar)
Taraxacum sp.
Bactericera nigricornis
(Trioza dispar)
Sonchus oleraceus L.
Bactericera trigonica
Mycelis muralis (L.) Dum.
Trioza försteri
Hieracium pilosella L.
Trioza proxima
Hieracium sp.
(Trioza tatrensis)
? *Hieracium* sp.
(Trioza megacerca)

Liliaceae (2)

Allium porrum L.
Bactericera tremblayi
Allium lusitanicum Lam.
(= *senescens L. subsp.* montanum *[Fries] Holub)*
Bactericera kratochvili
Allium cepa L.
Bactericera tremblayi

Juncaceae (1)

Juncus spp.
Livia juncorum

? Cyperaceae

? *Carex* sp.
(Livia mediterranea)

(3) The host plant of *Xanioptera carinthica* in its main collecting locality (Tr.A.A., Commune Ton, Loc. La Rocchetta) is *Artemisia alba* Turra, rather than *A. campestris*, as erroneously reported by Conci & Tamanini (1989b: 48, 49) and Conci *et al.* (1993: 57). However, at Fondo (Tr.A.A.) this psyllid has been collected on *A. campestris*. Therefore, the host plant data of this species from all the other Italian collecting localities need to be carefully verified.

3.1.4. Italian psyllids with doubtful or unknown host plant

The host plants still need to be investigated for a group of 21 Italian psyllids, which may divided in the following three categories.

a) Species whose host plant is completely unknown (3): *Aphorma lichenoides*, *Pseudaphorma astigma*, *Eutrioza opima*.
b) Species with ipotizable host plant (5): *Livia mediterranea* (probably living on *Carex* spp., Cyperaceae), *Arytaina torifrons* and *Arytainilla incuba* (both probably on plant species of Leguminosae Genistinae),

Bactericera harrisoni (likely on a *Geum* sp., Rosaceae), *Trioza megacerca* (probably on Compositae, close to *Hieracium*).

c) Species with known host plant (from the literature) but found in Italy up to now only on Conifers or by traps (13): *Aphalara maculipennis*, *A. longicaudata*, *A. borealis*, *A. calthae*, *Cacopsylla costalis*, *C. affinis*, *Bactericera modesta*, *Dyspersa apicalis*, *D. lautereriella*, *D. mesembrina*, *Trioza agrophila*, *T. dispar*, *T. tatrensis*.

3.1.5. Shelter plants

About 74 Italian psyllids (nearly 37% out of the total) hibernate on «shelter plants»; here they maintain a low trophic activity, which is sharply reduced during the coldest periods.

Evergreen trees of the family Coniferae show to be in Italy the most frequent shelter plants for psyllids. In particular, *Picea abies* (L.) Karsten is preferred by the greatest number of species; a lower attractivity has been evidenced by *Abies alba* Miller, *Pinus nigra* Arnold, *P. sylvestris* L., *P. mugo* Turra, *P. cembra* L., *Cupressus sempervirens* L., *Juniperus communis* L. (which the *Trioza* spp. of the group *dispar* usually hibernate on), *J. oxycedrus* L. (on which we found *Livia mediterranea*) and *Taxus baccata* L..

A very scarce preference has been shown by Italian psyllids for some exotic coniferous groups, recently introduced in this Country for ornamental and forestry purposes. As to this aspect, for instance, a few findings of psyllids have been carried out on *Cedrus libani* A. Richard.

3.2. Some aspects of psyllid life-cycles

3.2.1. Number of yearly generations

Almost controverse data are available up to now on this topic. Best example is that one of *Euphyllura olivina*, performing 4-6 yearly generations according to various Italian Authors, but only 2 in the opinion of other ones.

However, it seems that Psyllids may be almost variable in their number of annual generations, as a consequence of different environmental and climatic conditions. Thus, a polyvoltine species usually shows a higher number of generations in southern regions than in northern ones. Moreover, several species which are reported to be monovoltine in Central Europe or in Great Britain, seem to be bivoltine or even polyvoltine in Italy. Therefore, as it is indicated in the systematic part of

this catalogue and in table VI (whose data may be deeply modified in the future, as result of further researches), doubts still remain on a wide group of Italian species.

Surer information on this biological aspect could derive from rearings under artificially reproduced natural conditions. Such kind of studies have been mainly carried out in Moravian environments by Dr Pavel Lauterer (Museum of Brno - Czech Republic); but their interesting results could not be completely valid in Italy, due to ecological diversities. Thus, specific researches are necessary to be directly realized in the Italian territory, as the one carried out by Tremblay (1965b) on *Bactericera tremblayi*.

As far as presently known, about 110 species of Italian psyllids (55% out of the total) perform a single yearly generation, while one or two generations per year are shown by about 40 species (20%). More than two generations are performed by less than 20 species (10%). In particular, within this group, 1-5 yearly generations are reported for *Lauritrioza alacris*; 2 or 4-6 (according to the Authors, as previously said) for *Euphyllura olivina*; 2-3 for *Arytaina genistae* and *Cacopsylla visci* (populations of *Trioza centranthi* living on *Centranthus ruber* may likely belong to this group, too); 3 for *Agonoscena succincta*, *Heterotrioza chenopodii* and *Trioza urticae*; 4 for populations of *Spanioza galii* living on *Rubia peregrina*; 4-5 (and perhaps more) for *Cacopsylla pyricola* and *C. pyri*; 5 for *Diaphorina lycii*; 6-8 for *Acizzia uncatoides* and *Ctenarytaina eucalypti*; 7-10 for *Bactericera tremblayi*; an undefined number (4 or more) for *Acizzia acaciaebaileyanae*, *Cacopsylla alaterni*, *C. myrthi*, *Bactericera nigricornis* and perhaps *B. trigonica*.

On the contrary, a peculiar biennial life-cycle is reported for *Strophingia ericae* from mountain environments of Great Britain; but we do not know whether a similar cycle is performed by this species also in the Italian mountains where it occurs, such as the Alps. The number of annual generations is still unknown for about 30 Italian species (nearly the 15%).

Summing up, only 20 species of Italian Psylloidea (3 of which introduced) show three or more generations per year: 3 of them belong to the Aphalaridae, 8 to Psyllidae, 1 to Spondyliaspidae and 8 to Triozidae. This group of proper polyvoltine species practically includes nearly all the Italian psyllids which are or may become of economic importance.

3.2.2. Life length of the adults

Adults of Psylloidea may live in Italy from a few weeks, as in the case of summer generations, up to 8-11 months, such as specimens

overwintering on shelter plants. In the latter case, a strong reduction of the trophic activity and a sort of ovaric diapause may be usually noted in these adults during the coldest months.

3.2.3. Life-cycles and phenology of nymphs and adults

According to the kind of life-cycles they perform, Italian Psylloidea may be divided in the following seven categories (tables VI-VII):

1) species performing the entire life-cycle on the host plant, overwintering in the egg stage; about 31 species, the 16% out of the total (example: *Psyllopsis* spp., *Arytainilla barbagalloi*);
2) the same as above, but overwintering in the nymphal stage; about 17 species, 8% of the total (example: *Craspedolepta* s.l. spp., *Trioza ilicina*);
3) the same as above, but overwintering as adult; about 16 species, 8% of the total (example: *Cacopsylla pyri*, *Lauritrioza alacris*);
4) the same as above, but without a true winter diapause, with practically continuous cycles and overwintering in all stages; about 10 species, 5% of the total (example: *Cacopsylla alaterni*);
5) species migrating in autumn to a shelter plant (mainly a conifer) and moving back to the host plants during the following spring or summer; about 74 species, 37% of the total (example: various *Cacopsylla* spp., most of the Triozidae). Psyllids of the latter category may be ulteriorly divided as follows:
   5') monovoltine species, without a nymphal diapause;
   5'') the same as above, but with nymphal diapause;
   5''') species performing several generations, after they move back to the host plants.

Due to the scarce knowledge which is presently available, differences have not been stressed in table VI between the latter three subcategories.

6) species which overwinter as egg or nymph (about 15=8% of the total);
7) species whose life-cycle is still uncertain or unknown (about 42=21% of the total).

It is worth to note how some species may be contemporary assigned of two different categories.

In table VI, Italian data on the adult and also nymphal phenology are reported.

Table VI - NUMBER OF GENERATIONS PER YEAR, MAIN TYPES OF LIFE-CYCLE AND PHENOLOGY OF NYMPHS AND ADULTS OF THE ITALIAN PSYLLIDS

ng = presumable number of generations per year, mostly based on original data but also according to the Central European literature.
1 - 7 = main types of life-cycle in Italy:
1 = overwintering on the host plant as egg;
2 = the same, but as nymph;
3 = the same, but as adult;
4 = almost continuous cycles on the host plant;
5 = overwintering as adult on shelter plants;
6 = overwintering as egg or nymph on the host plant (uncertain data);
7 = unknown or uncertain data.
Ja-De = months of nymphal and adult appearance, according to original Italian data:
o = months of nymphal appearance;
\- = adult occurring only on the host plants;
! = adult occurring only on shelter plants;
\+ = adult occurring on both the host plant and on shelter plants;
• = wandering adult found occasionally.

	ng	Life-cycle							Phenology											
		1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
1. *Livia juncorum*	1					5			!		!	!	-	•	•	!	!	!		
2. *Livia mediterranea*	1?					5							!	!		!	!	!		
3. *Euphyllura olivina*	2-6			3					-	-	-	-	-	o	o	-	-	o	-	-
4. *Euphyllura phillyreae*	?							7			-		-	o		-	-	-	-	-
5. *Crastina loginovae*	1?							7					-	-						
6. *Stigmaphal. tamaricis*	1?							7					o			o	-			
7. *Colposcenia aliena*	1?			3			6			-			-	-	-		-	o	o	-
8. *Aphalara exilis*	1					5					!					!	!			
9. *Aphalara sauteri*	1?					5			!	!	!	+	o +	!	-	•	o +		!	!
10. *Aphal. maculipennis*	1					5				!							!	!		
11. *Aphal. longicaudata*	1					5			!	!	!	!		!	!	!	!	!		
12. *Aphalara borealis*	1					5										-	!	!		
13. *Aphalara polygoni*	1					5			!	!		!		-	-	-	+	!	!	
14. *Aphalara rumicicola*	2?					5			!	!	!	!	!	!		+	!	!	!	!

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
15. *Aphalara avicularis*	1					5							-	-	-	-	-			
16. *Aphalara calthae*	1					5														
17. *Crasped. malachitica*	1		2										•	-	-	-		•		
18. *Xaniopt. carinthica*	1		2										•	-	-	-				
19. *Xaniopt. conspersa*	1?		2										-	-	○ -	-	-			
20. *Xan.* near *alevtinae*	1?							7						-						
21. *Magnaph. flavipennis*	1?		2										•	•	-	•	•			
22. *Magnaphal. nervosa*	1		2											○ -	-	-				
23. *Magnaphal. bulgarica*	1		2									○ -	-	-						
24. *Magnaphal. santolinae*	1?		2										-							
25. *Magnaph.* near *pontica*	1		2											-						
26. *Tetrafollicula omissa*	1		2											○ -	○ -	-				
27. *Neocrasp. subpunctata*	1		2											-						
28. *Paracrasped. nebulosa*	1		2										○ -	○ -	○ -					
29. *Rhodochlanis bicolor*	1							7					•	•	○ -					
30. *Rhodochlanis salsolae*	1							7					○ -	-						
31. *Camarotosc. speciosa*	2?					5						+	-	○ -		+	○ +	!	•	
32. *Camarot. subrubescens*	?							7						-	-	•	•			
33. *Aphorma lichenoides*	1?					5							!	!		!	!			
34. *Strophingia ericae*	0,5-1		2										-	-	○ -	•	-			
35. *Strophingia cinereae*	1						6			-		-	○ -	○ -	-	-	-	-	-	
36. *Strophingia proxima*	1						6						○ -	○ -	-			-		
37. *Strophingia* sp.	?							7					○							
38. *Agonoscena targionii*	?				4				○ -	○	-	-	○ -	-	-	-	-	-		○ -
39. *Agonoscena succincta*	3		2						○	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	-	○	○

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
40. *Agonoscena cisti*	?							7		-	-		-	-			-	-		-
41. *Lisronia varicicosta*	1?						6						-							
42. *Rhinocola aceris*	1						6						-	-	-	-	•			
43. *Rhinocola fusca*	1							7					-	-	•					
44. *Diaphorina lycii*	5				4				o -	o -	o -	o -	o -	o -		-	-	o -	o -	o -
45. *Diaphorina putonii*	?							7					-	-		-	-			
46. *Diaphorina continua*	?							7					-							
47. *Diaphorina chobauti*	1							7					•	-		•		•		
48. *Pseudaphorma astigma*	?							7								•				
49. *Psyllops. fraxinicola*	1-2	1											o -	o -	o -	-	-			
50. *Psyllopsis meliphila*	1-2	1												o -	o -	-	-	o -		
51. *Psyllopsis discrepans*	1-2	1											-	-						
52. *Psyllopsis fraxini*	1-2	1											o -	-	o -	-	-			
53. *Acizzia acaciaebailey.*	?				4				o -	o -	o -	o -	o -	o -	o -	o -	o -	o -	o -	o -
54. *Acizzia uncatoides*	6-8				4				o -	o -	o -	o -	o -	o -	o -	o -	o -	o -	o -	o -
55. *Acizzia hollisi*	?							7					o -							
56. *Cyamophila prohaskai*	1					5			!	!	!	!		-	o -	o +	o +	o +	!	!
57. *Arytaina genistae*	2-3				4				o -	-	-	-	o -	o -	o -	o -	-	-	-	-
58. *Arytaina maculata*	?							7					o -				-			
59. *Arytaina adenocarpi*	?							7				-			o -	-	-	-		
60. *Arytaina africana*	2	1										o -	o -	o -	o -	-	-	-		
61. *Arytaina torifrons*	?							7							•					
62. *Arytainil. spartioph.*	1	1											o -	o -		-				
63. *Arytainil. spartiicola*	1							7					o -							
64. *Arytainil. barbagalloi*	1	1										o	o	o -	o -	-				

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
65. *Arytainilla hakani*	?							7					○	○	○					
													-	-	-					
66. *Arytainilla incuba*	?							7							•					
67. *Arytainilla cytisi*	1	1							○		○	○	○	○	○					
												-	-	-	-	-				
68. *Livilla ulicis*	1						6						-	•	-	•				
69. *Livilla vicina*	1			3					-	+	-	+	-		-	-	-	-	-	!
70. *Livilla cognata*	1						6							○	○	○				
															-	-	-	-		
71. *Livilla horvathi*	1						6						○	○	○					
													-	-	-					
72. *Livilla vittipennella*	1		2						-	○				○					○	○
													-	-	-	-	-		-	-
73. *Livilla radiata*	1						6						○	○	○					
													-	-	-					
74. *Livilla retamae*	1						6		○	○	○	○	○							○
									-	-		-	-	-	-	-	-	-	-	-
75. *Livilla siciliensis*	?							7					-	-	○					
															-				•	
76. *Livilla hollisi*	?							7					○							
													-							
77. *Livilla pyrenaea*	1?	1		3								○	○				○			+
												-	-	-			-	-		
78. *Livilla bimaculata*	1?						6					○	○		○	○				
												-	-	-	-	-		-		
79. *Livilla magna*	1 - 2		2						○			○	○							
													-	-	-	-	-	-	-	
80. *Livilla poggii*	?							7					-							
81. *Livilla spectabilis*	1	1							+		○	○	○	○						
											+	-	-	-	-	-	-	-	-	-
82. *Livilla variegata*	1						6					○	○							
												-	-	-	-	-				
83. *Psylla alni*	1	1											○	○						
													-	-	-	-	-			
84. *Psylla cordata*	1	1										○	○	○						
													-	-	-	-	-	-	-	
85. *Psylla fusca*	1	1												-	-	-	-			
86. *Psylla alpina*	1	1									•	•	•		○					
															-	-	-			
87. *Psylla betulae*	1	1														•	-			
88. *Asphagidella buxi*	1						6		○		○	○	○						○	
												-	-	-	-	-	-	-	-	
89. *Baeopelma colorata*	1	1											○	○	○					
													-	-	-	-	-			

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
90. *Baeopelma försteri*	1	1											○ -	○ -	-	-	-			
91. *Chamaepsylla hartigii*	1	1													-					
92. *Cacopsylla mali*	1	1											-	○ -	-	-	-			
93. *Cacopsylla sorbi*	1	1													○ -	-	-			
94. *Cacopsylla peregrina*	1	1				5			!	!	•	-	+	○ -	+	+	-	-	!	!
95. *Cacopsylla ulmi*	1	1												-	-		-			
96. *Cacopsylla pyrisuga*	1			3							+	+	+	-	-	•	•			•
97. *Cacopsylla costalis*	1					5				!										
98. *Cacopsylla affinis*	1					5			!	!	!	!	•	•	•	!	!	+	!	!
99. *Cacops. melanoneura*	1					5			!	!	+	+	○ +	+	+	!	+	!	!	!
100. *Cacopsylla crataegi*	1					5			!	!	!	+	○ +	○ -	○ +	+	!	!	!	!
101. *Cacopsylla albipes*	1					5			!				-		-	○ +	+			
102. *Cacops. breviatenn.*	1-2					5			!	!	!	!	+	-	-		+	+	!	!
103. *Cacopsylla pruni*	1					5			!	!	!	+	-	○ -	○ -	!	!	!	!	!
104. *Cacopsylla alaterni*	4-5				4				-	○ -	○ -	-	○ -	○ -	-	-	-	-	-	○ -
105. *Cacopsylla myrthi*	4-5				4				-	○ -	○ -	○ -	○ -	○ -	-	-	-	○ -	○ -	○ -
106. *Cacopsyl. rhamnicola*	1					5							○ -	○ -		!				
107. *Cacopsylla limbata*	1					5			!	!	!	!	-	-	-	○ +	○ +	!	!	!
108. *Cacopsylla pulchella*	1?					5			!	!	!	○ -	○ -	○ -	-	+	+	!	!	!
109. *Cacopsylla ambigua*	1-2						6					○ +	○ -	○ -	○ -	-	•	•		
110. *Cacops. abdominalis*	1-2						6				•	•	!	+	-	-	-		!	
111. *Cacopsylla intermedia*	?							7												
112. *Cacopsylla pulchra*	1					5			!	!	+	+	○ +	-	!	+	+	!	!	!
113. *Cacopsylla nigrita*	1					5			!	!	!	+	+	+	○ -	○ +	+	!	!	!
114. *Cacops. brunneipenn.*	1					5			!	!	-	!	+	-	+	+	!	!	!	!

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
115. *Cacopsylla propinqua*	1					5									!					
116. *Cacops. parvipennis*	?							7												
117. *Cacopsylla elegantula*	1					5			!		+	!	-			•	!			
118. *Cacopsylla saliceti*	1-2					5			!	!	!	+	-	+		!	+	!	!	!
119. *Cacopsylla iteophila*	1-2					5				!	-	+	○ -							!
120. *Cacopsylla pyricola*	3-5			3									○ -	○ -	-	-	○ -	-	-	-
121. *Cacopsylla bidens*	?			3					-					-	-	-	-	○ -	○ -	
122. *Cacopsylla notata*	?			3								-	○ -	○ -	•	-	-	-	-	-
123. *Cacopsylla pyri*	2-5			3					-	-	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -
124. *Cacopsylla hippophaes*	1	1												○ -	-	-	○ -		-	
125. *Cacops. zetterstedti*	1	1											○ -	○ -	○ -	-	-	○ -		
126. *Cacops. rhododendri*	1?	1													○ -	-	-	-		
127. *Cacopsylla myrtilli*	1	1														-				
128. *Cacopsylla viburni*	1	1											-		○ -	-	-			
129. *Cacopsylla visci*	2-3		2						○	○	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○	○	○
130. *Spanion. fonscolombii*	1			3					-	-	-	-	-	○ -		-	-	-	-	
131. *Ctenaryt. eucalypti*	6-8				4				○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -
132. *Calophya rhois*	1?	1											○ -	○ -	○ -	○ -				
133. *Homotoma ficus*	1	1										○ -	○ -	○ -	-	-	-	-	-	
134. *Homotoma viridis*	1	1									○ -	○ -	○ -	○ -	-	-	-	-		
135. *Trichocherm. walkeri*	1	1												•	-	-	-	-		
136. *Bactericera perrisii*	?							7			-		-	-	-	-	-	-	-	
137. *Bacteric. kratochvili*	?							7					-	-	-	-	-			
138. *Bacteric. femoralis*	2?					5			!	!	!	!	-	-	+	+	+	+	!	!
139. *Bactericera bohemica*	1					5				!	!	!			!	!	+	+		

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
140. *Bacteric. harrisoni*	1					5			!		!		!			!	!	!		
141. *Bactericera bucegica*	1					5								•	○ -	○ -	○ +	!		
142. *Bactericera modesta*	1					5				!	!			•			•	•	•	
143. *Bacteric. nigricorn.*	2-4							7	!	•			-	-	+	-	-	-	-	
144. *Bacteric. tremblayi*	7-10				4				○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -
145. *Bacteric. trigonica*	?							7					-	-	○ -	•	•	-	-	•
146. *Bactericera crithmi*	1?			3					-	-	-		-	-		?		-		-
147. *Bacteric. curvatinervis*	2?					5			!	!	!	+	+	+	-	+	○ +	+	!	!
148. *Bact.* near *silvarnis*	1							7						-	-					
149. *Bactericera striola*	2					5			!	!	!	-	-	-	○ -	-	+	+	!	!
150. *Bacteric. parastriola*	1					5										!	+	-		
151. *Bacteric. salicivora*	1					5							-							
152. *Bacteric. versicolor*	1							7						-	-	-	-			
153. *Bacteric. albiventris*	1-2					5			!	!	!	+	○ -	-	-	-	+	○ +	!	!
154. *Bacteric. calcarata*	1					5									-	-	○ +			
155. *Phyllopl. trisignata*	1			3		5			+	-	-	-	-	-	•	-	-	+	-	!
156. *Lauritrioza alacris*	1-5			3					-	-	-	-	○ -	○ -	○ -	○ -	○ -	-	-	-
157. *Span. galii* on *Galium*	1?							7				-	-	-	-	-	-	-	+	
157. *Spanioza galii* on *Rubia*	4			3	4				○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -	○ -
158. *Spanioza tamaninii*	1							7							-	-				
159. *Heterotr. chenopodii*	2-3							7	!	-	-		○ -	-	○ -	-	-	○ -	•	•
160. *Heter. portulacoides*	?							7					-	-	-		-			
161. *Heterotr. sahlbergi*	?							7					-	-		-	-			
162. *Heterotrioza concii*	?							7						-				-		
163. *Dyspersa apicalis*	1					5			!	!	!	!			!	!	!	!	!	!

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
164. *Dyspersa laserpitii*	1					5			!			!	!	!	° +	° +	° +			
165. *Dysp. lautereriella*	1					5				!			!				!			
166. *Dyspersa mesembrina*	1					5											!		!	!
167. *Dyspersa pallida*	1					5			!	!	!	!	!	-	° +	° +	° +	!	!	!
168. *Hippoph. binotata*	?							7						° -			° -	° -	° -	
169. *Trioza urticae*	3					5			!	!	!	+	+	+	° +	° +	° +	° +	+	+
170. *Trioza abdominalis*	1					5			!	!	!	+	!	-	!	!	!	!	!	+
171. *Trioza agrophila*	1					5				!										
172. *Trioza* near *cirsii*	1					5									° -	° -	° -			
173. *Trioza munda*	1					5			!				!			° +	!	!		
174. *Trioza chrysanthemi*	1					5			!	!	!	!				°		° +	!	!
175. *Trioza senecionis*	1					5								-	° -	° -	° +	° -		
176. *Trioza försteri*	1					5						!			° -	° -	° +			
177. *Trioza proxima*	1					5			!	!	!	!			° +	!	!	!	!	!
178. *Trioza dispar*	1					5			!		!					!	!			
179. *Trioza tatrensis*	1					5						!	!		!	!	!	!	!	
180. *Trioza megacerca*	1					5				!	!	!	!				!	!	!	!
181. *Trioza remota*	1					5			!	!	!	!	° !	°	°	°	°	° +	!	!
182. *Trioza soniae*	1					5								°	°		°	°	° -	
183. *Trioza apulica*	?							7											° -	
184. *Trioza ilicina*	1		2						°	°	° -	° -	-	°			°			°
185. *Trioza ramni*	1					5						!		-	-		-		!	
186. *Trioza marginepunct.*	1			3		?			-	-	° -	° -	-	° -	-	!	!	!		-
187. *Trioza kiefferi*	1			3					-	-	-						° -	° -	-	-
188. *Trioza flavipennis*	1							7				!		°		° -	° -			

	ng	1	2	3	4	5	6	7	Ja	F	M	A	M	J	J	A	S	O	N	De
189. *Trioza rapisardai*	1					5							!	° -	° -	-	° +			!
190. *Trioza rotundata*	2?					5			!	!	!	!	° +	° -	° +	° +	° +	!	!	!
191. *Trioza rumicis*	2?					5			!	!	!	+	° +	-	° -	° +	° -	-	!	!
192. *Trioza saxifragae*	1					5			!	!	!	!				° -	° +	!		
193. *Trioza schrankii*	1					5			!	!	!	!	!	!	+	+	+	!	!	!
194. *Trioza scottii*	1?					5			!	!	!	-		° -	° -	° -	° +	° +	+	!
195. *Trioza thomasii*	?							7						° -	° -					
196. *Trioza tripteridis*	1					5			!		!	!	!	-	° -	° -	!	!		
197. *Trioza centranthi*	1-3				4	5			-	° -	+	° -	° -	° -	-	° +	° +	° +	-	+
198. *Trioza cerastii*	1					5			!	!	!	!	!	!	!	!	!	!	!	!
199. *Eutrioza opima*	1					5									!					
General total		**31**	**17**	**16**	**10**	**74**	**15**	**42**												

Table VII - SUMMARIZING DATA ON THE MAIN TYPES OF LIFE-CYCLE WITHIN DIFFERENT FAMILIES

1 = overwintering on the host plant as egg;
2 = the same, but as nymph;
3 = the same, but as adult;
4 = almost continuous cycles on the host plant;
5 = overwintering as adult on shelter plants;
6 = overwintering as egg or nymph on the host plants (uncertain data);
7 = unknown data.

	Life-cycles						
	1	2	3	4	5	6	7
Aphalaridae, 48 spp.	0=0 %	13=27 %	2=4 %	1=2 %	13=27 %	5=10 %	14=29 %
Psyllidae, 82 spp.	27=33 %	3=4 %	8=10 %	5=6 %	19=23 %	10=12 %	12=15 %
Spondyliaspidae, 1 sp.	0=0 %	0=0 %	0=0 %	1=100 %	0=0 %	0=0 %	0=0 %
Calophyidae, 1 sp.	1=100 %	0=0 %	0=0 %	0=0 %	0=0 %	0=0 %	0=0 %
Homotomidae, 2 spp.	2=100 %	0=0 %	0=0 %	0=0 %	0=0 %	0=0 %	0=0 %
Triozidae, 65 spp.	1=1,5 %	1=1,5 %	6=9 %	3=5 %	42=65 %	0=0 %	16=25 %
Totals	31	17	16	10	74	15	42

3.2.4. Overwintering

Winter may be spent by Italian psyllids in different ways (see previous paragraph), which are usually almost uniform within homogeneous groups.

In the family Aphalaridae, species of the subfamilies Liviinae, Euphyllurinae and Paurocephalinae, together with those ones of the genus *Aphalara*, overwinter as adult on conifers. Nymphs overwintering on the host plants are known in the subfamily Strophingiinae and in the genus *Craspedolepta* s.l.; in particular, the species of the latter group usually migrate in winter to the roots. Almost continuous cycles, without a proper overwintering, are reported for the subfamily Diaphorininae. All remainig species of Aphalaridae overwinter as egg or nymph on the host plants, or perform continuous cycles, or need to be better understood under this aspect.

Within the family Psyllidae, species of the subfamily Psyllopseinae overwinter in the egg stage, those ones of Acizziinae perform continuous life-cycles, while in the subfamily Arytaininae the greatest part of species overwinter as egg or young nymph. A higher variability may be noted in the subfamily Psyllinae, of which 27 species overwinter on the primary host plants (17 as egg; 4 as egg or nymph; 6 as adult), while 18 species migrate as adult on shelter conifers.

Compared with the previous one, a more uniform behaviour is shown by the family Triozidae, of which about 8 species overwinter on the host plants (1 as egg; 1 as nymph; 6 as adult), 3 one practically perform continuous cycles and about 42 overwinter as adult on shelter conifers.

3.2.5. Migrations

Migration is a frequent event in the psyllids and it may occur under different modalities: active or passive; regular or irregular.

Active migrations do not usually cover long distances (we believe just a few tens of metres), due to the scarce flight ability of the adults.

A greater role in psyllid biology should be assigned to passive migrations, which are mostly caused by the wind, spreading these insects far away (even many kilometres) from the areas where their adults emerge. For instance, in the Region Friuli-Venezia Giulia passive transports of psyllids may be supposed for up to about thirty kilometres (see page 100).

In some cases, these psyllids may be brought back to their native areas by winds blowing in the opposite direction; but more often these migrations have no return possibility, consequently leading to huge losses.

All Italian psyllids overwintering on shelter conifers (about 74 species) compulsorily migrate, following one of the above reported modalities. By this way, psyllids substantially contribute to form the aereal plancton. Unfortunately, researches on this topic have not been specifically carried out in Italy up to now, except a few results of captures with several kinds of traps (HODKINSON, 1983b) or winter findings of still alive adults on the snow (MASUTTI, 1978: 83) or collections of large amount of adults on Alpine ridges and passes.

3.3. **Cecidia**

3.3.1. INTRODUCTION

Trophic activity of Psylloidea (usually higher in young stages than in the adults) mainly regards the phloem of the host plants, from which they suck up elaborate sap. While feeding, these insects inject saliva within the plant tissues. Among salivary components, various compounds occur which variously interfere with development and moltiplication of plant cells, thus causing alterations of tissues, colourations or decolourations, deformations, pseudogalls or galls, which are generally indicated as cecidia.

Gall-forming activity is very often optional in psyllids; thus, various species, which are usually considered as cecidium-producers, may also develop in some cases without causing galls. For many of these species, effects on plants (such as sprouts, leaves or flowers deformations) highly depend on the infestation level and consequent cecidia may be abundantly and frequently noted only in the case of high population densities of the psyllids. On the contrary, a few species (such as *Lauritrioza alacris*) always produce cecidia through their activity, and their nymphs cannot survive outside their own galls.

3.3.2. HISTORICAL NOTES

In Italy, studies on galls caused by the psyllids started a long time ago, with the first work on the topic published by Marcello MALPIGHI (1679). As already reported in this catalogue (pages 13-15, where detailed literary references may be found in), the greatest part of contributions came to the matter between 1890 and 1920; afterwards (and up to now), this kind of researches has been almost neglected, apart from the paper by SAMPÒ (1977) and a few other ones.

On the whole, about 70 works exclusively deal with galls caused in

Italy by psyllids or other agents; moreover, a further group of more than 20 publications on general topics give also some more cecidological information. Due to the importance of this aspect and the number of contributions which have been given by cecidologists to the knowledge of Italian psyllids, a special section on cecidological literature is arranged at the end of this catalogue.

Important treatises on European cecidia are, among others, those ones by Darboux & Houard (1901), Kieffer (1901), Houard (1908, 1909, 1913), Ross & Hedicke (1927), Buhr (1964, 1965). With specific reference to Italy, recent cecidological works, such as (for instance) those ones by Mani (1964) and Shorthouse & Rohfritsch (1992), give very little information on psyllids.A world wide review on galls caused by psyllids is provided by Hodkinson (1984b).

Owing to the fact that cecidological researches were carried out in the past by non-psyllidologists, some references to galls caused by psyllids are presently unreliable, since they probably are the typical result of a «from Author to Author inheritance», started from a former wrong report.

As to this aspect, best example is represented by Dalla Torre (1893), who erroneously ascribed to Löw (1888) the record of gall-forming responsibility in 11 species found in Trentino-Alto Adige, formerly part of Austrian Tyrol (*Aphalara calthae* var. *maculipennis*, page 111; *A. calthae*, page 111; *A. picta* (now *flavipennis*), page 116; *Aphalera* [sic] *nervosa*, page 113; *Psylla alni*, page 104; *P. fusca*, page 104; *P. alpina*, page 105; *P. crataegi*, page 118; *P. pulchella*, page 147; *Trioza acutipennis* (now *femoralis*), page 104; *T. tripunctata* (now *trisignata*), page 151), in addition to 5 more species, quoted in that work from territories which do not belong to Italy, at present (*Psylla ambigua*, pages 152, 153, 155; *P. salicicola* (now *saliceti*), page 153; *P. hippophaes*, page 133; *P. phaeoptera* (now *zetterstedti*), page 133; *P. rhododendri*, page 148). Some of the above mistakes (regarding *Psylla alni*, *P. fusca* and *P. alpina*) were already evidenced by Kieffer (1896: 63, in note).

The brief outline that has been given in the previous lines, allows to state the importance of improving cecidological studies and gives reasons to a deeper attention to this topic, which should be paid in the future by psyllidologists, while studying several other biological aspects of these insects. In particular, all species causing to plants limited or desultory deformations are in need of more detailed knowledge, in order to clarify their true role as gall-agents.

3.3.3. Groups of «psyllocecidia»

During our researches on Italian psyllids, about 30 species have been found to cause alterations or galls; some other ones are reported in the literature as responsible in deformations to plant organs in Italy, but they have not been directly noted by us. On the whole, we have reliable elements for cecidia caused by about 40 species, the 20% out of the total.

A satisfactory classification of the Italian psyllids, based on the manner they produce modifications, deform the plants or cause galls, is not easy to achieve, due to the frequent influence of peculiar local conditions on variability of the galls themselves. Thus, separation between species groups is sometimes problematic, owing to the occurrence of intermediate terms.

Nevertheless, an attempt has been made by us to classify the Italian cecidia and this let us to distinguish 9 apparently separated species groups, which are reported below.

In defining these groups, the distinction proposed by Houard (1908) between terminal or apical galls (= «acrocecidia») and lateral ones (= «pleurocecidia») is followed here. Within each group, species are listed in systematic order. Some interesting cecidia, not found up to now in Italy but likely findable in the next future, are marked with *. More detailed information and bibliographical data are reported in the treatment of each species. A complete Italian cecidological literature is given in the Bibliography (at n. 2, page 181). We report here only some ancient reports regarding cecidia which have not been sawn by us, together with some very recent reports, not included in the first part of this catalogue.

I group - Species usually causing only colour modifications in leaves, with production of decoloured areas or variously wide spots.

- *Bactericera femoralis*, on *Alchemilla* spp.;
- *Dyspersa laserpitii*, on *Laserpitium siler*, *L. krapfii* subsp. *gaudinii* and *L. latifolium*;
- various species here attributed to the II and III group, when weak infestations occur.

II group - Species causing various kinds of alterations to sprouts, stem apices, leaflets, leaves and flowers. Some species may infest economically important plants.

- *Acizzia acaciaebaileyanae*, on *Acacia* spp.;
- *Acizzia uncatoides*, on *Acacia* spp.;
- *Cacopsylla mali*, on *Malus domestica*;

- *Cacopsylla melanoneura*, on *Malus domestica*;
- *Cacopsylla pyricola*, on *Pyrus communis*;
- *Cacopsylla pyri*, on *Pyrus communis*;
- *Cacopsylla visci*, on *Viscum album* (causing showy sickle-shaped bending of the leaves);
- *Ctenarytaina eucalypti*, on *Eucalyptus* spp.;
- *Calophya rhois*, on *Cotinus coggygria* (wrinkling the leaves, through folds which are perpendicular to the main veins; sometimes also bending the leaf margin downwards);
- *Bactericera tremblayi*, on *Allium cepa* (cecidia consisting in spiral or cork-screw distorsions, which are produced on young leaves; on older ones the psyllid causes deep and wide concavities, more or less closed each other);
- **Dyspersa apicalis*, on *Daucus carota* (showy deformations reported from North and Central Europe but never found in Italy up to now);
- *Hippophaetrioza binotata*, on *Hippophae rhamnoides* (only doubtful observations are available);
- *Trioza urticae*, on *Urtica dioica* and *U. urens*.

III group - Species producing acrocecidia involving leaves and stems: in apical sprouts, leaflets are bent upwards, thus forming a sort of bowl or spoon, and internodes are shortened; the whole apex assumes an almost globose aspect, with the nymphs of the psyllid developing inside.

- *Asphagidella buxi*, on *Buxus sempervirens;* (CORTI (1904: 345) observed less showy deformations on *B. sempervirens* var. *rosmarinifolia*, probably related to its long and narrow leaves);
- *Spanioza galii*, on *Cruciata laevipes* and *Sherardia arvensis*;
- **Spanioza galii*, on *Galium* spp.;
- *Trioza cerastii*, on *Cerastium* spp..

IV group - Species causing foliar pleurocecidia, in shape of small bowls or weak concavities mostly at the leaf underface, which a rounded prominence corresponds to, at the upperface (= pit galls). Nymphs of these psyllids live inside these bowls or at their mouth (one per each). This is the typic and frequent cecidium caused by many Triozidae; in Italy, it has been observed for:

- *Heterotrioza portulacoides*, on *Halimione portulacoides* (doubtful production of red leaf cecidia, described by BALDRATI (1900: 30) but never observed by us);
- *Trioza munda*, on *Knautia drymeia*;
- *Trioza chrysanthemi*, on *Leucanthemum* spp. complex *vulgare*;
- *Trioza försteri*, on *Mycelis muralis*;
- *Trioza proxima*, on *Hieracium pilosella*;
- *Trioza dispar*, on *Leontodon hispidus*;
- *Trioza dispar* (doubtful identification), on *Taraxacum officinale*;
- *Trioza remota*, on *Quercus petraea*, *Q. robur* and *Q. pubescens*;
- *Trioza soniae*, on *Quercus cerris*;
- *Trioza apulica*, on *Quercus trojana*;

- *Trioza ilicina*, on *Quercus ilex*;
- *Trioza ramni*, on *Rhamnus catharticus*;
- *Trioza marginepunctata*, on *Rhamnus alaternus*;
- *Trioza flavipennis*, on *Aegopodium podagraria*;
- *Trioza scottii*, on *Berberis vulgaris*;
- *Trioza thomasii*, on *Homogyne alpina* (LÖW, 1888: 28);
- *Trioza* sp., on *Achillea moschata* (THOMAS, 1886: 297; LÖW, 1888: 28; DALLA TORRE, 1893: 103; all referred to findings in Trentino-Alto Adige, Solda-Sulden, 1930-2370 m).

V group - Species forming foliar pleurocecidia similar to those ones of the IV group, but showy protruding from the leaf upperface, in shape of 3-4 mm long tubes, slightly enlarged and curved at the apex.

- *Trioza kiefferi*, on *Rhamnus alaternus* and *R. oleoides*.

VI group - Species which cause foliar concavities at the leaf upperface (where the nymphs settle), with corresponding red pimples at the underface. Moreover, psyllids of this group longitudinally fold upwards the two halves of the leaves, very often leading the two edges to touch each other above the main vein and thus giving to the same leaves a keel-shaped aspect. Even the leaf apex may be folded upwards.

- *Trioza proxima*, on *Hieracium pilosella*.

VII group - Species producing a well evoluted foliar pleurocecidium, by rolling up the leaf margin (= leaf margin roll galls), which changes in colour and becomes hypertrophic. A sort of cylindric pocket is made up in this way, which the nymphs develop inside. They are the most evoluted and showy cecidia which are produced in Italy by psyllids on leaves.

- *Paracraspedolepta nebulosa*, on *Epilobium angustifolium* (eggs are deposited in a long line, parallel to the central vein; the leaf margin is folded downwards (SAMPÒ, 1975: fig. 5));
- *Camarotoscena speciosa*, on *Populus* spp. (leaf margin enrolled upwards);
- *Psyllopsis fraxini*, on *Fraxinus excelsior* (leaf margin enrolled downwards);
- *Trichochermes walkeri*, on *Rhamnus catharticus* and *R. saxatilis* (leaf margin enrolled upwards);
- *Lauritrioza alacris*, on *Laurus nobilis* (leaf margin enrolled downwards);
- *Spanioza galii*, on *Rubia peregrina* (according to BOSELLI (1929b: 25, fig. VIII), nymphs estivate and hibernate in galls built up in apical leaves);
- *Trioza centranthi*, on *Centranthus* spp., *Fedia cornucopiae* and *Valerianella* spp.

VIII group - Species causing showy acrocecidia in flowers and inflorescences, which are variously and sometimes deeply modified, up to flowers sterilization. In some cases, these cecidia were described well before the relative psyllids were known.

- *Livia juncorum*, on *Juncus* spp. (inflorescences are transformed in masses or glomerules of reddish and closed leaves, with short internodes; the treatment and representation of this cecidium by BAUHIN (1620) in Switzerland is the first, though undirect, world record of a psyllid);
- *Trioza rumicis*, on *Rumex* spp. (a very wide cecidium, up to 2 cm long);
- *Trioza centranthi*, on *Centranthus* spp., *Fedia cornucopiae* and *Valerianella* spp. (great and brightly coloured cecidia, frequently findable together with leaf-galls and giving to the whole inflorescence a subspherical aspect; see already the Swiss report by BAUHIN (1623)).

IX group - Species producing cecidia on roots, consisting in hypertrophies and entanglements of radicles, not actually found in Italy up to now but reported here for their biological importance. Apart from those ones which are listed below, other species of *Craspedolepta sensu lato* may cause similar galls.

- **Neocraspedolepta subpunctata*, on *Epilobium angustifolium* (LAUTERER & BAUDYS, 1968; LAUTERER, 1993: 159);
- **Paracraspedolepta nebulosa*, on *Epilobium angustifolium* (LAUTERER (1992: 149-150) gives interesting biological details on this species, which causes two kinds of galls: one on the leaves and the other one on the roots; as in the previous species, first instar nymphs of this psyllid migrate to the ground, where they live on the roots);
- **Spanioza galii*, on *Galim verum* in Holland (DOCTERS VAN LEEUWEN, 1937: 48).

3.3.4. FINAL REMARKS

The above considerations allow to note how Italian psyllids usually cause only one kind of gall per each, with the exception of *Trioza dispar* and *T. centranthi*, each one producing two rather similar cecidia, or *Paracraspedolepta nebulosa*, which determines two highly different kinds of galls (one of which has never been observed in Italy). *Spanioza galii* seems to cause three kinds of galls, but this needs to be verified.

Most of the galls caused by Italian species of psyllids occur on leaves, a few ones on sprouts and a very few on flowers; only three examples of root-galls are known in Europe, but they have not been found in Italy up to now.

As regards psyllid families, among the nearly 40 Italian species which are known to be involved in cecidological aspects, three ones belong to Aphalaridae (respectively to the subfamilies Liviinae, Aphalarinae and Paurocephalinae), nine ones to Psyllidae (1 to Psyllopseinae, 2 to Acizziinae (imported) and 6 to Psyllinae), one to Spondyliaspidae (imported) and all the remaining ones to Triozidae.

3.4. **Natural enemies**

Numerous biotic factors have an important role in naturally controlling field populations of Homoptera Psylloidea. Therefore, knowledge on these organisms, their biology, ethology and relationships with victims is highly important to be improved, in relation to the outstanding position that psyllids may occupy within phytophagous insects of some agricultural or forestal ecosystems.

As regards Italy, scarce and often approximate data on this topic are yet available up to now. Very few literary references occur and organic works lack, considering the whole insect group. This is probably due to practical difficulties which may be found in field researches on this aspect, as well as to uncertainty of present taxonomy in most of the involved groups, which makes uneasy to give sure specific identifications. In order to try to improve the knowledge on such an aspect, some material has been collected by us during the last years and shall be hopefully studied in the next future.

Due to our present limited competence on this topic, only a brief review is reported in this chapter, exclusively based on literary and uncommented references.

3.4.1. Entomophagous insects

Similarly to other phytophagous groups, also psyllids have their most important and diffused enemies within other insects, and very efficacious parasitoids or predators are well known to occur in Italy, on economically important species.

A) Parasitoids and hyperparasitoids

As far as presently known, all parasitoids and hyperparasitoids of Psylloidea presently known all over the world belong to about ten insect families, mainly ascribable to Hymenoptera Chalcidoidea but also to other hymenopterous superfamilies (such as Cynipoidea, Ichneumonoidea and Proctotrupoidea), as well as to Strepsiptera and Diptera Itonidae (Cecidomyiidae). For most of them, parasitic activity is primarily carried out on nymphal stages of the psyllids; very few species attack the adults, while no egg-parasitoids are known up to now.

As to the worldwide knowledge on this topic, many results have been achieved during the last times. A total of 60 species were reported by Jensen (1957) and about 40 by Fulmek (1958) (some Italian records occurring in both papers).

A poor situation regards the Italian territory, where only very scarce, fragmentary and sometimes contracdictory data are available, mostly limited to economically important psyllids. As a whole, 6 families, 13 genera and only 13 species of Hymenoptera have been reported in Italy up to now; some more references are limited to the generic name. This means that parasitoids or hyperparasitoids have been reported up to now only for 13 psyllid species (table VIII).

Herard (1986: 3; with reference to Carl, 1969) reported *Endopsylla agilis* de Meijere, 1907 (Diptera Cecidomyiidae) for the Italian territory; such a record is wrong, since Carl (1969: 149) states just the contrary, affirming that *E. agilis* does not occur in Italy.

Among the most outstanding Italian works on this topic, the paper by Masi (1911) is worth of being mentioned, where «*Encyrtus euphyllurae* Silvestri in litt.» is described. From the same psyllid host (*Euphyllura olivina*), Silvestri (1915) describes *Alloxista eleaphila* sp.n.. Some years later, a wide contribution to parasites and predators of *Trioza* (now *Lauritrioza*) *alacris* is given by Borelli (1920), with description of *Psyllaephagus femoralis* sp.n.. Golfari (1937) deals with 5 parasitoid species of *Psylla* (now *Cacopsylla*) *pyricola* and Zangheri (1954) reports *Tetrastichus obscuratus* (now *T. upis*) from *Trioza urticae*. Later on, in his revision of Palaearctic Tetrastichinae, Domenichini (1965) describes *Tetrastichus tremblayi* sp.n., parasitizing *Trioza* (now *Bactericera*) *tremblayi*; the biology of this species is deeply investigated by Tremblay (1965b). A list of the Italian species of the genus *Tetrastichus* (including some parasitoids of psyllids) may be found in the Index of Palaearctic Tetrastichinae, published by Domenichini (1966).

As to the more recent literature, parasitoids and hyperparasitoids have been variously recorded by several Authors: 2 species on *Trioza* (now *Bactericera*) *femoralis*, from Emilia-Romagna (Bin, 1972); 5 species on *Psylla* (now *Cacopsylla*) *pyri*, from Piemonte (Arzone, 1979); one species (*Encarsia aleuroilicis* sp.n.) on *Trioza ilicina*, from Italy (Viggiani, 1983); 5 species on *Cacopsylla pyri*, from Sicily (Rapisarda & Siscaro, 1991); 3 species on *Trioza ilicina*, from Italy (Viggiani, 1991). Other Italian records, sometimes based on compilation of former data, are given by Silvestri, 1911; *Mercet, 1921; Waterston, 1922; Ferrière, 1926; Gaham & Waterston, 1926; Grandi, 1927, 1930, 1951, 1953; Boselli, 1929c; Lal, 1934b; Silvestri, 1934; Ghesquiere, 1956; Tremblay, 1958, 1961, 1978, 1981; Ferrière, 1961; Vidano *et al.*, 1978; Giunchi, 1980; Fimiani, 1985; Herard, 1986; Viggiani, 1988; Conci & Tamanini, 1981; Priore, 1991; Siscaro & Rapisarda, 1994.

As results from the all above literature, brief notes on the species (in alphabetical order) found in Italy up to now are reported below.

Parasitoids

Ordo Hymenoptera

Superfamily Chalcidoidea

Family Encyrtidae

Encyrtus euphyllurae Masi, 1911: see *Psyllaephagus euphyllurae.*

Encyrtus triozae André, 1878: see *Microterys triozae.*

Metallon: see *Trechnites*

Microterys triozae (André, 1878)

It.Rep. - Ghesquière, 1956: 702 (Liguria).

Biol. - Endophagous in nymphs of *Trioza centranthi* (Vallot), on *Centranthus ruber.*

Ooencyrtus sp.

It.Rep. - Golfari, 1937: 218-219 (Emilia-Romagna), det. Masi; Fulmek, 1958: 56 (Italy).

Biol. - From *Cacopsylla pyricola* (Förster), on *Pyrus communis.*

Prionomitus mitratus (Dalman, 1820)

It.Rep. - Vidano *et al.*, 1978: 75, 76 (Piemonte, common); Arzone, 1979: 135, 141-142, fig. VII (ibid.), det. Viggiani; Giunchi, 1980: 49 (Piemonte); Tremblay, 1981: 93 (Italy); Herard, 1986: 3 (Italy); Priore, 1991: 61 (Campania); Rapisarda & Siscaro, 1991: 419 (Sicily, not common), det. Siscaro; Siscaro & Rapisarda, 1994: 123-126 (Sicily).

Biol. - Important endophagous in nymphs of *Cacopsylla pyri* (L.), on *Pyrus communis.*

Obs. - Good redescription of adult and preimaginal stages of this species is given by Delvare *et al.*, 1981.

Prionomitus tiliaris (Dalman, 1820)

It.Rep. - Arzone, 1979: 135-142 (Piemonte, efficacious), det. Viggiani; Giunchi, 1980: 49 (Piemonte); Herard, 1986: 2, 3 (Italy); Rapisarda & Siscaro, 1991: 419 (Sicily, sporadic), det. Siscaro.

Biol. - Endophagous in nymphs of *Cacopsylla pyri* (L.), on *Pyrus communis.*

Prionomitus sp.

It.Rep. - Grandi, 1951: 818 (Emilia-Romagna); Jensen, 1957: 78 (Italy).

Biol. - Endophagous in nymphs of *Cacopsylla pyricola* (Förster), on *Pyrus communis*.

Psyllaephagus Ashmead, 1900: this genus (and its related ones) is presently in need of taxonomic clarification (Viggiani, 1991: 173); it includes the greatest part of psyllid parasitoids.

Psyllaephagus euphyllurae (Masi, 1911)

It.Rep. - Silvestri, 1911: 99 (as *Encyrtus euphyllurae*, nom.nud.); Masi, 1911: 169-171, fig. 11 (as *Encyrtus euphyllurae*) (Umbria, Sicily); Ferrière, 1926: 191 (as *Encyrtus euphyllurae*) (Italy); *Mercet, 1921: 351, 699-700, fig. 290 (Sicily); Gahan & Waterston, 1926: 375 (as *Encyrtus euphyllurae*) (Sicily); Grandi, 1927: 200 (as *Encyrtus euphyllurae*) (Italy); Grandi, 1930: 248 (as *Encyrtus euphyllurae*) (Italy); Lal, 1934b: 326 (Sicily); Silvestri, 1934: 378 (as *Encyrtus euphyllurae*) (Italy); Grandi, 1951: 816 (as *Encyrtus euphyllurae*) (Italy); Jensen, 1957: 78, 82 (Italy); Fulmek, 1958: 55 (Sicily); Tremblay, 1978: 1017 (Italy); Tremblay, 1981: 89 (as *Encyrtus euphyllurae*) (Italy).

Biol. - Endophagous in nymphs of *Euphyllura olivina* O.G.Costa, on *Olea europaea*.

Psyllaephagus femoralis Borelli, 1920

It.Rep. - Borelli, 1920: 32-34 (Emilia-Romagna); Waterston, 1922: 44 (ibid.); Ferrière, 1953: 30 (Italy); Ghesquière, 1956: 702-703 (Emilia-Romagna); Jensen, 1957: 78, 85 (Italy); Fulmek, 1958: 57 (Italy); Ferrière, 1961: 46-48, fig. 5 (Emilia-Romagna), redescription, type material examined.

Biol. - Endophagous in nymphs of *Lauritrioza alacris* (Flor), on *Laurus nobilis*.

Psyllaephagus sp. (1)

It.Rep. - Golfari, 1937: 218-219 (Emilia-Romagna), det. Masi; Grandi, 1951: 818 (ibid.); Jensen, 1957: 79 (Italy); Fulmek, 1958: 56 (Italy).

Biol. - From nymphs of *Cacopsylla pyricola* (Förster).

Psyllaephagus sp. (2)

It.Rep. - Bin, 1972: 49, 52, fig. 9 (Emilia-Romagna), det. Domenichini.

Biol. - Endophagous in nymphs of *Bactericera femoralis* (Förster), on *Alchemilla vulgaris*.

Table VIII - LIST OF PSYLLOIDEA (IN SYSTEMATIC ORDER) ON WHICH PARASITOIDS (*par*) OR HYPERPARASITOIDS (*hyp*) HAVE BEEN REPORTED IN ITALY.

PSYLLIDS	PARASITOIDS OR HYPERPARASITOIDS
Euphyllura olivina (O.G. Costa, 1839)	*Alloxista eleaphila* Silvestri (? par) *Psyllaephagus euphyllurae* (Masi) (par)
Cacopsylla pyri (L., 1758)	*Aphidencyrtus mamitus* (Walker) (hyp) syn. A. *cantabricus* (Mercet) *Lygocerus* sp. (? hyp) syn. *Dendrocerus* sp. *Prionomitus mitratus* (Dalman) (par) *Prionomitus tiliaris* (Dalman) (par) *Pachyneuron concolor* (Förster) (?hyp) *Pachyneuron* sp. (hyp) *Trechnites psyllae* Ruschka (par)
Cacopsylla pyricola (Förster, 1848)	*Lygocerus* sp. (? hyp) syn. *Dendrocerus* sp. *Ooencyrtus* sp. (par) *Prionomitus* sp. (par) *Psyllaephagus* sp. (par) *Pachyneuron* sp. (? hyp) *Trechnites psyllae* Ruschka (par)
Bactericera bucegica (Dobreanu & Manolache, 1962)	*Tetrastichus* sp. gr. *pubescens* (Nees) (par)
Bactericera femoralis (Förster, 1848)	*Psyllaephagus* sp. (par) *Tetrastichus upis* Walker (par)
Bactericera tremblayi (Wagner, 1961)	*Tetrastichus tremblayi* Domenichini (par) sub *Tetrastichus ? triozae*
Spanioza galii aspinovelutina (Sulc, 1913)	Encyrtidae gen. sp. (par) *Tetrastichus* sp. (par)
Lauritrioza alacris (Flor, 1861)	*Psyllaephagus femoralis* Borelli (par)

Table VIII

PSYLLIDS	PARASITOIDS OR HYPERPARASITOIDS
Trioza centranthi (Vallot, 1829)	*Microterys triozae* (André) (par)
Trioza ilicina (De Stefani Perez, 1901)	*Encarsia aleuroilicis* Viggiani (hyp) *Psyllaephagus* sp. (par) *Syrphophagus* sp. (? par) *Tamarixia pubescens* (Nees) (par) sub *Tetrastichus* sp.
Trioza remota (Förster, 1848)	*Tamarixia pubescens* (Nees) (par) sub *Tetrastichus* sp.
Trioza tripteridis (Burckhardt *et al.*, 1991)	*Tetrastichus* sp. (par)
Trioza urticae (L., 1758)	*Tetrastichus upis* Walker (par) sub *T. obscuratus* Förster
? Psylloidea sp.	*Tetrastichus pronomus* Walker (par)

Psyllaephagus sp. (3)

It.Rep. - VIGGIANI, 1983: 141 (Italy); VIGGIANI, 1986: 90 (Lazio, Campania, Basilicata); VIGGIANI, 1988: 130 (Italy); VIGGIANI, 1991: 172-173 (Italy).

Biol. - Endophagous in nymphs of *Trioza ilicina* (De Stefani Perez), on *Quercus ilex*.

Syrphophagus sp.

It.Rep. - VIGGIANI, 1991: 172-173 (Campania).

Biol. - Perhaps endophagous (but it is not clear whether it is an hyperparasitoid) in nymphs of *Trioza ilicina* (De Stefani Perez), on *Quercus ilex*.

Trechnites psyllae (Ruschka, 1923)

It.Rep. - GOLFARI 1937: 218-219 (as *Metallon ? psyllae*) (Emilia-Romagna), det. Masi; GRANDI, 1951: 818 (as *Metallon* sp.) (ibid.); FULMEK, 1958: 56 (as *Metallon psyllae*) (Italy); ARZONE, 1979: 135, 142 (Piemonte), det. Viggiani; GIUNCHI, 1980: 49 (Piemonte); HERARD, 1986: 3 (Italy); RAPISARDA & SISCARO, 1991: 419-420 (Sicily), det. Siscaro; SISCARO & RAPISARDA, 1994: 123-126 (Sicily).

Biol. - Efficacious nymphal parasitoid of *Cacopsylla pyri* (L.) and *C. pyricola* (Förster).

Encyrtidae gen.sp.

It.Rep. - BOSELLI, 1929c: (Campania), not described; FULMEK, 1958: 58 (Italy).

Biol. - Parasitoid of *Spanioza galii aspinovelutina* Sulc, on *Rubia peregrina*.

Family Eulophidae

Tamarixia pubescens (Nees, 1834)

It.Rep. - VIGGIANI, 1986: 90 (as *Tetrastichus* sp.)(Lazio, Campania, Basilicata); VIGGIANI, 1988: 130 (as *Tetrastichus* sp.)(ibid.); VIGGIANI, 1991: 172-173, tav II: 3-6 (Italy), det. Graham.

Biol. - Ectophagous in nymphs of *Trioza ilicina* (De Stefani Perez), on *Quercus ilex*, and *T. remota* Förster, on *Quercus* sp..

Tetrastichus obscuratus André, 1858, *sensu* ZANGHERI, 1954: see *Tetrastichus upis*.

Tetrastichus pronomus Walker,1839

It.Rep. - DOMENICHINI, 1966: 46 (Italy).

Biol. - According to DOMENICHINI (1966) «Host: unknown. Morphologically closely related species of *Tetrastichus* are parasites of Hom.Psyllidae».

Tetrastichus sp.gr. *pubescens* (Nees, 1834)

It.Rep. - CONCI & TAMANINI, 1991: 42 (Trentino-Alto Adige), det. Siscaro.

Biol. - Obtained from nymphs of *Bactericera bucegica* (Dobreanu & Manolache), on *Ranunculus aconitifolius*.

Tetrastichus tremblayi Domenichini, 1965

It.Rep. - TREMBLAY, 1958: 168-169 (as *Tetrastichus ?triozae* Burks) (Campania); TREMBLAY, 1961: 4-5 (as *Tetrastichus ?triozae* Burks) (ibid.); TREMBLAY, 1965b: 129-133, figs 32-34 (as *Tetrastichus* sp.) (ibid.); DOMENICHINI, 1965: 83-85, figs 1, 4 (ibid.); DOMENICHINI, 1966: 51 (ibid.).

Biol. - Ectophagous of II-V instar nymphs of *Bactericera tremblayi* (Wagner) (*olim Trioza nigricornis* Förster, *pars*), on *Allium cepa*. Biological details are given by TREMBLAY, 1965b: 130-133.

Tetrastichus ? triozae Burks,1843: see *Tetrastichus tremblayi*.

Tetrastichus upis (Walker, 1839)

It.Rep. - GRANDI, 1953: 282 (as *Tetrastichus obscuratus* Förster) (Emilia-Romagna); ZANGHERI, 1954: 272 (as *Tetrastichus obscuratus* Förster-André) (Emilia-Romagna), det. Masi; JENSEN, 1957: 79, 85 (as *Tetrastichus obscuratus* Förster-André)(Italy); BIN, 1972: 49-52,

figs 7-8, 10 (Emilia-Romagna), det. Domenichini; Domenichini, 1965: 82 (Emilia-Romagna, Toscana, Campania), det. Domenichini; Domenichini, 1966: 52 (Italy).

Biol. - Ectophagous on IV-V instar nymphs of *Trioza urticae* (L.), on *Urtica dioica* (Zangheri, 1954), and on nymphs of *Bactericera femoralis* (Förster), on *Alchemilla vulgaris* (Bin, 1972).

Tetrastichus sp. (1)

It.Rep. - Conci & Tamanini, 1991: 51 (Trentino-Alto Adige), det. Siscaro.

Biol. - Ectophagous on nymphs of *Trioza tripteridis* Burckhardt *et al.*, on *Valeriana montana.*

Tetrastichus sp. (2)

It.Rep. - Boselli, 1929c: 27 (Campania); Fulmek, 1958: 58 (Italy).

Biol. - Ectophagous in nymphs of *Spanioza galii aspinovelutina* (Sulc), on *Rubia peregrina.*

Tetrastichus sp. (from *Trioza ilicina*, on *Quercus ilex*): see *Tamarixia pubescens.*

Superfamily Cynipoidea

Family Cynipidae

Alloxista eleaphila Silvestri, 1915

It.Rep. - Silvestri, 1911: 99 (Italy), nom.nud.; Silvestri, 1915: 274, note (ibid.); Grandi, 1927: 200 (ibid.); Grandi, 1930: 248 (ibid.); Silvestri, 1934: 378, fig. 345 (ibid.); Grandi, 1951: 816 (ibid.); Jensen, 1957: 81, 82 (ibid.); Fulmek, 1958: 55 (ibid.); Tremblay, 1981: 89 (ibid.); Fimiani, 1985: 268 (ibid.).

Biol. - Endophagous in nymphs of *Euphyllura olivina* O.G. Costa, on *Olea europaea.* According to Jensen (1957: 76) and Fulmek (1958: 53), «*Alloxista* may also be a secondary parasites when reared from psyllids.».

Hyperparasitoids

Ordo Hymenoptera

Superfamily Chalcidoidea

Family Aphelinidae

Encarsia aleuroilicis Viggiani, 1982

It.Rep. - Viggiani, 1983: 141 (Italy); Viggiani, 1986: 90 (ibid.); Viggiani, 1987: 128-130, figs IV: 1-3 (Lazio, Campania, Basilicata).

Biol. - Hyperparasitoid of *Tamarixia pubescens* (see) and

Psyllaephagus sp. (3) (see), both nymphal parasitoids of *Trioza ilicina* (De Stefani Perez).

Family Encyrtidae

Aphidencyrtus cantabricus (Mercet,1921): see *Aphidencyrtus mamitus*.

Aphidencyrtus mamitus (Walker, 1837)

It.Rep. - ARZONE, 1979: 135, 142 (as *Aphidencyrtus cantabricus*) (Piemonte), det. Viggiani; GIUNCHI, 1980: 49 (as *Aphidencyrtus cantabricus*) (Piemonte); RAPISARDA & SISCARO, 1991: 420 (Sicily), det. Siscaro; SISCARO & RAPISARDA, 1994: 123-126 (Sicily).

Biol. - Hyperparasitoid on chalcidids parasitizing *Cacopsylla pyri* (L.).

Obs. - The genus *Aphidencyrtus* has and intricate and still controversial taxonomy, having been recently reported even in synonymy of *Syrphophagus.*

Family Pteromalidae

Pachyneuron concolor (Förster, 1841)

It.Rep. - ARZONE, 1979: 135, 142 (Piemonte), det. Viggiani; GIUNCHI, 1980: 49 (Piemonte).

Biol. - Probably hyperparasitoid on chalcidids parasitizing *Cacopsylla pyri* (L.).

Pachyneuron sp. (1)

It.Rep. - GOLFARI, 1937: 218-219 (Emilia-Romagna), det. Masi; GRANDI, 1951: 818 (ibid.); JENSEN, 1957: 80, 84 (Italy); FULMEK, 1958: 56 (Italy).

Biol. - Probably hyperparasitoid, on Chalcidoidea parasitizing *Cacopsylla pyricola* (Förster).

Pachyneuron sp. (2)

It.Rep. - RAPISARDA & SISCARO, 1991: 420 (Sicily), det. Siscaro; SISCARO & RAPISARDA, 1994: 123-125 (Sicily).

Biol. - Hyperparasitoid, on Chalcidoidea parasitizing *Cacopsylla pyri* (L.).

Superfamily Proctotrupoidea

Family Ceraphronidae

Dendrocerus sp.: see *Lygocerus* sp.

Lygocerus sp.

It.Rep. - GOLFARI, 1937: 218-219 (Emilia-Romagna), det. Masi; GRANDI, 1951: 818 (ibid.); FULMEK, 1958: 56 (Italy).

Biol. - In Italy, reported from *Cacopsylla pyricola* (Förster), on *Pyrus communis*. According to FULMEK (1958: 53), it is likely an hyperparasitoid of *Prionomitus* spp..

Obs. - The genus *Lygocerus* has and intricate and still controversial taxonomy, having been recently reported even in synonymy of *Dendrocerus*.

B) Predators

On these entomophagous insects and their biology, numerous references are available in the Italian literature. As to this aspect, it is worth to mention the comprehensive works on predators of *Cacopsylla melanoneura* (Domenichini, 1963), *Cacopsylla pyri* (Arzone, 1979; Nicoli *et al.*, 1988) and *Lauritrioza alacris* (Borelli, 1920). But information on this topic is given also in other papers, as those ones by Silvestri, 1911, 1915, 1934; Boselli, 1929c; Grandi, 1930, 1951; Golfari, 1937; Della Beffa, 1949; Tremblay, 1965b, 1978, 1981; Domenichini, 1967; Bin, 1970, 1972; Picco, 1977; Picco & Picco, 1978; Vidano *et al.*, 1978; Giunchi, 1980; Pezzi, 1982; Alma & Arzone, 1988; Ivancich Gambaro, 1988; Terza & Pavan, 1988; Nicoli *et al.*, 1989; Ragusa Di Chiara *et al.*, 1990; Priore, 1991; Rapisarda & Siscaro, 1991; Celli & Marzocchi, 1992.

From the all previous literature, it emerges how Heteroptera Anthocoridae, especially *Anthocoris nemoralis* (F.), *A. punctillum* (Weise) and *Orius minutus* (L.), are the most important and diffused predators of psyllids in Italy, together with Coleoptera Coccinellidae, Neuroptera Chrysopidae and Diptera Syrphidae. Some references also regard Dermaptera Forficulidae, Orthoptera Gryllidae and Tettigonidae, Heteroptera Miridae and Nabidae, Neuroptera Coniopterygidae and Hemerobiidae, Diptera Tachinidae and some other taxa, all of them having a lower importance.

3.4.2. Other biological control agents

If entomophagous insects are the main natural enemies of psyllids, references to other biological control agents, which even actively may influence in some situations their population dynamics, are not unusual in the literature.

For instance, the activity on psyllids of various fungal species of the genus *Entomophthora* (Fungi Entomophthorales) is well known since a long time and from several Countries. With particular reference to Italy, it is worth to mention here the records of an *Entomophthora* sp., on *Cacopsylla pyri* in Piemonte (Arzone, 1979: 135, 142), and *E. sphaerosperma* Fresenius, on various pear-feeding psyllids of the genus *Cacopsylla* (Tremblay, 1981: 93).

In this context, the generic predacious activity shown on psyllids by representatives of various zoological groups - such as mites (especially in the family Trombidiidae), spiders or birds - is also not to be neglected, for the very important role these factors may play in some peculiar ecosystems.

4. ECONOMIC IMPORTANCE

Notes on psyllid damages to plants may be found since about the dawning of the Italian literature on this insect group (MALPIGHI, 1679). The Olive Psyllid, *Euphyllura olivina* (Costa), catched phytopathologists' attention from the end of XVIII century and for more than one century. Infact, already mentioned by *MOSCHETTINI (year ?), *TAVANTI, (1819) and GRIMALDI (1825 and 1828) and described by O.G. COSTA in 1839 (*sub Trips olivinus*) and 1840 (*sub Thrips olivinus*), this species has been more or less widely reported as noxious to olive plants in all following Italian texts on agricultural entomology. Among the most outstanding Authors who dealt with *E. olivina*, A. COSTA (1857 and 1877), LEONARDI (1901) and SILVESTRI (1934) may be mentioned here, while a wider bibliographic survey is reported in the first part of this catalogue (pages 46-47).

In addition to the Olive Psyllid, some other species have been reported as noxious in the Italian XIX century literature, sometimes only on the base of wrong and unverified foreign mentions and not seldom under distorted or unreliable specific names.

As to the first half of the current century, the treatise by LEONARDI (1901) examines the following 19 species, here listed in the original spelling: *Psylla pyrisuga*, *P. pyricola*, *P. Pyri*, *P. Mali*, *P. Pruni*, *P. Crataegi*, *P. Buxi*, *P. salicicola*, *P. peregrina*, *P. saliceti*, *P. Alni*, *Euphyllura Oleae* [*sic*], *Trioza Lauri* [*sic*], *T. pinicola* [= *Bactericera modesta*!], *Trichopsylla Walkerii* [*sic*], *Homotoma Ficus*, *Psyllopsis Fraxini*, *P. fraxinicola*, *Rhinocola Aceris*.

Some years after, in his review of noxious insects reported in the Italian literature from 1911 to 1925, BOSELLI (1928) gives a smaller list (compared with the previous one), including only the following 9 species: *Homotoma ficus*, *Psylla buxi*, *P. mali*, *P. pyri*, *P. pyricola*, *P. pyrisuga*, *Psyllopsis fraxini*, *Trioza alacris*, *Euphyllura oleae* [*sic*]. Then, almost the same psyllids are reported in all the following books on agricultural entomology, such as (among others) those ones by DELLA BEFFA (1949), GRANDI (1951), RUSSO (1956), VENTURI (1965), SERVADEI *et al.* (1972), TREMBLAY (1981), ZANGHERI & MASUTTI (1980, 1988).

Apart from the all mentioned literature, as far as we presently know and as derives from our field observations, only one psyllid species, *Cacopsylla pyri* (L.), may be actually considered a pest to cultivated plants in Italy, needing to be artificially controlled. The insect is particularly injurious in areas where highly productive but susceptible pear varieties are grown, aboundant fertilizations are applied and natural enemies are rarefied by the use of wide spectrum insecticides; under these conditions, the Pear Psyllid may almost yearly exceed the economic threshold, proving itself a key pest. Due to its relevant phytopathological importance in pear orchards, more than 70 Italian scientific papers have been published on the topic from the beginning of the sixties and up to now, as it is reviewed in the first part of this catalogue (pages 119-120) and in the third section of the following specific bibliography. The insect started to show in Italy its harmfulness from about the end of the fifthies (Bua, 1960; Sansavini & Bortolotti, 1961).

Four more psyllids are known to live on pear tree in Italy, but they usually have a lower or even no economic significance. *Cacopsylla pyricola* (Förster) was known as seriously noxious in Italy in the past and still is a pest in other Countries, as in North America; *C. pyrisuga* (Förster) showed us to be totally uninfluent to pear growth and production, in spite of the frequent literary mentions to its damages.

In addition to all direct damages which are usually caused to plants by the psyllids, the mentioned species (or at least some of them) are believed to transmit the pear-tree decline. As to this aspect, see (f.e.) Shalla *et al.* (1961), Chiarappa (1964), Refatti (1964).

The phytopathological problem of the pear psyllids and their control has been one of the main topics in a series of international meetings on integrated management in pear-groves (Bolzano 1974, Toulouse 1983, Yakima 1986, Changing 1988, Alcobacha 1989 and Cesena 1993). Among these meetings, it is worth to a particular mention the Colloque International «Lutte intégrée contre les Psylles du Poirier» (Various Authors, 1984).

As to other fruit trees, apple is reported in the Italian literature to be injuried by *Cacopsylla mali* (Schmidberger), which resulted, on the contrary, almost rare and sporadic to our observations; this psyllid seems to be more frequent and noxious in Northern and Central Europe. On the same plant, a serious infestation by *Cacopsylla melanoneura* (Förster) is reported by Domenichini (1967) from the Province of Varese, but no further records are available on this occurrence. The above mentioned Olive Psyllid, *Euphyllura olivina*, likely was seriously noxious during the last century; at present, it is widespread in the Italian olive groves

but at very low and noninjurious densities (FIMIANI, 1980: 222). The well known and frequently recorded Fig Psyllid, *Homotoma ficus* (L.), showed to be very common on its host plant though causing no appreciable damages at all, such as its close species *H. viridis* Klimaszewski.

Among psyllids living on vegetables, damages to onion cultivations by *Bactericera tremblayi* (Wagner), reported in the past from the Region Campania, are important to be mentioned, even if the species presently seems to have reduced its spreading, being nowadays almost rare and sporadic. Another Triozidae, *Dyspersa apicalis* (Förster), is seriously noxious to carrot in Northern and Central Europe, but its occurrence in Italy is almost rare and sporadic and no damages by this psyllid have been noted up to now.

Several other species show to be slightly or weakly injurious to various ornamental plants. This is the case, for instance, of two introduced species of *Acizzia*, *uncatoides* (Ferris & Klyver) and *acaciaebaileyanae* (Froggatt), which are responsible of limited and restricted damages to *Acacia* trees. Ornamental Box and Laurel are estetically damaged by the leaf galls respectively caused by *Asphagidella buxi* (L.) and *Lauritrioza alacris* (Flor). In a restricted area of the Western Ligurian riviera, leaves of *Eucalyptus* spp. are damaged by the exotic and recently introduced psyllid *Ctenarytaina eucalypti* (Maskell). The Judas tree psyllid, *Cacopsylla pulchella* (Löw), already reported by TARGIONI TOZZETTI (1877 and 1888) as noxious in Italy to *Cercis siliquastrum* L., soils the leaves with abundant honeydew but apparently causing no other damages to the plants, also in case of strong infestations.

As regards forestry plants, numerous psyllids are known to live on hosts of this category, such as alders, ashes, birches, elms, hawthorns, hornbeams, maples, oaks, poplars, willows and others. In some cases, population densities may reach conspicuous levels, but damages to this plants are usually derisory, consisting at most in production of galls.

Final mention is to be made to some foreign psyllid pests, such as *Diaphorina citri* Kuwayama and *Trioza erytreae* (Del Guercio), whose introduction should be avoided in Italy due to their harmfulnes to citrus cultivations; quarantine care should be paid also to *Paratrioza cockerelli* (Sulc), which is noxious to potato plants in North America.

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The bibliographical reports are exactly like the original titles, without corrections.

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