

CESARE CONCI e LIVIO TAMANINI, *Notes on the genus Psyllopsis : (Homoptera Psylloidea)*, in «Atti della Accademia Roveretana degli Agiati. Contributi della Classe di Scienze Matematiche, Fisiche e Naturali [Fasc. B]» (ISSN: 0393-2389), s. 6 v. 29 (1989), pp. 57-85.

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CESARE CONCI & LIVIO TAMANINI

NOTES ON THE GENUS *PSYLLOPSIS*

(Homoptera Psylloidea)

1. INTRODUCTION AND MORPHOLOGY

Type-species: Psylla fraxinicola Foerster, for subsequent designation (CRAWFORD, 1914).

1.1. The very interesting genus *Psyllopsis* so far was much studied, but some problems are still unsolved or necessitate control or deepening. The present note aims mostly to show the data till now doubtful.

This little genus is limited to the West and Central South Palaearctic, from Iberian Peninsula and Morocco to Tadzhikistan. It was found also in North America, perhaps imported. *Psyllopsis* includes 10 species, all living on *Fraxinus* spp. (Oleaceae).

1.2. *Adult* (Figs. 1-41)

Colour green-yellow or brown. Forewings hyaline or yellowish, transparent, with or without brown pattern.

Head wider than pronotum. Genal cones well developed, conic, enough pointed at the apex. Antennae long (1.7-2.7 times the breadth of the head), thin, with a sensille at the segment II and a rhinarium at the segments IV, VI, VIII and IX.

Forewings with well developed pterostigma and weak costal break; anal break near to apex of vein Cu_{1b} ; $M+Cu_1$ vein 0.75 times longer than Cu_1 vein; m_1 cell great and long. Fine microsculpture and indistinct radular spinules. Hindwings transparent or with a great brown band in the anal zone. Legs with well developed meracanthus; metati-

biae at the base without genual tubercle and at the apex with 7-11 black spurs; apex of metatarsus with two black spurs.

Parameres of singular shape, with the inner surface with hairs, spurs and teeth. The apical segment of the penis has at the base a peculiar structure with the form of a «cuff», very developed and protruding in *P. fraxinicola*. Ductus ejaculatorius at the base of the apical part with an evident sclerotized structure.

Genital segment of the female of peculiar shape: its anterior margin is strongly excavated (no other European psyllid has such character); its inferior margin has long, dense, sometimes wavy hairs; genital segment, in ventral view, with bipartite apex.

1-3. Egg (figs. 42-51)

The egg of *Psyllopsis* is known for 6 species (on a total of 10) and was figured by LOGINOVA 1979 for 5 species (*fraxinicola*, *discrepans*, *fraxini*, *distinguenda* and *securicola*). In the present work we give original drawings for *fraxinicola*, *discrepans*, *fraxini* and *distinguenda* and also for *meliphila*, till now unpublished. Therefore, for European *Psyllopsis*, only the egg of the rare and localized *P. dobreanuae* is unknown.

In the reported species the egg has an homogeneous aspect (I type, III subtype of LOGINOVA 1979) and is a little different from all other Psylloidea, except that in the very distant genus *Egeivotrioza*, belonging to another family. The likeness with *Egeivotrioza* is caused only by convergence.

The form of egg is oval, the base is widely rounded and the apex is narrower, rounded. The stalk is at a good distance from the base, about at 1/5 of the total length of the egg, and it is perpendicular or slightly inclined regarding its greater axis. The stalk is showy, long, sometimes as long as the width of the egg and is at times slightly enlarged near its half. A concavity more or less marked is found in the zone of the insertion of the stalk, giving sometimes to the egg a characteristic bean like shape. The phylogenetic and taxonomic importance of this character should be verify.

1.4. Nymphs (figs. 52-57)

The nymph of the fifth instar of *Psyllopsis* was described for 4 species (*fraxinicola*, *discrepans*, *fraxini* and *distinguenda*: cf. paragraph 5); the nymph of *P. meliphila* is in description by RAPISARDA. Therefore, for the 6 European species, only the nymph of *P. dobreanuae* is unk-

noun. On the contrary, the nymphs of the 4 Asiatic species are all undescribed. The nymphs of all instars were figured only for *P. fraxini*.

The nymphs of *Psyllopsis* have the following principal characters:

- 1) General aspect of Psylline type (sensu WHITE & HODKINSON 1982 pag. 6).
- 2) Antennae long, with 8 segments and 4 rhinaria.
- 3) Mesothoracic and metathoracic sclerites numerous and small, well separate from wing-pads.
- 4) Forewing-pads not extending anteriorly on humeral lobes.
- 5) Tarsal arolium with a very long petiole.
- 6) Abdomen with some sclerites anteriorly to caudal plate.
- 7) Anus ventral, surrounded by two circumanal pore rings; additional pore areas are absent on the lateral margins of abdomen.
- 8) Dorsal surface of thorax, wing-pads and abdomen without lanceolate or rod setae.
- 9) Sectasetae and capitate setae absent.
- 10) Lanceolate setae present on the external margins of fore- and hind wing-pads and of abdomen.
- 11) Dorsal surface of abdomen with characteristic semispherical and clavate formations.

The nymphs of *Psyllopsis* have therefore characters both of Psyllidae and of Aphalaridae, but we note in particular the important last reported character, that seems unique in Palaearctic psyllids.

The abdominal dorsal surface of mature nymphs of *Psyllopsis* of the three species examined (*fraxinicola*, *meliphila* and *fraxini*) have some protuberances (figs. 55, 57) which are rounded in vertical view and sub-spherical or clavate in lateral view. The dimensions are small: diameter about 10-20 micron. They are probably connected with wax production.

These formations were already seen and figured by FERRIS (1923:253; pl. 12: F) with the ambiguous names «pores or prominences» and «clavate setae». The Authors who examined the nymphal morphology of *Psyllopsis* (and also WHITE & HODKINSON, 1985) did not put them in evidence and figured them only as small rounded formations under feeble magnification. This interesting character will have to be still studied.

2. LIFE HISTORY AND GALLS

All the species of *Psyllopsis* of which the literature reports notices on the life history, overwinter as egg. VONDRACEK (1957:102) report

erroneously overwintering as imago. On the contrary, the reports of the Authors disagree regarding the number of generations per year.

NGUYEN (1970:762-763, fig. 14) studied carefully the life history of *P. fraxini* in France, in the region of Toulouse, and reports for this zone two generations per year; he observed the nymphs of the first generation from end of April till half June and the adult from half June till end of July; the nymphs of the second generation from the beginning of July till end of August and the adults from end of August to September.

LAUTERER & EASTOP (1968:242) report for *P. distinguenda* one generation per year; but LAUTERER (1982:138-139) deepened the study of the life history of this species in Czechoslovakia and showed two generations per year. The nymphs of the first generation were observed in May and June and the adults from the beginning of June till half of July; the adults of the second generation were observed from half of August till the beginning of November.

LOGINOVA 1963, 1965 and 1968 reports two generations per year for *P. dispar*, *fraxinicola*, *machinosus*, *repens* and *securicola* in USSR. GEGECHKORI (1985:60) reports for Caucasus that *P. discrepans* has two generations per year and *P. distinguenda* perhaps two.

BAEVA (1985:271) reports that *P. narzikulovi* in Tadzhikistan (m 1200-2000) has two generations per year: the adults of the first are present from the end of May till the beginning of July and those of the second were observed on October and November. The nymphs of the second generation have a diapause in July and August. Baeva 1985 reports two generations also for *P. machinosus* and *securicola*.

On the contrary, HODKINSON & WHITE (1979:86) report that all the four species of the genus found in Great Britain (*discrepans*, *distinguenda*, *fraxini* and *fraxinicola*) have in this Country one generation per year and that adult was found on the host plant from June (July for *fraxinicola*) till October.

Therefore, it is possible that *Psyllopsis* has one or two generations per year according to the climate of the regions, but the problem necessitates confirm. As regards Italy, we still have not sure data.

Galls. *Psyllopsis* is one of the few genera of West Palaearctic psyllids that produces galls with rolled up leaf margins and which give hospitality to more than one nymph.

However, for Europe it is ascertained that only *P. fraxini* produces red and violet coloured galls (cf. paragraph 5.5). The reports of the literature regarding *P. distinguenda*, *discrepans* and *dobreanuae* necessitate to be confirmed.

P. fraxinicola and *meliphila* do not produce galls.

As regard the oriental species, LOGINOVA reports, without giving descriptions or figures, that *P. repens* produces galls (1963, 1968:292) and that «it is possible» that *P. machinosus* and *securicola* produce galls (1968:192-193). BAEVA (1985:271,273) wrote that *P. machinosa* [sic] and *securicola* «produce» galls.

New observations are necessary on this subject. It was observed that in the gall produced by *P. fraxini* nymphs of other species of *Psyllopsis* may find protection (NGUYEN 1970:767); this fact makes difficult the exact attribution of the galls producing species.

3. HOST PLANTS AND DAMAGES

The host plants of *Psyllopsis* are exclusively species of the genus *Fraxinus* (Oleaceae family). The reports in the literature regarding *Juglans*, *Corylus* and other, are of occasional findings, of no interest.

Fraxinus comprises trees widely present in the Nearctic (fig. 59) with about 65 species. In the Palaearctic, *Fraxinus* is lacking in the most part of Central and North Asia. TUTIN (1972) ascribes 4 species to the European flora and GREUTER, BURDET & LONG (1989) ascribe 5 species and 3 subspecies to the Mediterranean flora. The remaining species are widespread in Asia and Nord America.

The nomenclature of *Fraxinus* has also some names of cultivar, because the ashes are ornamental trees as well, cultivated in parks. The determination of some species of *Fraxinus* is not easy and therefore the literature has erroneous reports of host plants for a few *Psyllopsis*. Checking these errors is now difficult. A species of *Fraxinus* may be host plant of some species of *Psyllopsis*. LOGINOVA (1963:195) observed 4 species of *Psyllopsis* on ash in Georgia, in the parks of Jerevan. On the other hand, the same species of *Psyllopsis* can develop the whole cycle on different species of *Fraxinus*; but the details needs confirmation.

On the table I we report the species and subspecies of *Fraxinus* with the findings of *Psyllopsis* on them, according to the literature. The list of the species of *Psyllopsis* with their host plants are in the paragraph 5.

Damages. Scarce reports are found in the literature as regards the damages caused to ash-trees by *Psyllopsis*, and they appear negligible in Central and West Europe. LAL (1934:367) however quoted that *Psyllopsis* in Scotland causes appreciable injury.

On the 24.V.1982 we observed *Psyllopsis fraxinicola* in enormous numbers on *Fraxinus angustifolia* subsp. *oxycarpa* in Basilicata, South

Table I - Species and subspecies of *Fraxinus*, with the synonyms and the species of *Psyllopsi* reported in the psyllidological literature, according TUTIN (1972), KRUESSMAN (1986) and GREUTER, BURDET & LONG (1989), with their general distribution. C = Central; E = Eastern; W = Western.

A) European and Mediterranean *Fraxinus*

<i>Fraxinus</i>	<i>Psyllopsi</i>
1) <i>angustifolia</i> subsp. <i>angustifolia</i> Vahl (= <i>monophylla</i>) (= <i>heterophylla</i>) Europe, Mediterranean Region, W Asia	<i>distinguenda</i> , <i>fraxini</i> , <i>fraxinicola</i>
2) <i>angustifolia</i> subsp. <i>oxycarpa</i> (Willd.) Franco & Rocha Afonso (= <i>oxyphylla</i>) C E Europa, W Asia	<i>discrepans</i> , <i>distinguenda</i> , <i>fraxini</i> , <i>fraxinicola</i> , <i>machinosus</i>
3) <i>angustifolia</i> subsp. <i>syriaca</i> Boissier Asia Minor to Central Asia	<i>repens</i> , <i>securicola</i>
4) <i>dimorpha</i> Cosson & Durieu Algeria, Marocco	? <i>meliphila</i> (LOGINOVA 1972: without host plant)
5) <i>excelsior</i> L. Most of Europe, Asia Minor, Caucasus	<i>discrepans</i> , <i>distinguenda</i> , <i>dobreanae</i> , <i>fraxini</i> , <i>fraxinicola</i> , <i>repens</i>
6) <i>ornus</i> L. C and Mediterranean Europe, NW Asia	<i>discrepans</i> (needs confirmation), <i>fraxini</i> , <i>meliphila</i>
7) <i>pallisae</i> Willmott European Turkey, Bulgaria, Moldavia	no reports

B) Asiatic and North American *Fraxinus*

8) <i>americana</i> L. U.S.A., cultivated in Europe	<i>sp.</i> ?
9) <i>nigra</i> Marsh (= <i>sambucifolia</i> Lam., nec <i>sambustifolia</i>) U.S.A., cultivated in Europe, reported from France	<i>fraxini</i>
10) <i>pensylvanica</i> Marsh. U.S.A., cultivated in Europe	<i>sp.</i> ?
11) <i>potamophila</i> Herd Turkestan, Tadzhikistan	<i>narzikulovi</i>
12) <i>dipetala</i> Hook. & Harn. U.S.A.	<i>fraxini</i> , <i>fraxinicola</i>
13) <i>sp.</i> Asia	<i>machinosus</i>

Italy, in the splendid «Bosco di Policoro». The forest was sticky for the very abundant honey-dew, but the ash-trees seemed to tolerate the psyllids well.

On the contrary, LOGINOVA (1963:196; 1968:292) reports for Caucasus, Georgia, that she observed the ash-tree in the parks of Jerevan strongly damaged from *Psyllopsis machinosus*, *repens* and *securicola*. The psyllids damaged more than 30% of the leaves, decolorated from the great number of stings and with the alterations of the very abundant galls.

4. KEY OF THE EUROPEAN SPECIES OF PSYLLOPSIS

The females of *P. discrepans* and *fraxini* seem to be undistinguishable. We do not know characters separating the females of *P. meliphila* and *dobreanuuae*.

1. Head and thorax dorsally green, yellowish or yellow orange; scarce patterns light brown are present only in well mature specimens. Wings hyalin or yellowish, without patterns (figs. 7-9) 2
- Thorax and often the head dorsally with brown-black patterns. Forewings with brown patterns, more or less extended, mostly on the apical part (figs. 10-12) 4
2. Male proctiger well expanded posteriorly (cf. fig. 14). Parameres with shape of pole-ax (fig. 15). Base of apical segment of penis with a great «cuff», expanded laterally and apically with two teeth (fig. 24); terminal part of the penis triangular (fig. 26). The upper margin of the female proctiger, in lateral view, after anus, narrows suddenly in a thin terminal part (fig. 33) 1. *fraxinicola*
- Male protiger not or slightly expanded posteriorly (fig. 13). Parameres of other shape (figs. 16, 17). Base of apical segment of penis with a little «cuff», not expanded laterally. Terminal expansion of the penis as a club (figs. 27-28). The upper margin of the female proctiger, in lateral view, is almost straight and it narrows gradually in a broader terminal part (figs. 34, 36) 3
3. Parameres, in lateral view (fig. 16), with the anterior lobe very prominent; the parameres have not the posterior apophysis in the basal third and the black tooth on the internal surface; the black spines of the inner surface are in a continuous proximal-upper area. Female proctiger as in fig. 34. Colour often yellow orange 2. *meliphila*

- Parameres (fig. 17) with the anterior lobe less developed; they have a great posterior apophysis in the basal third and a black tooth on the internal surface; the black spines of the inner surface are in two discontinuous zones, anteriorly and posteriorly. Female proctiger as in fig. 36 3. *dobreanuae*
- 4. Forewing with the brown patterns often separated, as stripes in the apical part of the veins, sometimes greater (fig. 10). Parameres, in lateral view, with the form of a hammer (fig. 20). Apical part of penis triangular (figs. 25, 29). Female terminalia as in fig. 37 4. *discrepans*
- Forewings with brown patterns united in a broad band on their apical part (figs. 11, 12). Parameres of different shape. Apical part of penis oval (figs. 30-32) 5
- 5. Forewings with pattern sometimes lighter and smaller, shaded in the basal part (fig. 11). Male proctiger with two great posterior lobes with maximum expansion in its basal third (fig. 14). Parameres (figs. 18, 19), in lateral view, without the posterior apophysis in the basal third and without the black tooth on the median internal surface; the apical part is subtriangular with the anterior margin almost straight. The dorsal margin of the female proctiger, in lateral view, is straight or weakly concave in its distal half (fig. 38) 5. *fraxini*
- Forewings with pattern dark and with sharp margins (fig. 12). Male proctiger with two great posterior lobes with maximum expansion at about its half. Parameres (fig. 21) with the posterior apophysis on the basal third and a showy black tooth on the median internal surface; the apical part has a different form and the anterior margin convex. The dorsal margin of the female proctiger is slightly convex in its distal half (fig. 41) 6. *distinguenda*

5. SUMMARIZING DATA ON THE SPECIES

- 5.1. *Psyllopsis fraxinicola* (Foerster, 1848) - Figs. 7, 15, 24, 26, 33, 42, 43, 52-58)

Type locality: Germany.

Morphology. The adult was described many times; the best drawings are in DOBREANU & MANOLACHE (1962:149-153, figs. 98-100).

Egg: LOGINOVA 1979, figs. 2, 3, 11, 12, 129.

Nymphs: FERRIS, 1923:251-254, pl. 12:D-N; WHITE & HODKINSON 1982:24, figs. 53, 54, 57.

Host plants. *Fraxinus angustifolia* subsp. *angustifolia* and subsp. *oxycarpa*, *F. excelsior*, *F. ornus*. Reported also from *F. dipetala* (TUTHILL 1943) for U.S.A.

Life history. Overwinters as egg, like all species of *Psyllopsis*. One or two generations per year.

The species does not produce galls.

Damages. *P. fraxinicola* is not considered a pest; also the great infestations generally do slight damages.

General distribution. Throughout Europe (except Portugal and Albania), Morocco, Algeria, Turkey, Caucasus, Central Asia to Kazakhstan. U.S.A. (introduced, according to HODKINSON & WHITE 1979).

Distribution in Italy. *P. fraxinicola* is the more common and widespread species of the genus in Italy. It was reported from Friuli-Venezia Giulia (HODKINSON 1983), Alto Adige and Trentino (TAMANINI 1977) Sicilia (RAGUSA 1907, RAPISARDA 1985) and Sardegna (RAPISARDA 1990). We have specimens from Alto Adige, Trentino, Lombardia, Piemonte, Liguria, Emilia-Romagna, Toscana, Puglia, Basilicata, Calabria and Sicilia).

On the whole, *P. fraxinicola* was collected almost throughout Italy, from more than 35 localities, with more than 40 findings, between the sea level and 1400 m, and also at 1700 m (Piemonte, Prali) and 1900 m (Piemonte, Sestriere). We found more than 800 adult specimens, from May to November, with maximum in June and August, above all on *Fraxinus excelsior* and rarely on *F. oxycarpa* and *ornus*. We found only few nymphs, in May, June and July.

Observations. The data of LAL (1934, 1937) on life history and preimaginal stages of *P. fraxinicola* and *discrepans* are not reported, because he appears to have confused closely related form (according to HODKINSON & WHITE 1979:80).

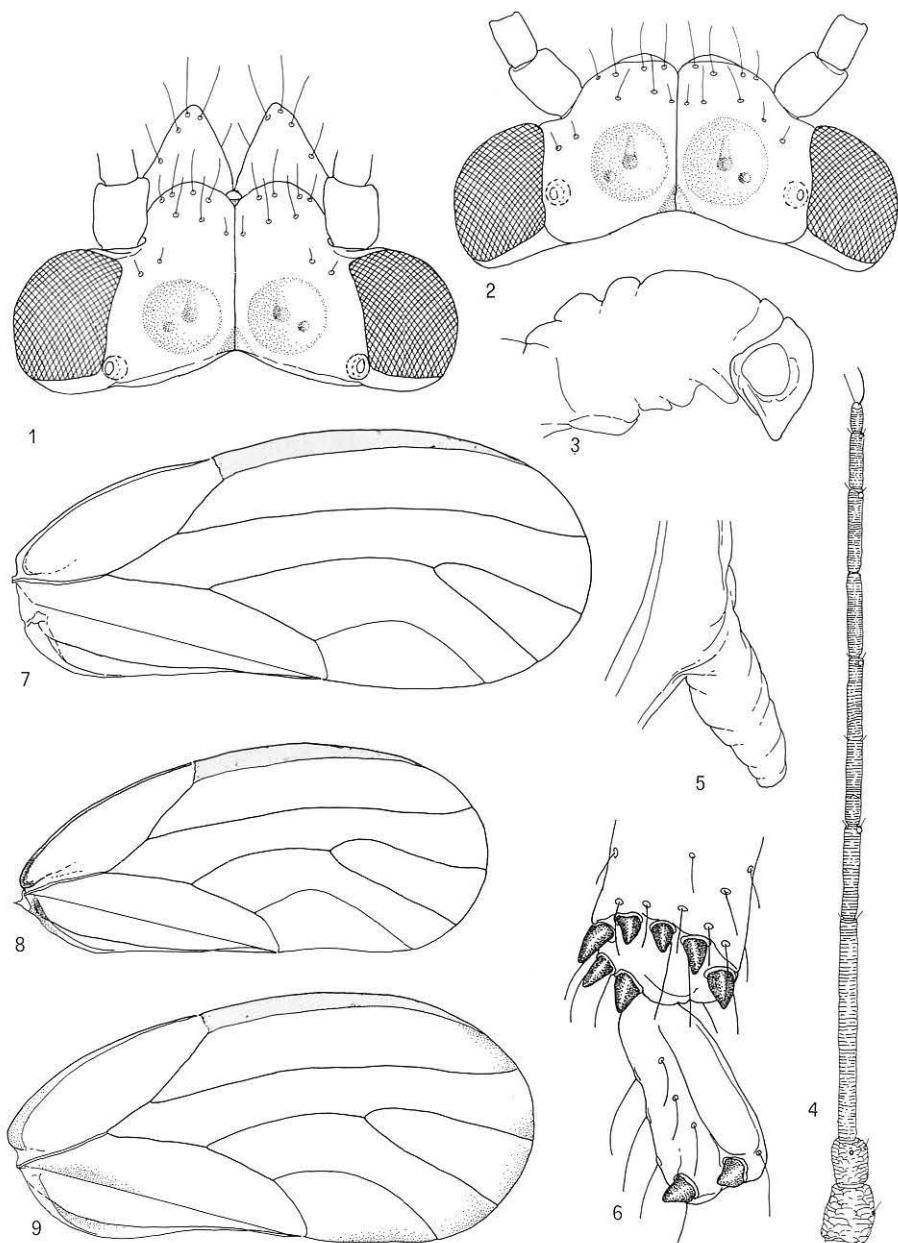
5.2. *Psyllopsis meliphila* (Loew, 1881) - Figs. 8, 13, 16, 27, 34, 35, 44, 45, 58

Type locality: Austria, Kärnten, Lees-Valdes.

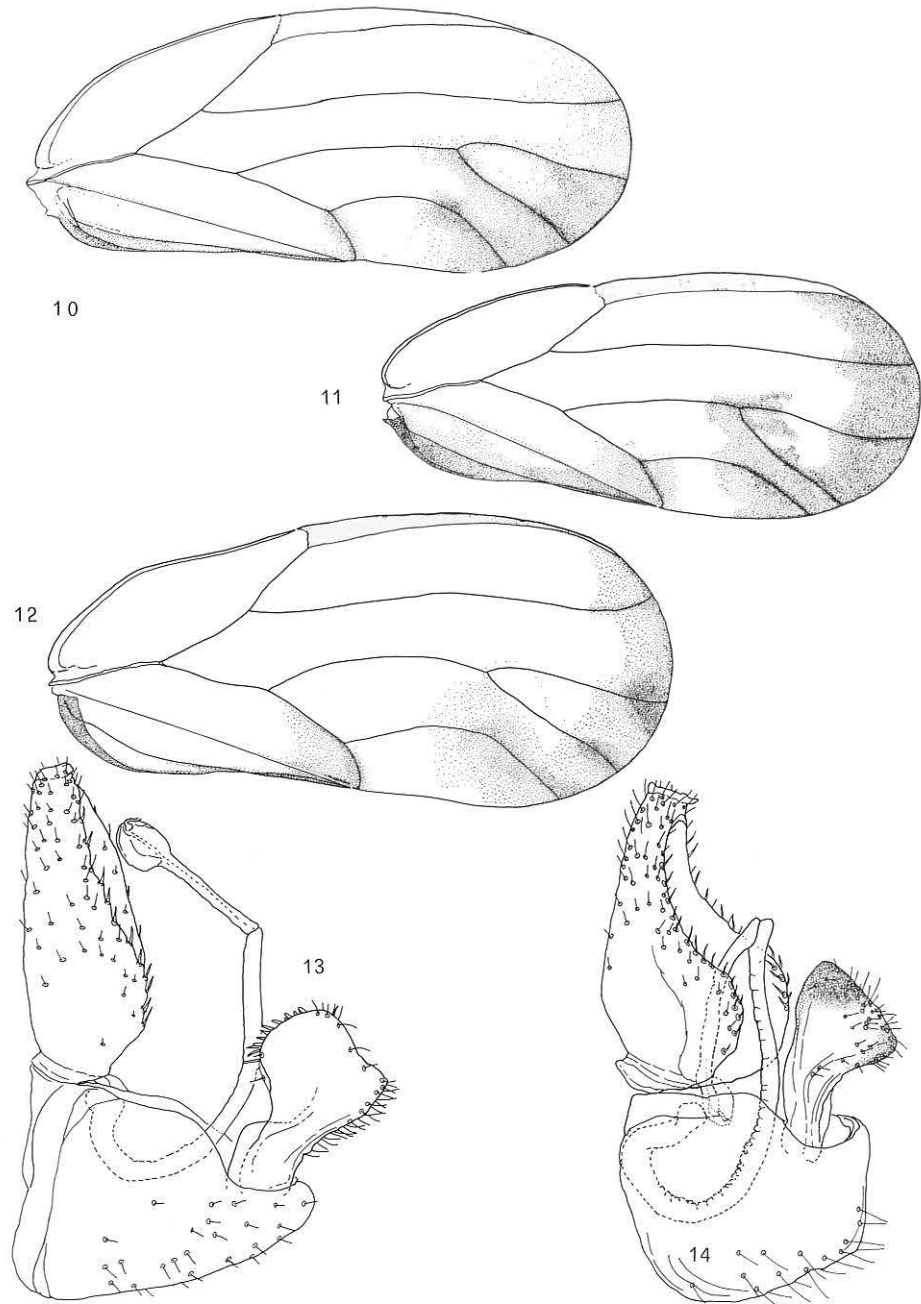
Morphology. Adult described by LOEW 1881, KLIMASZEWSKI 1962, 1968, LOGINOVA 1971 (all only partially) and by BURCKHARDT 1983. LAUTERER 1979 described two forms differing in colour: we have seen in Italy only the pale form.

Egg figured here for the first time.

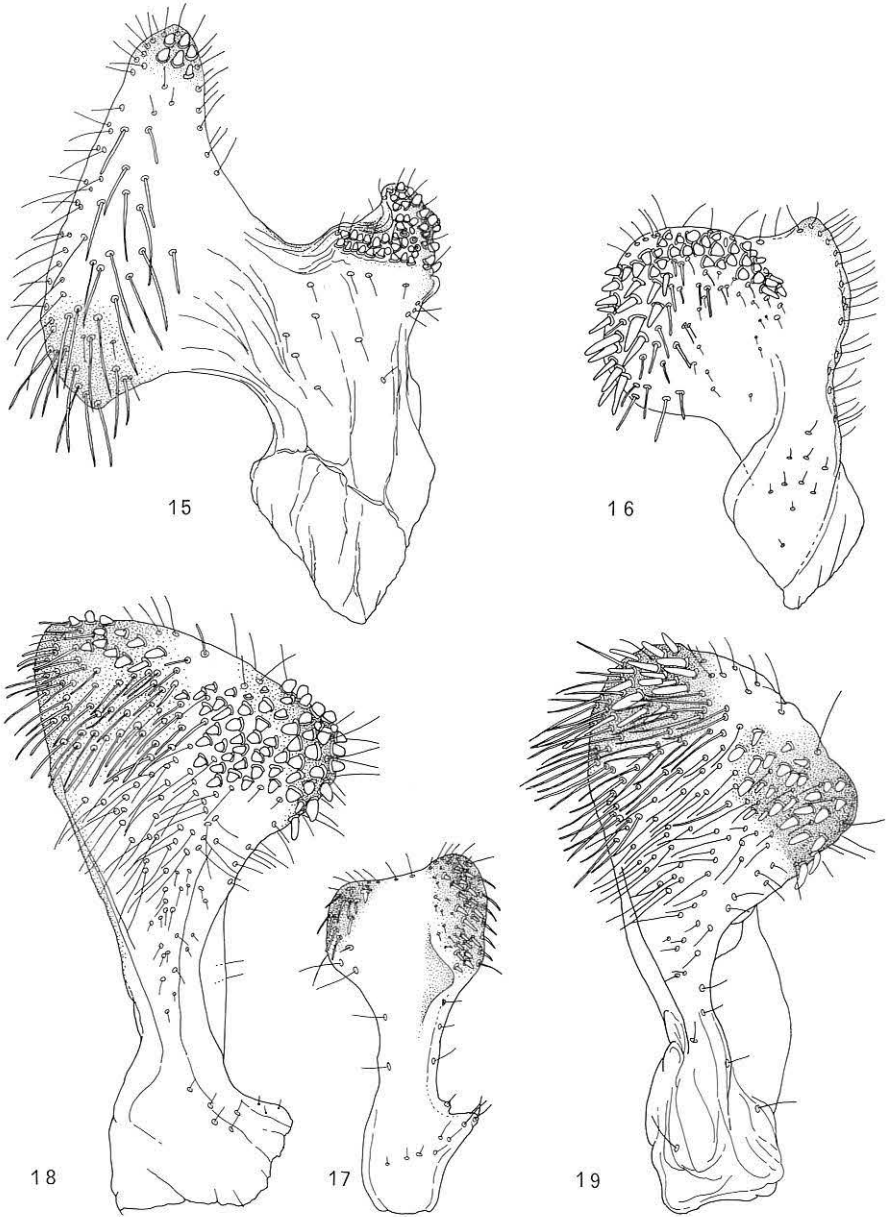
Nymph now in description by RAPISARDA.



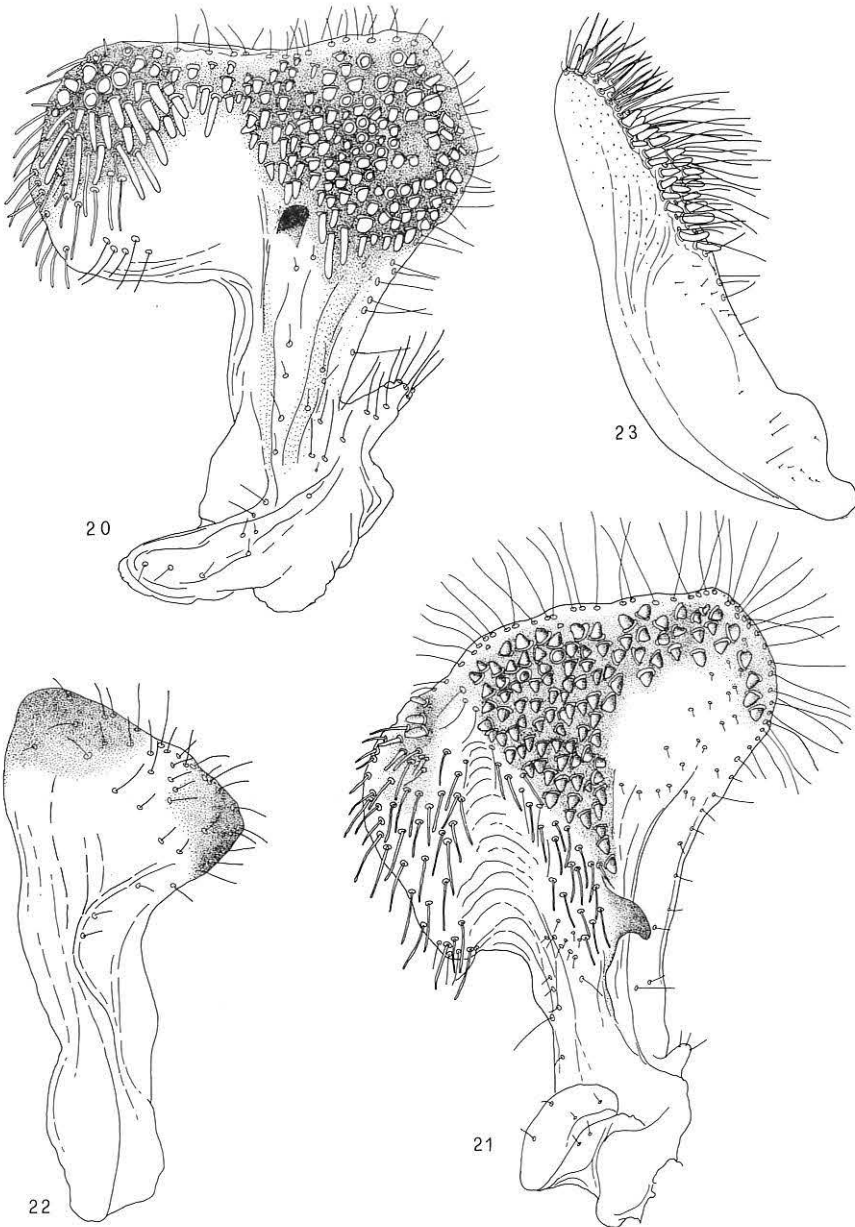
Figs. 1-9. *Psyllopsis* spp. - *P. fraxini*, specimen from Italy, head, anterior view; fig. 2, idem, dorsal view; fig. 3, idem, head and thorax, lateral view; fig. 4, idem, antenna; fig. 5, idem, meracanthus; fig. 6, idem, metatibia and first tarsal segment; fig. 7, *P. fraxinicola*, Italy, female forewing; fig. 8, *P. meliphila*, Italy, forewing; fig. 9, *P. dobreanuae*, Rumania, forewing (by DOBREANU & MANOLACHE, 1962).



Figs. 10-14. *Psyllopsis* spp.; fig. 10, *P. discrepans*, South Italy, female forewing; fig. 11, *P. fraxini*, Italy, male forewing; fig. 12, *P. distinguenda*, Czechoslovakia, Moravia, male forewing; fig. 13, *P. meliphila*, Italy, male terminalia; fig. 14, *P. fraxini*, Italy, male terminalia.



Figs. 15-19. *Psyllopsis* spp., right parameres, inner surface; fig. 15, *P. fraxinicola*, Italy; fig. 16, *P. meliphila*, Italy; fig. 17, *P. dobreanuae*, Rumania (by DOBREANU & MANOLACHE, 1962); figs. 18-19, *P. fraxini*, Italy.



Figs. 20-23. *Psyllopsis* spp., parameres; fig. 20, *P. discrepans*, South Italy, right paramere, inner surface; fig. 21, *P. distinguenda*, Czechoslovakia, Moravia, right paramere, inner surface; fig. 22, *P. fraxini*, Italy, left paramere, outer surface; fig. 23, *idem*, paramere, posterior view.

Host plant. Only *Fraxinus ornus*. The reports in the literature regarding *F. excelsior* derive by WAGNER & FRANZ (1961:170) and probably are wrong.

Life history. The biological cycle is still to be explained: probably the number of generations is different in North and South.

The species does not produce galls.

General distribution. Central, Central-South and a little part of Eastern Europe: Austria, Czechoslovakia, Italy, Yugoslavia, Hungary and Bulgaria. The species is reported also from Morocco (LOGINOVA 1972:16), host plant unknown, because *Fraxinus ornus* is not in N Africa.

Distribution in Italy. *P. meliphila* was reported from Friuli-Venezia Giulia (GRAEFFE 1911) and Sicilia (RAPISARDA 1988). We found the species widespread and sufficiently common.

On the whole, *P. meliphila* was collected by us in other 7 Regions of N, Central and S Italy (fig. 58), in about 18 localities, with more than 35 findings and 200 specimens, between 100 and 950 m, from June to October as adult and in June, July and October as nymph, on the host plant *F. ornus*. The tree is very common in thermophilus deciduous woods in North Italy. Findings of *P. meliphila* are lacking for Sardegna.

5.3. *Psyllopsis dobreanuae* Loginova, 1971 - Figs. 9, 17, 28, 36

Type locality: USSR, Moldavia SSR, Kotov district.

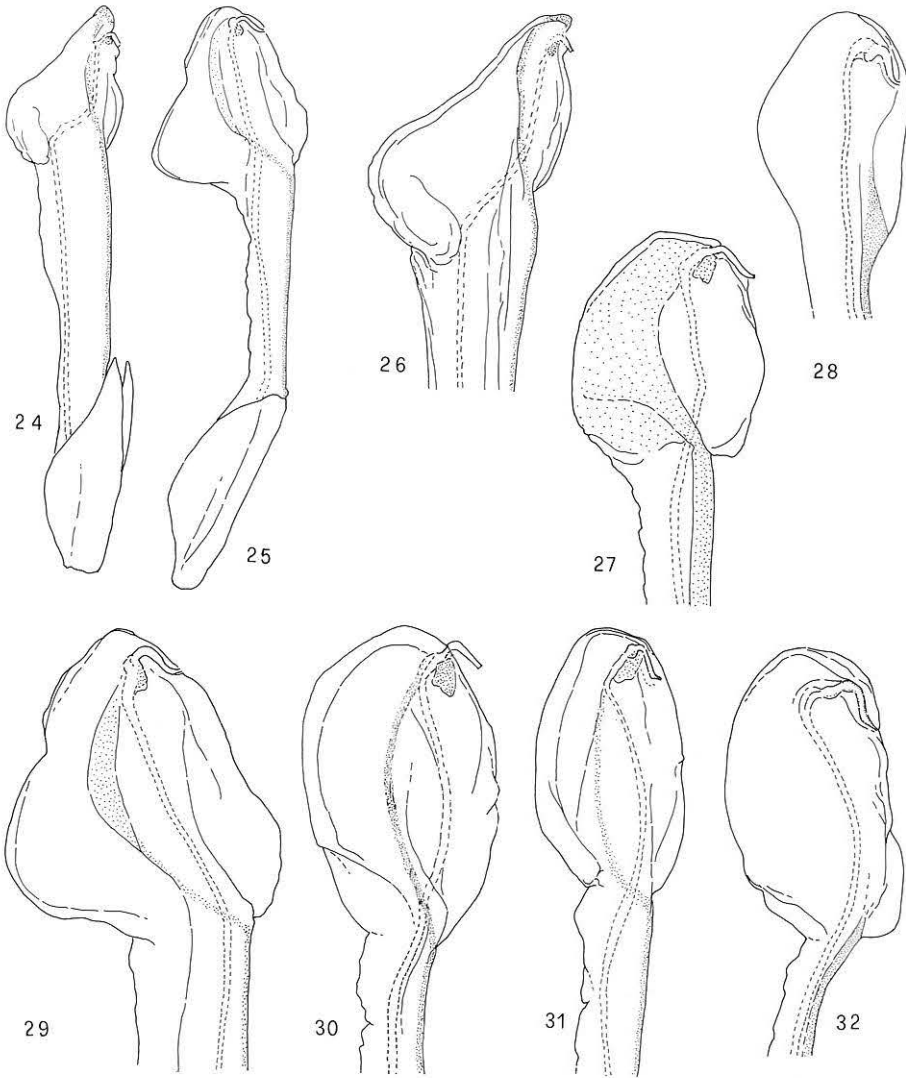
Morphology. The adult was described by DOBREANU & MANOLACHE (1962:164-167, figs. 112-115) sub *P. meliphila* Löw. After this description the literature reports only the little and schematic figures by LOGINOVA (1971a, 1971b, figs. 5-6). The female is so far unsatisfactory described. LAUTERER (1979:95) reported that *P. dobreanuae* «has two forms differing in colour» (as the similar *P. meliphila*) and that he found the pale form; while DOBREANU & MANOLACHE (1962) described the form with the dark pattern; and he said exactly «this is not a case of developing coloration during the adult stage».

Preimaginal stages unknown.

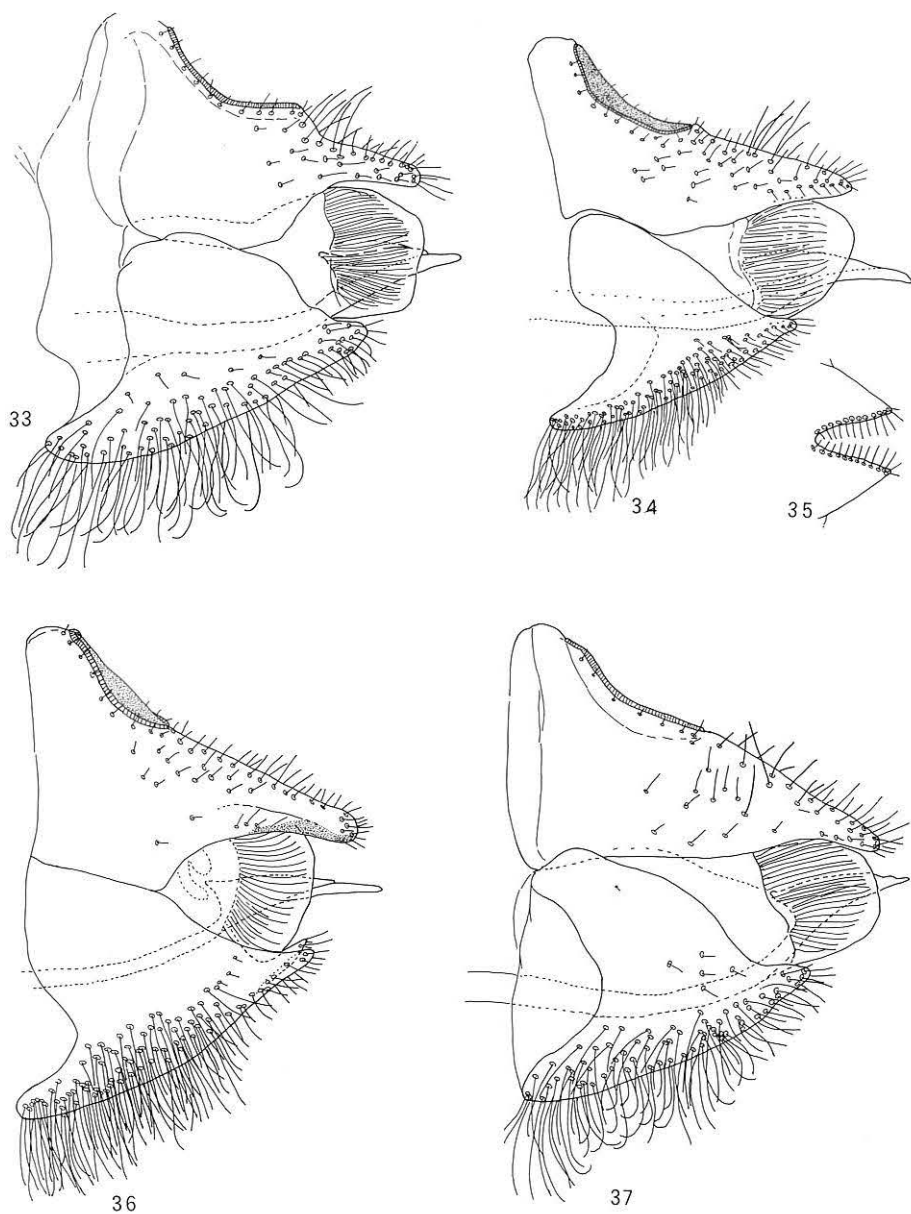
Host plant. *Fraxinus excelsior*.

Life history unknown. The species would produce galls on leaves (DOBREANU & MANOLACHE 1962:166, fig. 115).

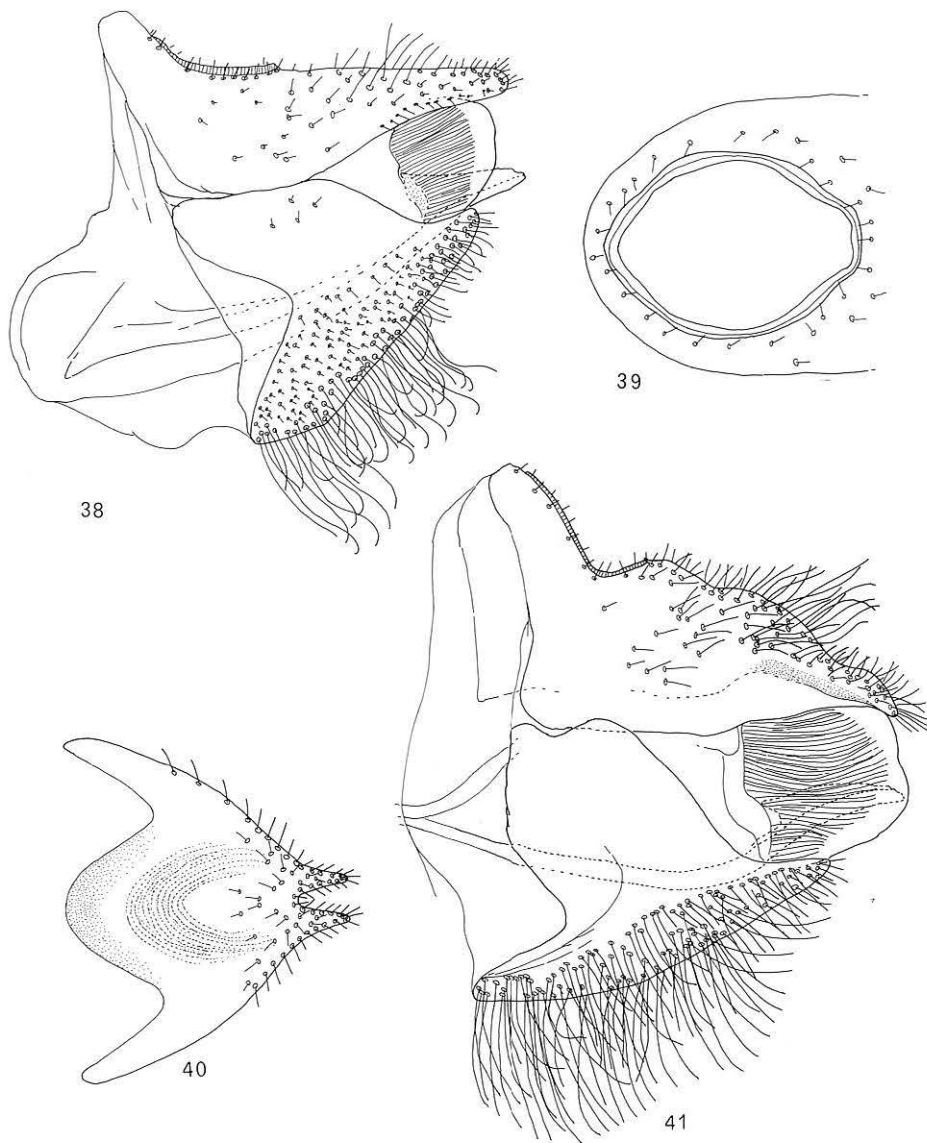
General distribution. Till now reported only from Rumania (Dobruja, Oltina) and Moldavia SSR (Kotov), i.e. from a little region near and at West of the Black Sea. The species is very rare. Its finding in Italy will be difficult, but possible. We till now did not see specimens; our figures are reported from DOBREANU & MANOLACHE, 1962.



Figs. 24-32. *Psyllopsis* spp., terminal segment and terminal part of the penis; figs. 24, 26, *P. fraxinicola*, Italy; figs. 25, 29, *P. discrepans*, South Italy; fig. 27, *P. meliphila*, Italy; fig. 28, *P. dobreanuae*, Rumania (by DOBREANU & MANOLACHE, 1962); figs. 30-31, *P. fraxini*, Italy; fig. 32, *P. distinguenda*, Czechoslovakia, Moravia.



Figs. 33-37. *Psyllopsis* spp., terminalia of females; fig. 33, *P. fraxinicola*, Italy; fig. 34, *P. meliphila*, Italy; fig. 35, *idem*, subgenital plate; fig. 36, *P. dobreanuuae*, Rumania (by DOBREANU & MANOLACHE, 1962); fig. 37, *P. discrepans*, South Italy.



Figs. 38-41. *Psyllopsis* spp., terminalia of females; fig. 38, *P. fraxini*, Italy; fig. 39, idem, anus; fig. 40, idem, genital segment, seen from below; fig. 41, *P. distinguenda*, Czechoslovakia, Moravia.

5.4. *Psyllopsiis discrepans* (Flor, 1861) - Figs. 10, 20, 25, 29, 37, 46, 47, 58.

Type locality: France, Bouche-du-Rhône, Marseille.

Morphology. The adult was described some times; the best drawings are in DOBREANU & MANOLACHE (1962:161-164, figs. 109-111).

Egg: LOGINOVA 1979, fig. 131.

Nymph: LOGINOVA 1981, figs. 54-55; WHITE & HODKINSON 1982:24, fig. 59.

Host plants. *Fraxinus angustifolia* subsp. *angustifolia* and subsp. *oxycarpa*, *F. excelsior*. The report from *F. ornus* (only DOBREANU & MANOLACHE 1962) needs a confirmation.

Life history and damages. One or two generations per year. The species should produce galls (WAHLGREN 1947; DOBREANU & MANOLACHE 1962:164); BUHR 1965:516; LOGINOVA 1968:292), but these data necessitate to be confirmed.

P. discrepans is a pest for ash in the parks of Jerevan (LONGINOVA 1968:292).

General distribution. Throughout Europe (except Iberian peninsula, Albania and Greece); Caucasus. Its presence in Central Sovietic Asia needs a confirmation: LOGINOVA (1966:135) and other Authors report Tadzhikistan, but BAEVA (1985) in the Fauna of Tadzhikistan does not report this species. One specimens (!) is reported for U.S.A. (TUTHILL 1943:519).

Distribution in Italy. It is reported only from Puglia and Basilicata (CONCI & TAMANINI 1984:261). We known the species also from Calabria (Cosenza, Cerchiara, leg. C. Leonardi).

5.5 *Psyllopsiis fraxini* (Linnaeus, 1758) - Figs. 1-6, 11, 14, 18, 19, 22, 23, 30, 31, 38-40, 48, 49, 58.

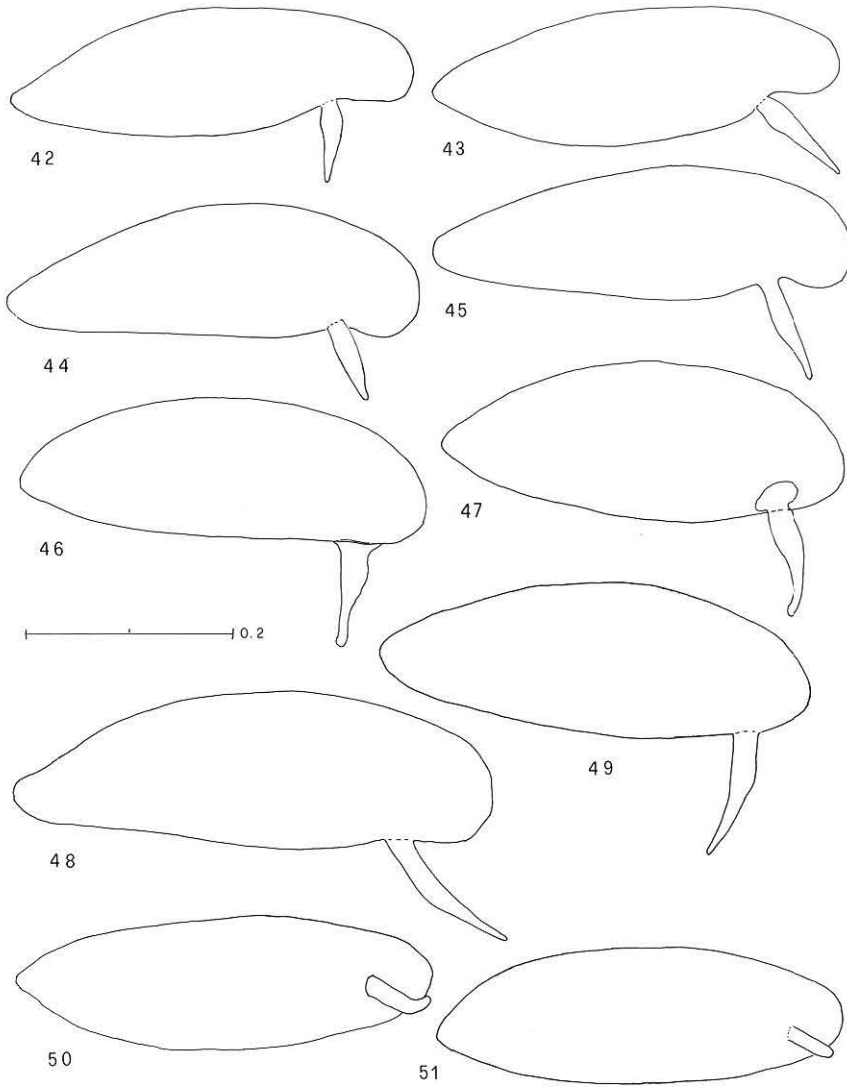
Type locality: Sweden.

Morphology. The adult was described many times; the best figures are in DOBREANU & MANOLACHE (1962:153-156, figs. 101-103). The female is almost undistinguishable from *P. distinguenda*.

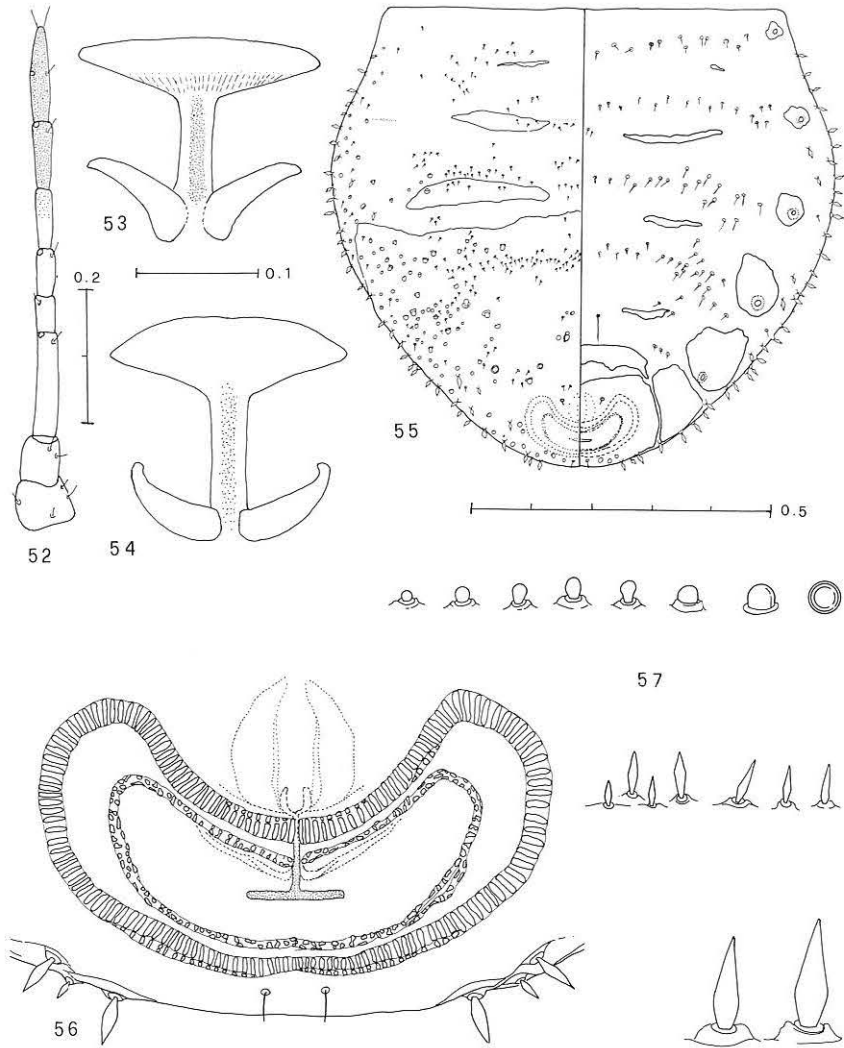
Egg: NGUYEN 1970:760-762, fig. 8), LOGINOVA 1979, fig. 127.

Nymphs: NGUYEN 1970:762, figs. 9-13; WHITE & HODKINSON 1982:23, figs. 56, 58.

Host plants. *Fraxinus angustifolia* subsp. *angustifolia* and subsp. *oxycarpa*, *F. excelsior*. Reported also from *F. nigra* var. *sambucifolia* (nec *sambustifolia*, NGUYEN 1970:763). The report from *F. ornus* needs confirmation.



Figs. 42-51. *Psyllopsis* sp., eggs; figs. 42-43, *P. fraxinicola*, Italy; figs. 44-45, *P. meliphila*, Italy; figs. 46-47, *P. discrepans*, South Italy; figs. 48-49, *P. fraxini*, Italy; figs. 50-51, *P. distinguenda*, Czechoslovakia, Moravia.



Figs. 52-57. *Psyllopsis fraxinicola*, Italy, fifth instar nymph; fig. 52, antenna; figs. 53-54, arolium; fig. 55, abdomen; fig. 56, circumanal pore field; fig. 57 lanceolate, semispherical and clavate setae with great magnification.

Life history. Two generations per year in France (NGUYEN 1970), one in Great Britain (HODKINSON & WHITE 1979); cf. paragraph 2.

Galls. *P. fraxini* produces showy galls on *Fraxinus excelsior* and *F. angustifolia*, reported and described many times in the cecidological literature; only for Italy we have about twenty quotations. The few reports of galls on *Fraxinus ornus* are unlikely. The gall is a rolled up leaf border toward the inferior surface; the part rolled up is dilated, broadened, turgescens, decolorated and veined in red and violet. Figures are in DARBOUX & HOUARD (1901, figs. 242-244) and SAMPÒ (1975, fig. 11).

General distribution. Throughout Europe, except Albania, Greece and the Eastern part of European USSR. The reports of Asia Minor, Israel, Irak, Iran and N India probably refer to other species. *P. fraxini* is not present in Caucasus and Tadzhikistan, the two regions better investigated in Western and Central Asia. U.S.A. (introduced, according to HODKINSON & WHITE 1979).

Distribution in Italy. About twenty reports in the literature. We found the species in more than 20 other localities, between the sea level and 1700 m, in many specimens, adults, nymphs and galls. We collected adults from May to September, above all on *Fraxinus excelsior*; we found few nymphs and galls in July in Piemonte.

On the whole, *P. fraxini* was collected almost throughout Italy (except Sardegna).

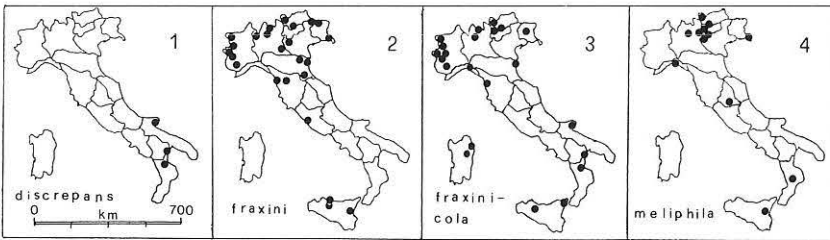


Fig. 58: Orientative geographical maps of the findings of *Psyllopsis* in the various Regions of Italy.

5.6. *Psyllopsis distinguenda* Edwards, 1913 - Figs. 12, 21, 32, 41, 50, 51, 58

Type locality: Great Britain, Hampshire, New Forest.

Morphology. The adult was described many times; the best drawings are in DOBREANU & MANOLACHE (1962:156-160, figs. 104-107) and LAU-

TERER & EASTOP (1968:239-242, fig. 1). *P. proprius*, subsequently synonymized with *distinguenda*, was described by LOGINOVA (1963:191-193, figs. 29-36).

Egg: LOGINOVA 1979, fig. 128.

Nymph: WHITE & HODKINSON 1982:23-25, fig. 55.

Host plants: *Fraxinus angustifolia* subsp. *angustifolia* and subsp. *oxycarpa*, *F. excelsior*.

Life history. LAUTERER (1982:138-139) proved that *P. distinguenda* in Czechoslovakia has two generations per year: cf. paragraph 2.

Galls. DOBREANU & MANOLACHE (1982:158, fig. 108) report that this species produces galls on the leaves: the datum needs confirmation.

General distribution. *P. distinguenda*, sporadic and rare, is reported from Great Britain, Poland, Switzerland, Czechoslovakia, Rumania, South and SW European USSR and Caucasus; but some data of the literature refer to the similar *P. discrepans*.

The report by CONCI & TAMANINI (1984:262) for Italy is uncorrect (erroneous determination). The species as yet was not found in Italy, but its presence in our country is probable.

* * *

The following four species are exclusively Asiatic:

5.7. *Psyllopsis repens* Loginova, 1963

Type locality: USSR, Armenia SSR, Jerevan.

Morphology. Adult: LOGINOVA (1963:185-186, figs. 1-11).

Preimaginal stages unknown.

Host plants. *Fraxinus* sp. (LOGINOVA 1963), *F. angustifolia* subsp. *syriaca* (HALPERIN et al. 1982), *F. angustifolia* subsp. *oxycarpa* (GEGECKKORI 1984).

Life history and damages. Two generations per year; produces galls and damages (LOGINOVA 1963, 1968).

General distribution. Israel, Caucasus, Iran (LOGINOVA 1963, HALPERIN et al. 1982, GEGECKKORI 1984).

5.8. *Psyllopsis securicola* Loginova, 1963

Type locality: USSR, Armenia SSR, Jerevan.

Morphology. Adult: LOGINOVA 1963:188-190, figs. 20-28; BAEVA 1985:272-273, fig. 140. Egg: LOGINOVA 1979, fig. 130. Nymph unknown.

Host plants. *Fraxinus* sp. (LOGINOVA 1963), *F. angustifolia* subsp. *syriaca* (HALPERIN et al. 1982), *F. angustifolia* subsp. *oxycarpa* (GEGECKKORI 1984).

Life history. Two generations per year; possibly producing galls; it causes damages (LOGINOVA 1968:294).

General distribution. Israel, Turkey, Caucasus, Iran, Turkmenia SSR, Tadzhikistan SSR (LOGINOVA 1963, HALPERIN et al. 1982, GEGECKKORI 1984, BAEVA 1985, BURCKHARDT 1988).

5.9. *Psyllopsis machinosus* Loginova, 1963

Type locality: USSR, Armenia SSR, Jerevan.

Morphology. Adult: LOGINOVA 1963:186-188, figs. 12-19; BAEVA 1985:271-272, fig. 139. Preimaginal stages unknown.

Host plants. *Fraxinus* sp. (LOGINOVA 1963), *F. angustifolia* subsp. *oxycarpa* (GEGECKKORI 1984).

Life history. Two generation per year; possibly producing galls; it causes damages (LOGINOVA 1968:292).

General distribution. From Turkey and Caucasus through Sovietic Central Asia to Tadzhikistan SSR, Iran (LOGINOVA 1963, GEGECKKORI 1984, BAEVA 1985, BURCKHARDT 1988).

5.10. *Psyllopsis narzykulovi* Baeva, 1964.

Type locality USSR, Tadzhikistan SSR.

Morphology. Adult: BAEVA 1984:269-271, fig. 138. Preimaginal stages undescribed.

Host plant. *Fraxinus potamophila* (BAEVA 1985).

Life history. Two generations per year; the nymphs of the second generation have a diapause in July and August. The species does not produce galls (BAEVA 1985:270-271).

General distribution. Only Tadzhikistan SSR.

* * *

The *Psyllopsis mexicana* Crawford, 1914 (pages 133-134, figs. 46,228, 438) from Mexico, Acapulco, host plant unknown, was inadequately described on a single male and belongs to another genus (LOGINOVA 1963).

6. GENERAL DISTRIBUTION

The Central-West Palaearctic genus *Psyllopsis* is present throughout Europe to 61° N (except Albania for lacking of researches) with 6 species, in North Africa (2 species, only in Morocco and Algeria), in Israel (2 species), Turkey (2 species), Caucasus (6 species) and in Sovietic Central-South Asia to Tadzhikistan (4 species); two species are reported for Iran. Its presence in North India (in the Oriental Zoogeographical Region) is based on a single finding by HESLOP HARRISON (1946:37). No *Psyllopsis* are reported for Siberia, Mongolia and the Far East.

An interesting problem regards the *Psyllopsis* found in U.S.A. on local *Fraxinus*: two species (*fraxini* and *fraxinicola*) are considered as introduced by HODKINSON & WHITE 1979; the determination of a third species (*P. discrepans*) is doubtful. But *Fraxinus* is widely present in North America: the situation of these species necessitates new researches because perhaps a part of them could be indigenous, as, for example, is the case of the *Psylla* of *Alnus* or the *Neocraspedolepta* of *Epilobium angustifolium*.

On the whole, *Psyllopsis* has an Euro-North African-W-Central Asiatic distribution, similar, in these Continents, to that of the genus *Fraxinus*, except for China and Japan. In these two last countries *Fraxinus* is present, but not *Psyllopsis*.

By the examination of all species, it should be noted that some old reports can be wrong for errors of determination (for example *discre-*

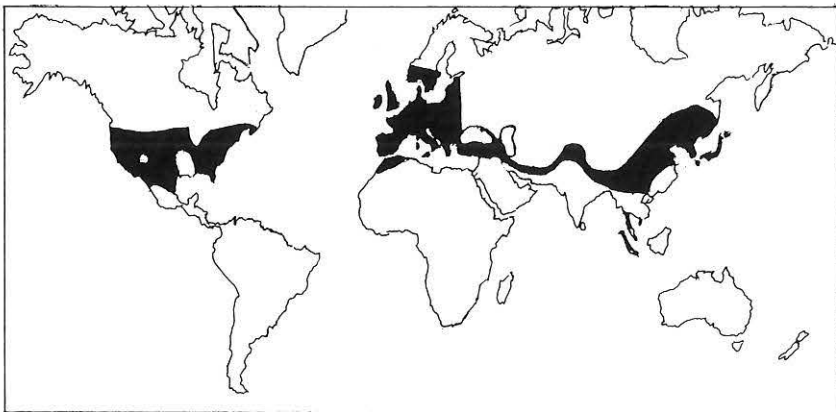


Fig. 59: Indicative distribution of the genus *Fraxinus* in the world (by KRUESSMANN, modified).

pans was mixed with *distinguenda*) or for attribution of old names to specimens belonging to species described subsequently by Loginova and Baeva.

The species more widespread is *P. fraxinicola*, present throughout Europe (except Portugal), in Morocco, Algeria and in the Palaearctic Central-South Asia to Kazakhstan.

The other species belong clearly to two groups. The first one is European (*meliphila*, *dobreanuuae*, *discrepans*, *fraxini* and *distinguenda*); of these, *discrepans* and *distinguenda* arrive to Caucasus. The second group is Asiatic (*repens*, *securicola*, *machinosus* and *narzykulovi*) and on contrary does not live in Europe. This repartition, based on data from literature, is so sharp, that causes doubts.

7. SYSTEMATIC POSITION

Psyllopsis has a complex of peculiar characters that justifies the doubts regarding its systematic position, very isolated. Its affinities are controversial and the Authors, also recently, placed the genus in very different positions. For example, HODKINSON & WHITE 1979 placed *Psyllopsis* at the beginning of Psyllidae family; after the careful study of the nymphs, the same Authors (WHITE & HODKINSON 1985) placed *Psyllopsis* at about the end of the Aphalaridae family, in the Diaphorinae subfamily, as sole genus of Psyllopsini tribe. BURCKHARDT 1985 unified Aphalaridae with Psyllidae.

We think that the affinities between *Psyllopsis* and *Diaphorina* are small and that *Psyllopsis* belongs to an isolated subfamily:

Psyllopsinae subfam. nov. (Type-genus *Psyllopsis* Foerster) belonging to the Psyllidae family (if the adult morphology is preminent) or to the Aphalaridae family (if some details of the nymphal chetotaxy are preminent).

Some differential characters between *Psyllopsis* and *Diaphorina* are in the Table II.

8. ACKNOWLEDGEMENTS

We thank Dr. Pavel Lauterer (Brno), that kindly sand us specimens of *Psyllopsis distinguenda*; Dr. Enrico Banfi (Milan) for the botanical informations; Dr. Carlo Leonardi (Milan) for specimens; Dr. Carlo Violani (Milan) for co-operation in the English translation.

Table II - Differential characters between *Psyllopsis* and *Diaphorina* (the characters of *Diaphorina* by BURCKHARDT 1985).

<i>Psyllopsis</i>	<i>Diaphorina</i>
<i>Egg</i>	
Type I, subtype III of LOGINOVA	Type I, subtype II of LOGINOVA
form sometimes as a bean	normal
apex stump, rounded	pointed
micropyle absent	present
stalk long	short
<i>Fifth instar nymph</i>	
type psylline	aphalarine
antennae with 8 segments	3 segments
dorsal sclerites of thorax small	great
humeral lobe of forewing-pads wanting	present
tarsal arolium with long petiole	without petiole
lateral margins of wing-pads with lanceolate setae	without lanceolate setae
<i>Adult</i>	
genal cones long, pointed	short, generally rounded
antennae long	short
pterostigma wide	wanting or narrow
M+Cu ₁ vein long regarding Cu ₁	short
metatibial spurs 7-11	5-9
parameres complex, with black spurs on inner surface	normal, uniform, simple, without spurs
penis with cuff	without
ductus ejaculatorius with sclerotized formation	without
genital segment of female with excavated anterior margin	normal
id with long curved hairs	normal
id with bipartite apex	normal
<i>Galls</i> on leaves sometimes present	absent
<i>Host plant</i>	
<i>Fraxinus</i>	other plants

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RIASSUNTO - Note sul genere *Psyllopsis* (Homoptera Psylloidea).

Si esamina il genere *Psyllopsis*, esclusivo dei frassini (*Fraxinus*, Oleaceae). Si riportano dati riassuntivi su morfologia di adulti, uova e ninfe (di cui si evidenziano le singolari setole subsferiche e clavate), nonché su biologia, galle, piante nutrici primarie, danni, distribuzione geografica. È riportata una chiave per le 6 specie europee ed una check-list delle 10 specie note. A causa della posizione molto isolata, il genere viene ascritto a Psyllopsinae n. subfam., nettamente distinta da Diaphorininae. Il lavoro è corredato da 59 figure.

SUMMARY - Notes on the genus *Psyllopsis* (Homoptera Psylloidea).

The genus *Psyllopsis*, exclusive of ashes (*Fraxinus*, Oleaceae), is examined. Data on adult, egg and nymph morphology, on life history, galls, host plants, damages and geographical distribution are reported. The peculiar subspherical and clavate setae of nymphs are stressed. A key for the six European species is reported. Because of the very isolated position of *Psyllopsis*, the Authors fix the new subfamily Psyllopsinae, clearly separated from Diaphorininae. Fifty-nine drawing are reported.

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