

Three New Records of Psyllid Species (Psylloidea, Insect) From Syria

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Received: 29/08/2021

Accepted: 29/09/2021

Abstract

During regular investigation of plant sanitation in the area of Latakia center for Scientific Agricultural Research activities, some abnormal waxy secretion on terminal buds of three tree species, Indian cherry, *Cordia myxa* L. (Boraginaceae); Indian laurel tree, *Ficus microcarpa* L. f. (Moraceae) and green olive tree, *Phillyrea latifolia* L. (Oleaceae) were noticed. Those insect species responsible were identified as *Diaphorina aegyptiaca*, *Macrohormotoma gladiata* and *Euphyllura phillyreae*, respectively. This is the first record of those species, as well as, a new record of *Diaphorina* and *Macrohormotoma* genera from Syria.

Keywords: Latakia, *Macrohormotoma*, *Diaphorina*, *Citrus*, *Euphyllura*.

Introduction

Prior to this study number of psyllid species reported from Syria is limited to only twelve species (Zeity, 2018; Zeity and Mofleh, 2020; Zeity and Burckhardt, 2021). Number of species recorded under genus, *Diaphorina* is 76 principally distributed in the old world (Ouvrard, 2021). Species belong to the genus, *Diaphorina* are closely related and very difficult to separate based on coloration, and their morphological features are relatively homogenous (Heslop-Harrison, 1961; Loginova, 1972). Burckhardt (1984) provided a key to the *Diaphornia* species reported from Mediterranean basin based on the shape of genal cones, shape of female terminalia and, shape and coloration of forewings. Asian citrus psyllids, *Diaphorina citri* is known to be the most serious pest of citrus. This species is very well known for transmitting the greening disease of citrus (huanglongbing), in the presence of disease pathogens such as *Candidatus* spp.. However, it is considered as a minor pest in absence of those pathogens (Halbert and Manjunath, 2004). Fortunately, both insect and disease are not yet reported from Syria. No species under this genus has been recorded so far from Syria.

To date, 15 species in the genus *Macrohormotoma* Crawford are described having valid names (Ouvrard, 2021). Up to 2009, *Macrohormotoma gladiata* was only known from Japan, Taiwan and Hong Kong with most records being found on *Ficus microcarpa* (Hollis & Broomfield, 1989). Introduction of several ornamental *Ficus* species from the tropical East Asia to urban areas in the EPPO region has facilitated invasion of many fig-associated insects inhabit new areas (Mifsud and Porcelli, 2012). The most recent evidence for such

introduction is new reports of invasive species *Trioza brevigenea* Mathur on *Ficus microcarpa* in Syria (Zeity and Burckhardt, 2021).

Three species of *Euphyllura* reported to inhabit olive trees of Mediterranean Basin and Middle East namely, *Euphyllura olivina* (Costa, 1839), *Euphyllura phillyreae* Foerster, 1848 and *Euphyllura straminea* Loginova, 1973. Lauterer *et al.* (1986) provided the main characters for differentiation of those three species based on some features like, forewing characters, male parameres and female proctiger. Psyllid species infest olive in Syria was reported by Talhouk (1969) as *Euphyllura olivine* (Costa) which was later it correctly identified as *Euphyllura straminea* Longinova by Zeidan-Geze and Burckhardt (1998).

The aim of this study is to report three psyllid species associated with *C. myxa*, *F. microcarpa* and *Ph. latifolia* collected from Latakia Province, Syria with brief diagnostic characters of these species.

Material and methods:

Terminal twinges of *Cordia myxa*, *Ficus microcarpa* and *Phillyrea latifolia* with waxy secretions were collected and kept in plastic containers up to emergence of adult males and females. All emerged adults collected using insect aspirator. All collected materials were dehydrated in alcohol 90% then shifted to the KOH 10% for clearing before dissection and mounted them in Hoyer medium for permanent microscope slide preservation. Mounted slides examined under Nikon® microscope and compared with suitable literature (Burckhardt, 1984 for *Diaphorina aegyptiaca* Puton; Mifsud and Porcelli, 2012 for *Macrohormotoma gladiata* and Lauterer *et al.* (1986) for *Euphyllura phillyreae*). All collected materials were stored in the Entomological collection of Latakia center for Scientific Agricultural Research, Bouqa, Latakia, Syria.

Results:

Systematic

Psyllidae Latreille, 1807

Diaphorininae Vondráček, 1951

Diaphorina Löw, 1880

Diaphorina aegyptiaca Puton, 1892

***Diaphorina aegyptiaca* Puton**

Diagnosis:

Adult,

Head dorsally and laterally brown, genal cones ochreous and ventral brown. Forewings whitish with brown pattern composed of defined patches which are often extensive (Fig. 1A, B). Genal cones one time as long as vertex along the coronal suture, tapering, apically pointed or rounded and antennae 0.8 times as long as head width (Fig. 1C). Forewings 2.5 times as long as broad strongly broadened towards the apex. Fore margin more or less straight up to the apical fifth then strongly bent (Fig. 1E). Posterior bulge of male proctiger flattened in the middle. Parameres of male narrowly clavate basally constricted (Fig. 2A). Inner margin of basal segment of aedeagus in the straight part not dilated (Fig. 1D). Female proctiger is as long as head width. Ventral margin of female subgenital plate straight or irregularly rounded (Fig. 2B).

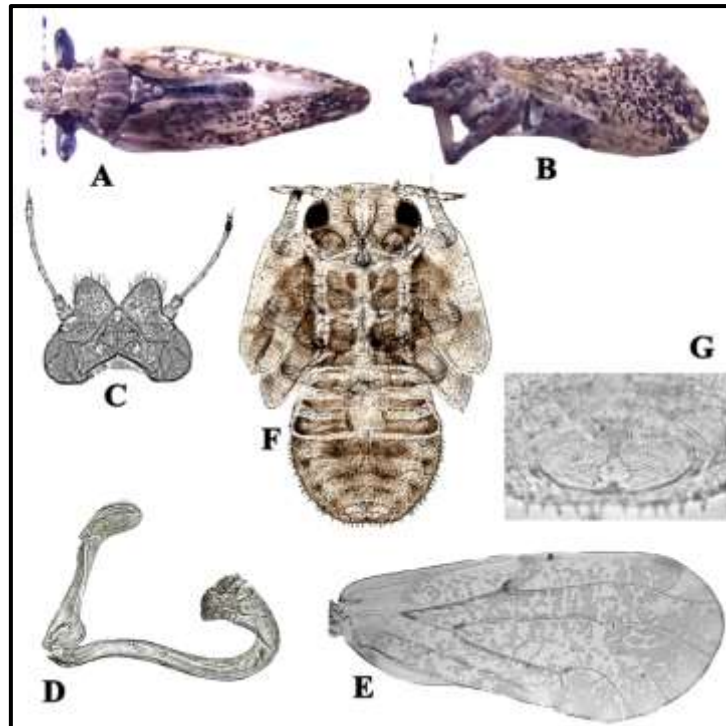


Figure (1), *Diaphorina aegyptiaca*, A and B adult male; C head; D male aedeagus; E forewing, F Nymph, G Caudal plate

Nymph,

Margin of abdomen with 43 caudal setae and 4 precaudal setae, forewings pads 2.3 times as long as antennae outer margin comparatively straight (Fig. 1F). Outer perianal rings consisting of 2 rows of pores (Fig. 1G).

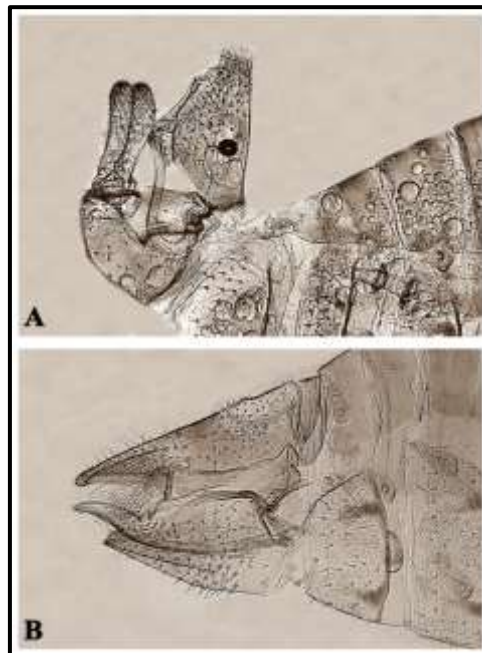


Figure (2) *Diaphorina aegyptiaca*, A Lateral view external genitalia male; B lateral view of external genitalia female

Nature of damage

Several adults and immature stages of *D. aegyptiaca* was observed to be associated with waxy secretion on the terminal twigs of *Cordia myxa* (Fig. 2 A, B), and honeydew which cause growth of black fungi and turn twigs sticky and black in color. Feeding of adult

and immature stages retarded growth and facilitated compensatory development of new twigs.



Figure (3) Wax secretion of *Diaphorina aegyptiaca* on terminal buds of *Cordia myxa*

Examined materials

Three males and two females, 04.x.2020, ex. *Cordia myxa* L. , (Boraginaceae), Khirbet Al Jawziyah, Latakia, Syria (N35°39'36"; E 35°50'33"; elevation 79m), coll. Mahran Zeity.

Two males and two females, 10.v.2021, ex. *Cordia myxa* L. , (Boraginaceae), Bisnadah, Latakia city, Syria (N35°32'54"; E 35°48'9"; elevation 78m), coll. Mahran Zeity.

Distribution:

Cyprus, Egypt, India, India (Maharashtra), India (Punjab), India (Tamil Nadu), India (Uttar Pradesh), India (West Bengal), Iran, Kriti, Pakistan, Pakistan, Sudan and Yemen (Ouvrard, 2021).

Host plants:

Cordia L., *Cordia dichotoma* G. Forst., *Cordia grandis* Roxb., *Cordia myxa* L. *Cordia oblique* Willd. and *Cordia sinensis* Lam. (Ouvrard, 2021).

Remarks:

Diaphorina cardiae Crawford 1924, *Diaphorina salvadorae* Loginova, 1978 and *Diaphorina cardiae pakistanica* Loginova, 1978 are synonyms of *Diaphorina aegyptiaca* according to Burckhardt, 1984. This species reported mainly from Asian part of Palearctic realm in addition to Sudan and Yemen. After collecting the sample some adults and immatures of this species were introduced onto some citrus plants in which they couldn't establish and start new colony.

Carsidaridae Crawford, 1911

Homotominae Heslop-Harrison, 1958

Macrohomotomini White & Hodkinson, 1985

Macrohomotomina White & Hodkinson, 1985

Macrohomotoma Kuwayama, 1908

Macrohomotoma gladiata Kuwayama, 1908

Macrohomotoma gladiata Kuwayama

Diagnosis:

Adult of this species is long with 2.0–3.0 mm long; head as wide as thorax, strongly down-curved; thorax strongly arched (Fig. 4 A,B). Forewings are transparent, with brown spot on distal portion of pterostigma, there is a larger, dark spot along vein Cu_{1b} , and three smaller spots on radular spinules. Forewing is long with about 2.4 times as long as wide and acute distally, with characteristic oval but short pterostigma, and M_{1+2} curved and reaching wing margin posterior to wing apex (Fig. 4A; Fig. 5 E). Male genitalia with proctiger much wider than long and with two posterior lobes; aedeagus long, basal segment two times as long as apical (Fig. 5 A, B and C). Female terminalia elongated, proctiger almost as long as thorax (Fig. 5 D)

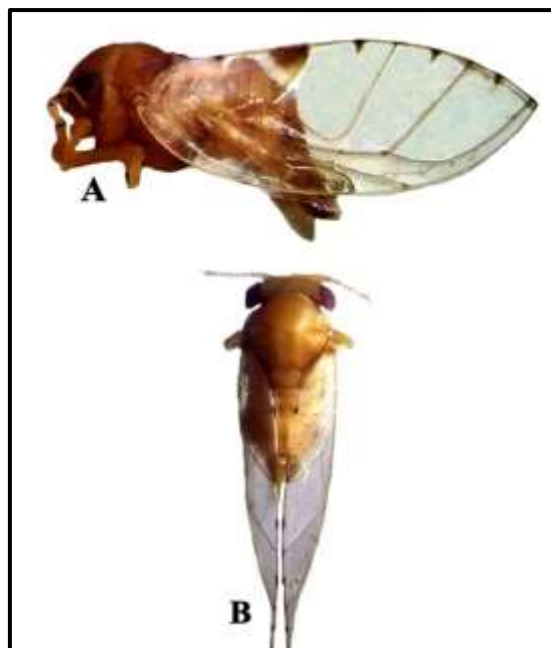


Figure (4) *Macrohomotoma gladiata*, A and B Adult female

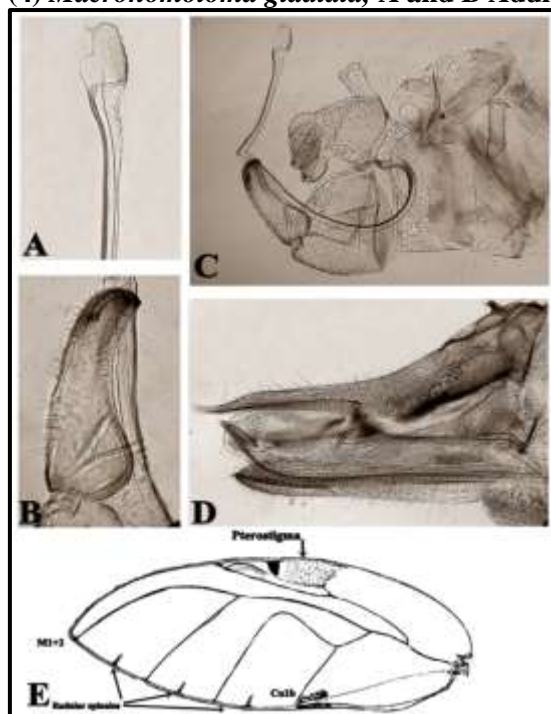


Figure (5) *Macrohomotoma gladiata*, A, Distal portion of aedeagus; B, Paramere, lateral surface; C lateral view external genitalia male; D lateral view of external genitalia female; E, forewing.

Nature of damage:

Infested trees can be easily identified from long distance as this species inhabit the growing tips of host plant twigs which they cover with woolly wax secretion (Fig. 6A and D). This species sticks all leaves together with the gummy honey dew secretion to create a protected microclimate; by removing those leaves several instar stages of psyllid can be noticed. The outer leaves of infested twigs may remain healthy and green but the internal ones become mostly dead, dry and blackened. By presence and feeding of this pest may result in deformations of infested shoots (Fig. 6B). Exuviae were found on the underside of the outer non infested green leaves (Fig. 6C).

Examined materials

5 male and 2 females, 18.iii. 2021. ex. *Ficus microcarpa* L. f. (Moraceae), Bouqa. Latakia city, Syria (N 35°32'20"; 35°48'30"E, elevation 69m), coll. Mahran Zeity.

2 male and 1 females, 28.vi. 2021. ex. *Ficus microcarpa* L. f. (Moraceae), Tartus city, Syria (N 34°52'45"; 35°53'27"E, elevation 25 m), coll. Mahran Zeity.

Distribution:

Algeria, China, China (Hong Kong), India (Maharashtra), Indonesia (Sumatra), Italy, Italy (Sicily), Malaysia, Montenegro, Ryukyu Islands, Spain, Spain (Balearic Islands), Taiwan, United States of America (California), United States of America (Hawaii) (Ouvrard, 2021). Recently, this species was reported from, Tunisia and Morocco (Harbi *et al.*, 2021; Afechtal *et al.*, 2021).



Figure (6), A, B and D symptoms of *Macrohomotoma gladiata* on *Ficus microcarpa*; C exuviae of 5th instar nymphs

Host plants:

Ficus benghalensis L., *Ficus cuspidatocaudata* Hayata, *Ficus microcarpa* L. f., *Ficus religiosa* L. *Ficus retusa* L. and *Ficus retusa* var. *retusa* (Ouvrard, 2021).

Liviidae Löw, 1879**Euphyllurinae Crawford, 1914*****Euphyllura* Foerster, 1848*****Euphyllura phillyreae* Foerster, 1848**

Euphyllura phillyreae* Foerster*Diagnosis**

Pterostigma at most twice as long as the section of the margin vein between the top of veins R and R₅. Pterostigma without transverse veins, apical part of forewings of different consistency than other parts of wings (Fig. 8 D). Body ochreous, forewings very variable in color, the main form of forewings, is white to light ochreous with small dense dark spots (Fig. 7 A and B). Parameres narrow, long, not widening apically, converging slightly in apical two-third of length in rear view (Fig. 8 B).

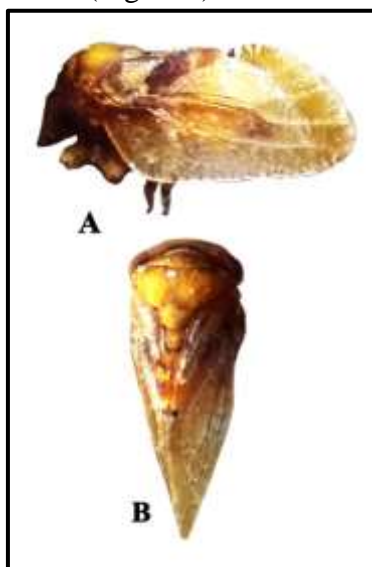


Figure (7) *Euphyllura phillyreae*, A and B adult female

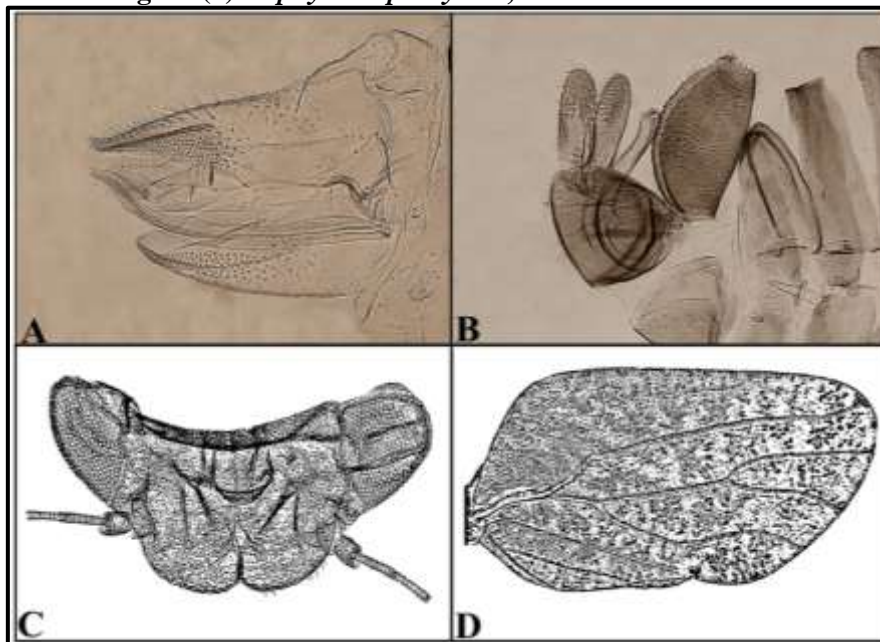


Figure (8) *Euphyllura phillyreae*, A lateral view external genitalia female; B lateral view external genitalia male; C head; D forewing

Nature of damage

After hatching of eggs, young instars form colonies and produce a white waxy secretions and honey-dew droplets. The waxy secretions usually more prominent during the 5th instar (Fig. 9, A and B). Under those waxy secretions several stages of this insect can be recognized.



Figure (9) waxy secretion of *Euphyllura phillyreae* on twigs of *Phillyrea latifolia*

Examined material

4 males and 3 females, 05.v.2021, ex. *Phillyrea latifolia* L. , (Oleaceae), Qalaat Al-Mahalibeh, Latakia, Syria (35°30'34" N; E 36°05'55"; elevation 631m), May 2021, coll. Mahran Zeity.

Distribution

Euphyllura phillyreae is restricted to the Mediterranean Sea and western of Palaricitic. This species reported from Algeria, Bulgaria, Croatia, France, Georgia, Greece, Iran, Italy, Lebanon, Morocco, Russia, Slovenia, Spain, Spain Balearic Islands, Switzerland, Tunisia, Turkey, Ukraine and Yugoslavia (Ouvrard, 2021).

Host plants:

Olea L., *Olea europaea* L., *Osmanthus* Lour., *Osmanthus fragrans* Lour., *Osmanthus ilicifolius* (Hassk.), *Phillyrea* L., *Phillyrea angustifolia* L., *Phillyrea latifolia* L. and *Phillyrea media* L. (Ouvrard, 2021).

Remarks

Adult and some immature stages of *Anthocoris* sp. (Anthocoridae) predator were associated with this insect during this study. So far, this species was reported to be a pest of olive trees from several neighboring countries like, Greece, Algeria, Turkey, Lebanon and Spain (Lauterer et al., 1986; Burckhardt, 1988; Burckhardt, 1989; Kovanci et al., 2005; Zeidan-Geze & Burckhardt, 1998; Hodkinson and Hollis (1981). However several studies have to be conducted to determine whether this species is an inhabitant of olive tree in Syria.

Conclusion

This study was conducted to identify psyllid species associated with some wild and ornamental plants. This is a new contribution to this group from Syria.

Acknowledgment:

Author is thankful to Mondal Priyankar for his comments on the early manuscript. Author is grateful to the General Commission for Scientific Agricultural Research, Latakia, Syria for support during this work.

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تسجيل جديد لثلاث حشرات من البسيلا (Insect, Psylloidea) من سورية

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تاريخ القبول: 2021/09/20

تاريخ الاستلام: 2021/08/29

الملخص

تم ملاحظة الكثير من المفززات الشمعية على البراعم الطرفية لثلاث أشجار وشجيرات هي، النبق (*Cordia myxa* L. (Boraginaceae) ، والتين التنزيني *Ficus microcarpa* L. f. (Moraceae) ، والزرود (*Phillyrea latifolia* L. (Oleacea) خلال مسوحات صحة النبات في منطقة عمل ونشاط مركز البحوث العلمية الزراعية في اللاذقية. تم تعريف الأنواع الحشرية المسببه لتلك الأعراض على أنها *Diaphorina aegyptiaca* و *Macrohomotoma gladiate* و *Euphyllura phillyreae* على التوالي. تمثل هذه الدراسة التسجيل الأول للأنواع الثلاثة، بالإضافة إلى ذلك، تسجيل الجنسين *Diaphorina* و *Macrohomotoma* هو الأول خلال هذه الدراسة.

الكلمات المفتاحية: اللاذقية، *Macrohomotoma* ، *Diaphorina* ، الحمضيات، *Euphyllura*