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**Nymphal description and life-cycle of *Livilla retamae* (Puton)
and *L. spectabilis* (Flor) (Homoptera Psylloidea) (*)**

Abstract - The fifth instar nymph is described of *Livilla retamae* (Puton) and *L. spectabilis* (Flor) and notes are also reported on their geographical distribution, host plants and life-cycle. The first of the two species has a South Mediterranean distribution and lives on plants of the genus *Retama* Boissier; the second one, monophagous on *Spartium junceum* L., is diffused in South-Central-Western Europe and the Balcans. In Sicily, both species have a monovoltine cycle, characterized by a relevant adult longevity. Adults emerge in spring (April-May in *L. spectabilis*; May-June in *L. retamae*) but oviposit in autumn and during part of the following winter.

Riassunto - *Stadi preimmaginali e comportamento biologico di Livilla retamae* (Puton) e *L. spectabilis* (Flor).

Viene descritta la ninfa di ultima età di *Livilla retamae* (Puton) e *L. spectabilis* (Flor) e si riportano brevi notizie sulla loro distribuzione geografica, piante ospiti e comportamento biologico. La prima delle due specie ha una geonemia di tipo sud-mediterraneo e vive su piante del genere *Retama* Boissier, mentre la seconda, monofaga su *Spartium junceum* L., è diffusa in Europa centro-sud-occidentale e nella penisola balcanica. Negli ambienti siciliani d'indagine, entrambe le specie mostrano un comportamento monovoltino, caratterizzato da una notevole longevità degli adulti. Questi sfarfallano in primavera più o meno avanzata (aprile-maggio per *L. spectabilis*; maggio-giugno per *L. retamae*) ma ovidepongono a partire dall'autunno e per tutta la prima parte dell'inverno successivo.

Key words: Psylloidea, broom-feeding, nymphal morphology, biology, Sicily.

(*) Psyllids living on Genistinae in the Mediterranean Region. Paper n. 5.

Within the studies on Genistinae-feeding psyllids, which are carrying out at the Institute of agricultural Entomology of the University of Catania, two species of the genus *Livilla* Curtis have been taken into consideration, as regard their biological behaviour and, above all, nymphal morphology.

The first species, *Livilla retamae* (Puton), is a recent record for the Italian fauna, having been found in Sicilian southern coast on *Retama raetam* subsp. *gussonei* (Webb) Heywood (Conci & Tamanini, 1989); nymphs and life cycle of such psyllid are undescribed up to now. The other one, *L. spectabilis* (Flor), is widely diffused in Mediterranean environments and it has been known for the Italian fauna since the last century (Löw, 1879) but no description is presently available of its young stages. Thus, a brief contribution to a better knowledge of the above two species is given in the following pages.

***Livilla retamae* (Puton, 1878)**

It has been originally described as *Psylla* Geoffroy (subgenus *Arytaina*) (Puton, 1878) and subsequently transferred to the genera *Floria* Löw (Löw, 1882), *Alloeoneura* Löw (Vondracek, 1951) and again to *Floria* in the subgenus *Brinckitia* Heslop-Harrison (Loginova, 1971). Both *Alloeoneura* and *Floria* have been recently synonymized to *Livilla* Curtis (Hodkinson & Hollis, 1987).

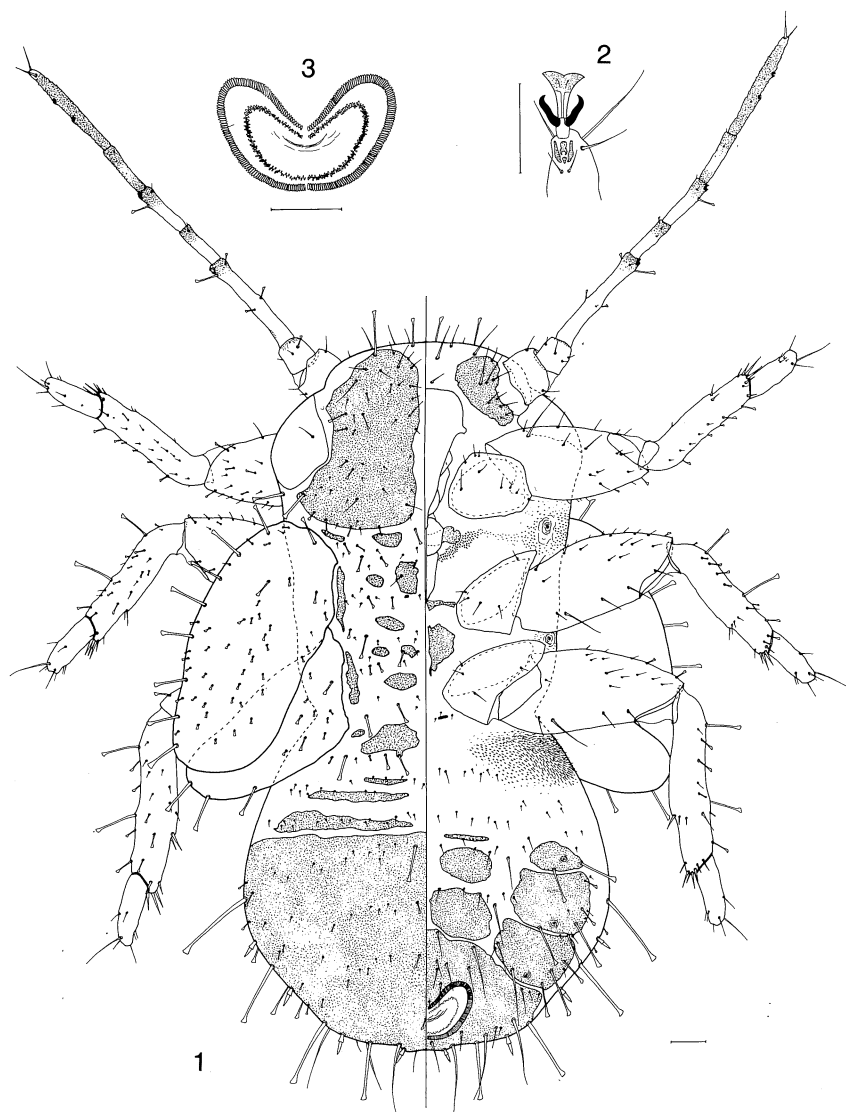
The adults of *L. retamae* are easily discernible for the oblong shape of the forewings, whose membrane shows some typical brown stripes at the apical third. Useful descriptions are given by various Authors (Loginova, 1972; Samy, 1973; Hodkinson & Hollis, 1987).

As to preimaginal stages, only a drawing of the egg (Loginova, 1979) and very short notes on the final instar nymph (from a key of the Algerian psyllids) (Burckhardt, 1989a) are available in the literature. A description of the latter instar is given below.

Fifth instar nymph (fig. 1)

Ground body colouration creamy-yellow, with brown wing-pads, sclerites (both dorsal and ventral), antennal segments 6th-7th and apical part of segments 3rd-5th. Body length: 1.95-2.07 mm; body breadth: 1.34-1.45 mm. Body breadth / body length ratio (BBBL) equal to 0.68-0.73.

Dorsal cephalo-prothoracic sclerites with simple and capitate setae. Antennae ventrally inserted in the head, seven segmented and 1.13-1.26 mm long. Several capitate setae are scattered as follows on the antennal segments: 2nd, 1 small dorsal seta; 3rd, 2 median and 2 distal setae (one of the latter ones about twice as long as the others); 4th, 1 subapical seta; 5th, 1 seta inserted at



Figs. 1-3 - *Livilla retamae*, fifth instar nymph: 1. General aspect, dorsal (left) and ventral view; 2. Ventral view of praetarsus and arolium; 3. Anal pore with circumanal rings.

the base of the apical third (as long as the longest seta of the 3rd segment). One apical rhinarium on each of antennal segments 3rd and 5th and two other ones

in the median third of the 7th; two stout simple setae are apically inserted on the latter segment. Mouth parts with ultimate two rostral segments 205-225 μ long.

Meso- and metanotum, on each side, with a lateral elongate sclerite and three small median ones. Forewing-pads 0.65-0.73 mm long, so that the antennal length / forewing-pad length ratio (AWL) is equal to 1.68-1.75. On each forewing-pad, 8-9 long capitate setae are inserted at the outer margin, together with various smaller ones; numerous small similar setae are scattered on the dorsal face of both fore- and hindwing-pads. Moreover, three long capitate setae (two of which have an apical position) are marginally inserted on each hindwing-pad.

Legs with numerous simple and capitate setae; two ones of the latter type are of peculiar evidence at the outer face of each meso- and metatibia. Arolia subtriangular shaped and longly petiolate (fig. 2); nails long and stout.

Abdomen margin with 4 sectasetae and 4 capitate setae on each side. Dorsal caudal plate 0.54-0.60 mm long and 1.01-1.07 mm wide, the caudal plate breadth / length ratio (CPR) being equal to 1.70-1.90. In addition to various simple and capitate setae, scattered all over the sclerite, the following capitate ones may be evidenced along the median line: an anterior pair of long setae; two more pairs of similar setae but half as long as the previous ones; one posterior median seta. Main ventral sclerites of the abdomen all separated each other and from the anal one. Anal pore (fig. 3) entirely ventral, with simple inner and outer circumanal rings; in the inner one the pores are almost irregularly arranged, while the outer one, 240-290 μ wide, is composed by radially elongate pores.

Respiratory system with five pairs of ventral spiracles: two in the thorax and three in the abdomen.

Geographical distribution

Such as its host plants, *L. retamae* has a South Mediterranean distribution, having been recorded in Algeria, Egypt, Israel, Italy, Morocco, Portugal and Spain (Puton 1878, 1886; Bolivar & Chicote, 1879; Loginova, 1972; Samy, 1973; Halperin et al., 1982; Hodkinson & Hollis, 1987; Conci & Tamanini, 1989). As to the Italian territory, the southern coast of Sicily is the only area where the insect can be found (similarly to its host plant). In such environments, where wide areas are quickly brought under cultivation, both *Retama raetam* and *Livilla retamae* are in serious danger of extinction. Such a risk should be avoided, both to defend a plant of a high botanic value (which is a true European relict of the North African flora) and to protect the rich fauna living on it.

Host plants

L. retamae is strictly oligophagous on plants of the genus *Retama* Boissier. In particular, *R. monosperma* (L.) Boissier, *R. raetam* (Forsskal) Webb & Berth., *R. raetam* subsp. *gussonei* (Webb) Heywood and *R. shpaerocarpa* (L.) Boissier are quoted in the literature as host plants of the psyllid (Puton, 1878;



Fig. 4 - *Livilla retamae*: eggs (left) and nymphs (right) on young sprouts of *Retama raetam*.

Loginova, 1972; Halperin et al., 1982; Hodkinson & Hollis, 1987; Conci & Tamanini, 1989). The record of *Sarothamnus scoparius* Wimmer (= *Cytisus scoparius* (L.) Link) (Ramirez Gomez, 1956) is to be considered as wrong.

Life cycle

L. retamae development is strictly related to the growth rhythm of its host plant, since the insect exclusively oviposits along the young sprouts (fig. 4, left), which fall on the plant during the hot summer months. Thus, from the second half of June to the end of September, the psyllid survives in the adult stage, feeding on the hardening spring vegetation. Oviposition occurs from October onwards, on the autumn shoots. Ovipositing adults may be found on the plants through all winter and rare females can be collected up to February. After the eggs hatching, which gradually takes place starting from early winter (December), the nymphs migrate to the axil of the tender sprouts (fig. 4, right) and here they gather in groups, being very often attended by ants. They show an almost slow development and the new adults emerge from mid May (sometimes earlier, under favourable conditions). Preimaginal development is completed within the first decade of July and no nymphs can be found on the plant starting from this moment.

***Livilla spectabilis* (Flor, 1861)**

Such as the previous one, also this species has been originally ascribed to the genus *Psylla* Geoffroy (Flor, 1861) and subsequently transferred to *Floria* Löw (Löw, 1879) and *Livilla* Curtis (Hodkinson & Hollis, 1987).

As to its adults, detailed and useful descriptions are given by Klimaszewski (1968) and by Hodkinson & Hollis (1987). Main adult morphological characters are the great dimensions, the very long and massive genal cones, the long and narrow forewings, whose membrane distally shows an irregular brown or orange-brown infuscation. On the contrary, nothing is presently known on young stages of this psyllid, thus notes are given below on its final instar nymph.

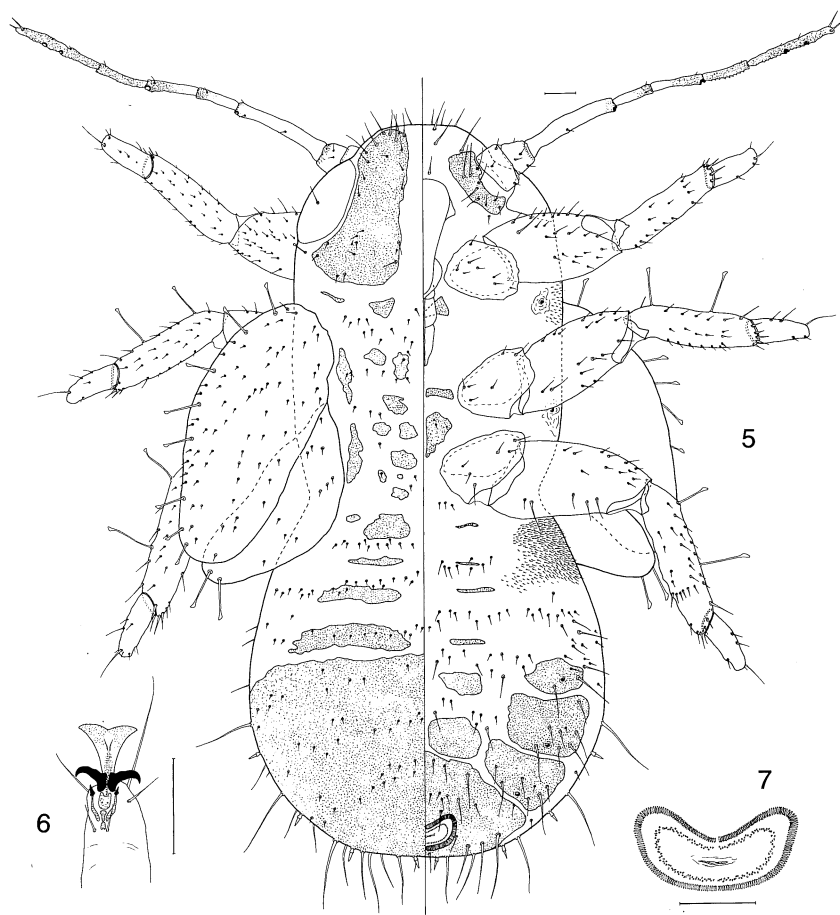
Fifth instar nymph (fig. 5)

Generally winy-red to brown coloured; 2.15-3.00 mm long and 1.50-2.00 mm wide. Body breadth / body length ratio (BBBL) equal to 0.65-0.70.

Head with antennae seven segmented, ventrally inserted, 1.15-1.25 mm long. Ground antennal colour light brown, with darker segments 6th-7th and distal portions of segments 3rd-5th. One apical rhinarium on each of antennal segments 3rd and 5th and two other ones in the median third of the 7th; two stout simple setae are apically inserted on the latter segment. Mouth parts with ultimate two rostral segments 215-230 μ long.

Meso- and metathorax, on each side, with four dorsal sclerites: a lateral one, elongate, and three small median ones. Forewing-pads 0.85-1.10 mm long,

so that the antennal length / forewing-pad length ratio (AWL) is equal to 1.35-1.45. Each forewing-pad with 8-11 long capitate setae inserted at the outer margin; 2 similar setae apically occur in the hindwing-pads. Dorsal surface of both fore- and hindwing-pads with only small simple setae.



Figs. 5-7 - *Livilla spectabilis*, fifth instar nymph: 5. General aspect, dorsal (left) and ventral view; 6. Ventral view of praetarsus and arolium; 7. Anal pore with circumanal rings.

Meso- and metathoracic legs with 2 (sometimes 3) long capitate setae on the outer face of each tibia, in addition to various simple ones. Praetarsi with very long nails; arolium triangular shaped and markedly petiolate (fig. 6).

Dorsal caudal plate of the abdomen 0.65-0.78 mm long and 1.10-1.40 mm wide; caudal plate breadth / length ratio (CPR) equal to 1.65-1.85. Abdomen margin, for each side, with 4 setae and 4-5 long and stout simple setae (the latter ones may be slightly capitate in some specimens). Main ventral sclerites of the abdomen all separated each other and from the anal one. Anal pore entirely ventral, with simple inner and outer circumanal rings (fig. 7); in the inner one the pores are almost irregularly arranged, while the outer one, 200-215 μ wide, is composed by radially elongate pores.

Chaetotaxy and sclerotisations as in fig. 5. Respiratory system with five pairs of ventral spiracles: two in the thorax and three in the abdomen.

Geographical distribution

L. spectabilis has a South-Central-Western European distribution; it has been recorded in France, Greece, Italy, Portugal, Spain, Switzerland and Yugoslavia (Flor, 1861; Löw, 1879, 1888; Chicote, 1880; Horvath, 1918; Schäfer, 1949; Novak & Wagner, 1962; Klimaszewski, 1968, 1973; Burckhardt, 1987; Hodkinson & Hollis, 1987). As to the Italian territory, the psyllid is quoted from Friuli-Venezia Giulia (Gräffe, 1911; Vondracek, 1951; Rapisarda & Conci, 1989), Piedmont and Liguria (Ferrari, 1888), Emilia-Romagna (Ferrari, 1885; Zangheri, 1934, 1966), Umbria (Mancini, 1954), Campania (Löw, 1879; Ferrari, 1885), Basilicata (Castellani, 1951, 1953) and Sicily (Rapisarda, 1988a, 1988b). Further material of *L. spectabilis*, stored in the psyllid collections «Conci» and «Tamanini», has been collected in many other Italian Regions, such as Marche, Toscana, Lazio, Abruzzo, Molise, Puglia and Calabria. Thus, the occurrence of *L. spectabilis* is proved in 15 Italian Regions, and its chorology almost clashes with that one of its host plant (Pignatti, 1982).

Host plants

As far as presently known, *L. spectabilis* is strictly monophagous on *Spartium junceum* L..

Life-cycle

Notes on biology of *L. spectabilis* have been reported in a previous paper (Rapisarda, 1988a); thus only few details are added below.

The psyllid has a monovoltine behaviour, with adults emerging in late April-May. They survive all summer and start to oviposit, on the young sprouts, from mid autumn, going on all winter through (mostly in relation to the availability of tender sprouts and the general environmental conditions). Egg hatching occurs from late February. Preimaginal development is completed in about two months.

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