

# New records of Auchenorrhyncha (Insecta: Hemiptera) from the Maltese archipelago with an updated checklist

Vera D'URSO<sup>1</sup>, Ilia GJONOV<sup>2</sup> & David MIFSUD<sup>3</sup>

**ABSTRACT.** Twenty-four new records of Auchenorrhyncha are reported from the Maltese Islands. Up to now 71 species are known from the territory. Among the new recorded species, 1 belongs to Cixiidae, 5 to Delphacidae, 2 to Tettigometridae, 1 to Issidae and 15 to Cicadellidae.

**KEY WORDS.** Malta, Mediterranean, Planthoppers, Leafhoppers.

## INTRODUCTION

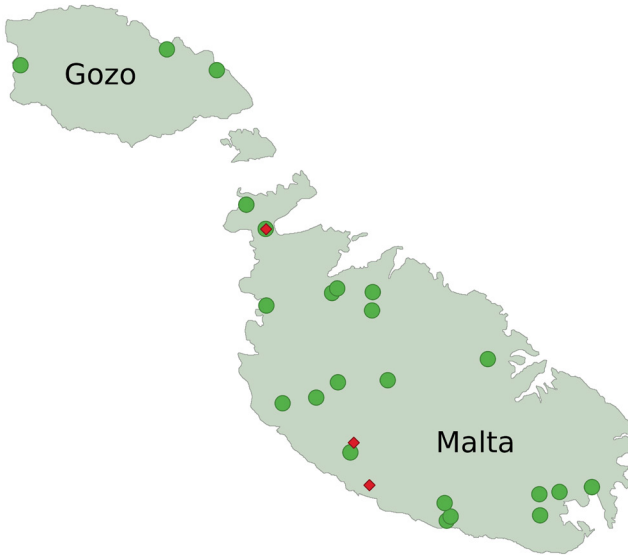
Specific field studies for collecting Auchenorrhyncha from the Maltese archipelago were only recently conducted. Up till now, 47 species were recorded from the mentioned territory (D'URSO & MIFSUD, 2012; D'URSO, 2016). Material studied from additional field work added 24 new records bringing the number of known species to 71. The present study was undertaken on material collected mainly by the authors (DM - David Mifsud; IG – Ilia Gjonov; VD - Vera D'Urso; RZM – Rachel Zammit-Mangion) which is housed in their respective private collections. The main part of the material was collected between 2014 and 2017 from both Malta and Gozo by malaise traps and sweep nets. The collecting points are visualized on the map (Fig. 1). In the annotated species list which follows, the sequence of families and species within each family follows the one used by D'URSO & MIFSUD (2012). Appendix I provides a complete checklist of all Auchenorrhyncha recorded so far from Malta. The 24 new records reported in this study are marked with an asterisk. Families are arranged taxonomically and species therein are listed alphabetically.

---

<sup>1</sup> Dipartimento di Scienze Biologiche, Geologiche e Ambientali Sezione di Biologia Animale 'Marcello La Greca', Università degli Studi di Catania, Via Androne 81, Catania, Italy. E-mail: dursove@unict.it

<sup>2</sup> Sofia University "St. Kliment Ohridski", Faculty of Biology, Department of Zoology and Anthropology, 8 Dragan Tsankov blvd., 1164 Sofia, Bulgaria; National Museum of Natural History, Sofia, Bulgaria. E-mail: gjonov@cicadina.com

<sup>3</sup> Institute of Earth Systems, Division for Rural Sciences and Food systems, University of Malta, Msida MSD 2080, Malta. E-mail: david.a.mifsud@um.edu.mt



**Figure 1:** Collecting points in Malta and Gozo – green circle – sweeping net; red triangle – malaise trap.

## ANNOTATED SPECIES LIST

### CIXIIDAE Spinola, 1839

#### *Tachycixius* cf. *osellai* (Dlabola, 1980)

**Material examined:** Malta, Ghajn Tuffieha Bay, 24.xi.2017, 3 ♂♂ & 2 ♀♀, IG.

**Notes:** Among *Tachycixius* species, *T. osellai* is recognizable by the shape of the wings. The species was described from Sicily. The specimens collected from Malta belong to the *T. osellai* species group, but more specimens are needed to better understand the range of variability of the male genitalia.

**General distribution:** Sicily (DLABOLA, 1980; D'URSO, 1995).

### DELPHACIDAE Leach, 1815

#### *Iubsoda stigmatica* (Melichar, 1897)

**Material examined:** Malta, Qannotta Valley, 27.iv.1985, 1 ♂, VD.

**Notes:** This species is known from the North and East of the Mediterranean. It is also recorded from the Ethiopian Region. It is widespread in Sicily and southern peninsular Italy and is associated with *Hyparrhenia hirta* (L.) Stapf.

**General distribution:** Southern Europe, Mediterranean islands and Ethiopian Region (MELICHAR, 1897; D'URSO & GUGLIELMINO, 1995; D'URSO, 1986; ASCHE, 1982).

***Kelisia brucki* Fieber, 1878**

**Material examined:** Malta, Rabat, L-Andrijiet, 24.xi.2017, 1 ♂ & 1 ♀, IG.

**Notes:** The species lives on *Juncus* spp. in humid biotopes. It is present in southern Europe and in the regions along the northern Mediterranean Sea (included peninsular Italy and Sicily).

**General distribution:** Southern and eastern Europe, Near East (HOLZINGER *et al.*, 2003).

***Kelisia ribauti* W. Wagner, 1938**

**Material examined:** Malta, Ġhajn Rihana, on the hygrophilous vegetation with *Jucus* sp. and *Typha* sp., 3.ii.2015, 1 ♂ & 1 ♀, VD; Rabat, L-Andrijiet, 24.xi.2017, 5 ♂♂, IG.

**Notes:** The specimens collected in Malta belong to the Mediterranean morph after ASCHE (1986), living on *Juncus* sp.. DROSOPoulos (1982) recorded this species also on *Deschampsia cespitosa* (L.) P. Beauv. The species has a Palearctic distribution and is widespread in the Mediterranean basin.

**General distribution:** Palearctic (HOLZINGER *et al.*, 2003).

***Kelisia sulcata* Ribaut, 1934**

**Material examined:** Malta, Chadwick lakes, along the valley, on *Juncus* sp., 4.ii.2015, 1 ♂ & 3 ♀♀, VD.

**Notes:** *Kelisia sulcata* lives in humid biotopes and feeds on *Jucus* sp. It represents a western Mediterranean species widespread in the Iberian Peninsula, France and Sardinia, but has not been recorded from peninsular Italy and Sicily.

**General distribution:** West Mediterranean (RIBAUT, 1934; ASCHE, 1982a).

***Sogatella vibix* (Haupt, 1927)**

**Material examined:** Malta, Wardija Hilltop vill., 22.xi.2017, 2 ♂♂ & 1 ♀, IG. Gozo, Ramla Bay, 23.xi.2017, 1 ♂, IG.

**Notes:** This species feeds on Poaceae including barley, maize and rice. It is a vector of the Maize Rough Dwarf Virus, Maize Sterile Stunt Virus and Finger Millet Mosaic Virus (WILSON, 2005).

**General distribution:** Palearctic, Ethiopian Region, Oriental Region, Australia and the Western Pacific (ASCHE & WILSON, 1990).

## TETTIGOMETRIDAE Germar, 1821

### *Tettigometra impressifrons* Mulsant & Rey, 1855

**Material examined:** Malta, Żejtun, 15.xi.2017, 1 ♂ parasitized by dryinid, IG.

**Notes:** In France, BOURGOIN (1985) reported this species and *Tettigometra sulfurea* Mulsant & Rey as attended by the ants *Tetramorium* spp., *Camponotus aethiops* (Latreille, 1798), *Tapinoma* spp. and *Formica rufibarbis* Fabricius, 1793. The distribution of this species is Mediterranean-Atlantic and recently the species was also recorded from Iran.

**General distribution:** Northern Africa, western and southern Europe and western Asia (MOZAFFARIAN *et al.*, 2018).

### *Tettigometra laeta* Herrich-Schäffer, 1835

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.x.2014 – 30.xi.2014, 1 ♂, DM; Ta' Qali National Park, 16.xi.2017, 1 ♀, IG.

**Notes:** This species is known from dry grassland in the Mediterranean region and the southern parts of central Europe (HOLZINGER *et al.*, 2003). In a costal dune area of Belgium, LEHOUCK *et al.* (2004) reported this species as associated with the ants *Lasius psammophilus* Seifert, 1992, *Tetramorium caespitum* (Linnaeus, 1758) and *Formica cunicularia* Latreille, 1798.

**General distribution:** Southern Europe and northern Africa (LINNAVUORI, 1971; HOLZINGER *et al.*, 2003).

## ISSIDAE Spinola, 1839

### *Latilica tunetana* (Matsumura, 1910)

**Material examined:** Malta, Żurrieq Valley, 20.xi.2017, 2♂♂ & 1 ♀, IG. Gozo, Dwejra, on *Euphorbia dendroides* L., 23.xi.2017, 2 ♂♂ & 3 ♀♀, IG.

**Notes:** *Latilica tunetana* is mainly found in Mediterranean bush biotopes dominated by *Pistacia lentiscus* L., *Quercus ilex* L. and *Phillyrea* sp. (GNEZDILOV & MAZZONI, 2003). The species was recorded from Italy (southern peninsular Italy, Sicily, Linosa and Pantelleria) and Tunisia.

**General distribution:** South-western Europe, Mediterranean islands and northern Africa (GNEZDILOV *et al.*, 2014).

## CICADELLIDAE Latreille, 1825

### *Asymmetrasca decedens* (Paoli, 1932)

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.ix.2014 – 30.ix.2014, 1 ♂, DM.

**Notes:** The species is known from the North and East Mediterranean reaching also Germany. It is present in the Afrotropical region and was also reported from California and Central America. It is a polyphagous species on weeds and fruit plants (FREITAS & AGUIN POMBO, 2005). It was also recorded as causing damage to citrus fruit (ABDUL-NOUR, 1985; BASPINAR *et al.*, 2011) and other plants of economic importance (e.g. cotton, grapevine, beans, etc.) (ATAKAN, 2009). It is also a vector of phytoplasmas (PASTORE *et al.*, 2003). In fact, in Lebanon it causes almond witches' broom, associated with '*Candidatus Phytoplasma phoenicium*', which is a lethal disease of almond (*Prunus dulcis*), peach (*P. persica*) and nectarine (*P. persica* var. *nucipersica*) (ABOU-JAWDAH *et al.*, 2014; EPPO, 2018).

**General distribution:** Southern Europe, northern Africa, Near Middle and Far East (DLABOLA, 1957; BOUKHRIS-BOUHACHEM, 2007; ZAHNISER, 2007-present; RADOVIĆ & PEŠIĆ, 2014, MOZAFFARIAN & WILSON, 2016).

### *Balclutha frontalis* (Ferrari, 1882)

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.viii.2014 – 31.viii.2014, 1 ♂ & 1 ♀, DM; Żejtun, 15.xi.2017, 5 ♂♂ & 1 ♀, IG; Birzebbuga, 15.xi.2017, 3 ♂♂ & 1 ♀, IG; Żurrieq Valley, 20.xi.2017, 3 ♂♂, IG; Ghar Dalam, 21.xi.2017, 2 ♂♂ & 5 ♀♀, IG; Wardija Hilltop vill., 22.xi.2017, 1 ♂ & 1 ♀, IG; Ghajn Tuffieha Bay, 24.xi.2017, 1 ♂, IG.

**Notes:** A widespread cosmopolitan species with many records from central and southern Europe and associated with grasses.

**General distribution:** Palaearctic Region, Oriental Region, Ethiopian Region, Nearctic Region and Neotropical Region (ZAHNISER, 2007-present).

### *Bugraia ocularis* (Mulsant & Rey, 1855)

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 30.vi.2015 – 30.ix.2015, 1 ♀, DM; Mellieha, malaise trap, 2.i.2017-23.i.2017, 15 ♂♂ & 12 ♀♀, RZM; 24.i.2017 – 14.ii.2017, 7 ♂♂ & 7 ♀♀, RZM; 14.ii.2017 – 7.iii.2017, 2 ♂♂ & 5 ♀♀, RZM; Żurrieq, 15.xi.2017, 1 ♀, IG; Żurrieq Valley, 20.xi.2017, 1 ♂ & 1 ♀, IG, in both cases on *Pistacia lentiscus* L.

**Notes:** A Mediterranean-Atlantic species, feeding on *Pistacia lentiscus* L.

**General distribution:** Europe, northern Africa and Anatolia (DMITRIEV, 2003-present; ÖNDER *et al.*, 2011; GĘBICKI *et al.*, 2013).

### *Circulifer dubiosus* (Matsumura, 1908)

**Material examined:** Gozo, Ramla Bay, 23.xi.2017, 1 ♂ & 2 ♀♀, IG.

**Notes:** A rare species with a Turranic-Mediterranean distribution and associated with grasses.

**General distribution:** Southern Europe, European Russia, Near and Middle East (LINNAVUORI, 1965; MITJAEV, 1971; LODOS & KALKANDELEN, 1985; NOVIKOV *et al.*, 2006; ZAHNISER, 2007-present; MOZAFFARIAN & WILSON, 2016).

***Empoasca decipiens* Paoli, 1930**

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.viii.2014 – 31.viii.2014, 1 ♂, DM; 1.ix.2014 – 30.ix.2014, 1 ♂, DM; Fawwara, malaise trap, 24.iii.2017 – 27.iii.2017, 3 ♀♀; 27.iii.2017 – 3.iv.2017, 1 ♂ & 7 ♀♀, DM; Ta' Qali National Park, 16.xi.2017, 3 ♂♂ & 1 ♀, IG; Żurrieq Valley, 20.xi.2017, 1 ♂, IG; Qrendi, Il-Maqluba, 22.xi.2017, 1 ♂, IG.

**Notes:** Species with a Turranic-Euro-Mediterranean distribution. It is a polyphagous grass taxon with adults living also on several shrubs and trees. *Empoasca decipiens* damages leaves and shoots by producing punctures on several plants of economic importance (e.g. soybeans, cotton, potato) (FATHI *et al.*, 2009). According to BASPINAR *et al.* (2011), *E. decipiens* adults were reported as causing serious damage to citrus fruits in Turkey. In addition, the species proved to be an experimental vector of “*Candidatus* Phytoplasma asteris”, 16SrI-B, the chrysanthemum yellow phytoplasma, affecting *Chrysanthemum carinatum* Schousboe (GALETTO *et al.*, 2011).

**General distribution:** Europe, northern Africa, Near and Middle East and Ethiopian Region (DMITRIEV, 2003-present).

***Exitianus taeniaticeps* (Kirschbaum, 1868)**

**Material examined:** Malta, Ghadira Natural Reserve, 19.xi.2017, 1 ♂, IG. Gozo, Ramla Bay, 23.xi.2017, on *Panicum repens* L., 3 ♂♂ & 1 ♀, IG.

**Notes:** Species feeding on *Cynodon dactylon* (L.) Pers. and other herbaceous plants.

**General distribution:** Southern Europe and northern Africa (RIBAUT, 1952; NAST, 1987).

***Hauptidia distinguenda* (Kirschbaum, 1868)**

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.x.2014 – 30.xi.2014, 1 ♀; 30.vii.2015 – 30.ix.2015, 1 ♂ & 2 ♀♀, DM; Fawwara, malaise trap, 27.iii.2017 – 3.iv.2017, 1 ♀, DM.

**Notes:** Species widespread in Europe and in the eastern Mediterranean. Polyphagous species on herbaceous plants, especially Geraniaceae.

**General distribution:** Europe and the Near East (DMITRIEV, 2003-present).

***Hauptidia provincialis* (Ribaut, 1931)**

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 30.vi.2015 – 30.ix.2015, 1 ♂, DM; Fawwara, malaise trap, 27.iii.2017 – 3.iv.2017, 1 ♀, DM; Dingli, Buskett Gardens, 16.xi.2017, 1 ♂, 21.xi.2017, 3 ♂♂ & 2 ♀♀, IG; Qrendi, Il-Maqluba, 22.xi.2017, 2 ♂♂ & 2 ♀♀, IG.

**Notes:** A widespread species in central and South-eastern Europe. Polyphagous on grasses.

**General distribution:** Southern Europe, Germany (DMITRIEV, 2003-present).

***Liguropia juniperi* (Lethierry, 1876)**

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.viii.2014 – 31.viii.2014, 4 ♂♂ & 4 ♀♀; 1.ix.2014 – 30.ix.2014, 2 ♀♀, 30.vi.2015 – 30.ix.2015, 12 ♂♂ & 1 ♀, DM.

**Notes:** Mediterranean species reaching central Europe, southern England and also Sweden (SÖDERMAN *et al.*, 2009). It is associated with Cupressaceae.

**General distribution:** Europe, northern Africa and the Near East (DMITRIEV, 2003-present).

***Macropsis fuscula* (Zetterstedt, 1828)**

**Material examined:** Malta, Dingli, Buskett Gardens, 16.xi.2017, on *Rubus* sp. 1 ♂ & 1 ♀, IG.

**Notes:** This species has a Turranic-Euro-Mediterranean distribution but is also recorded from North America; it lives on *Rubus* spp. According to NICKEL (2003), *M. fuscula* is a potential vector of *Rubus* Stunt Disease (RSD) in several European countries.

**General distribution:** Europe, Middle and Far East, Nearctic region (TISHECHKIN, 2002).

***Macrosteles ramosus* Ribaut, 1952**

**Material examined:** Malta, Ghajn Rihana, on the hygrophilous vegetation with *Jucus* sp. and *Typha* sp., 3.ii.2015, 17 ♂♂ & 9 ♀♀, VD.

**Notes:** Species with a Turranic-Mediterranean distribution. Associated with Poaceae in humid biotopes.

**General distribution:** Southern Europe, northern Africa and Kazakhstan (ZAHNISER, 2007-present).

***Maiestas schmidtgeni* (Wagner, 1939)**

**Material examined:** Malta, Buskett, Verdala Palace, malaise trap, 1.ix.2014 – 30.ix.2014, 1 ♂ & 1 ♀, DM; Ghadira Natural Reserve, 19.xi.2017, 1 ♂ & 1 ♀, IG. Gozo, Ramla Bay, 23.xi.2017, 3 ♂♂, IG.

**Notes:** A widespread species distributed from central Asia to central Europe and the Mediterranean basin and associated with *Cynodon dactylon* L.

**General distribution:** Southern and Central Europe, United Kingdom, Near and Middle East, China (DLABOLA, 1954, 1957, 1961 and 1977; HOLZINGER, 1996; HOLZINGER & SELJAK, 2001; DEMIR, 2006; ZAHNISER, 2007-present; RADOVIĆ & PEŠIĆ, 2014; MOZAFFARIAN & WILSON, 2016; OROSZ & TÓTH, 2016).

***Melillaia desbrochersi* (Lethierry, 1899)**

**Material examined:** Malta, Wardija, 3.ii.2015, 10 ♂♂ & 3 ♀♀, VD; Ta' Qali National Park, 16.xi.2017, 1 ♂, IG; Paradise Bay, 19.xi.2017, 1 ♂, IG; Ghar Dalam, 21.xi.2017, 1 ♂ & 1 ♀, IG; Dingli, Buskett Gardens, 21.xi.2017, 1 ♂, IG; Wardija Hilltop vill., 22.xi.2017, 1 ♂ & 1 ♀, IG; Ghajn Tuffieha Bay, 24.xi.2017, 2 ♂♂, IG. Gozo, Dahlet Qorrot Bay, clay cliffs with *Limbarda critimoides* (L.) Dumort, 5.ii.2015, 24 ♂♂, 4 ♀♀ & many juvenes, VD; Ramla, 5.ii.2015, costal sandy dunes with *Ononis* sp., *Matthiola* sp., etc, 24 ♂♂, 10 ♀♀ & many juvenes, VD; Dwejra, 23.xi.2017, 2 ♂♂, IG.

**Notes:** This species has a scattered Mediterranean distribution. It is mainly found in open herbaceous environments.

**General distribution:** Southern Europe and northern Africa (DELLA GIUSTINA, 1989; MIFSUD *et al.*, 2010).

***Orosius orientalis* (Matsumura, 1914)**

**Material examined:** Malta, Ta' Qali National Park, 16.xi.2017, 1 ♂, IG.

**Notes:** This polyphagous species is of economic importance in Japan as a vector of the witch's broom of some legumes and in India as a vector of the sesame-phyllody (ISHIHARA, 1982). It is known from the Oriental region, India, Australia and Ethiopian region; in the Mediterranean area *O. orientalis* is a rather rare species known from the South-western regions. Up till now, the synonymy of this species with *O. albicinctus* Distant, 1918 and *O. filigranus* (Haupt, 1927) is not clear.

**General distribution:** Madeira, northern Africa, Near and Far East, Oriental Region and Australian Region (ZAHNISER, 2007-present).

***Ribautiana tenerrima* (Herrich-Schäffer, 1834)**

**Material examined:** Malta, Dingli, Buskett Gardens, 21.xi.2017, 1 ♂ & 1 ♀, IG.

**Notes:** This species is widespread in Europe and in the eastern Mediterranean region. It was also introduced in the Australian and the Nearctic Region. It is reported for *Rubus* spp. and also, but in low numbers, on some woody plants (e.g. *Corylus*, *Quercus*, etc.) (NICKEL, 2003).

**General distribution:** Western Palaearctic, Nearctic region, Australian region (DMITRIEV, 2003-present).

**DISCUSSION**

Even though recent collecting trips in Malta and Gozo allowed us to add new records to the Auchenorrhyncha fauna of Malta, the total number of 71 recorded species will surely increase again. It is however possible to make a preliminary comparison with the Auchenorrhyncha fauna of the nearby islands of Sicily in order to know what we can expect to find in the future. The Auchenorrhyncha fauna of Sicily is very rich with about 400 recorded species (in comparison with that for Italy which counts over 900 species). However, the Sicilian territory is more than 50 times larger than that of the Maltese archipelago; it is less affected by anthropogenic pressures; presents



a wider range of habitat types and as a direct consequence of this, the floral biodiversity which can host Auchenorrhyncha is also much more diverse. Nevertheless, we expect that at least 100 different species could potentially occur in Malta.

## REFERENCES

- ABDUL-NOUR, H. (1985) Cicadellidae of Lebanon records and bio-ecological notes. *Marburger Ent. Publikationen*, 1 (10): 169–190.
- ABOU-JAWDAH, Y., ABDEL SATER, A., JAWHARI, M., SOBH, H., ABDUL-NOUR, H., BIANCO, P.A., MOLINO LOVA, M. & ALMA, A. (2014) *Asymmetrasca decedens* (Cicadellidae, Typhlocybae), a natural vector of ‘*Candidatus Phytoplasma phoenixium*’. *Annals of Applied Biology*, 165(3), 395–403.
- ASCHE, M. (1982) Beiträge zur Delphaciden - Fauna Jugoslawiens und Bulgariens (Homoptera Cicadina Delphacidae). *Marburger Entomologische Publikationen*, 1: 99–138.
- ASCHE, M. (1982a) *Kelisia creticola* nov. spec. und Ergänzungen zu den ubrigen Taxa des *Kelisia brucki* Fieber, 1878 - Kreises (Homoptera Cicadina Delphacidae). *Marburger Entomologische Publikationen*, 1: 89–116.
- ASCHE, M. & WILSON, M.R. (1990) The delphacid genus *Sogatella* and related groups: a revision with special reference to rice-associated species (Homoptera: Fulgoroidea). *Systematic Entomology*, 15: 1–42. doi: 10.1111/j.1365-3113.1990.tb00301.x
- ASCHE, M. (1986) Remarks on the occurrence of *Kelisia perrieri* Ribaut from Cyprus supposed by Lindberg 1948 (Homoptera, Fulgoromorpha, Delphacidae). *Marburger Entomologische Publikationen*, 2: 211–216.
- ATAKAN, E. (2009) Damage assessment of the leafhopper complex *Asymmetrasca decedens* (Paoli) and *Empoasca decipiens* Paoli (Homoptera: Cicadellidae) in cotton. *Journal of Pest Science*, 82: 227–234.
- BASPINAR, H., UYGUN, N. & DE MENDOZA, A.H. (2011) Cicadellidae (pp. 119–125). In, VACANTE, V & GERSON, U. [eds.] Integrated Control of *Citrus* pests in the Mediterranean Region. Bentham E Books.
- BOUKHRIS-BOUHACHEM, S., CHABBOUH, N., HARBI, M. & DANET J.-L. (2007) Les cicadaires vecteurs potentiels de phytopathogènes en vignoble tunisien (Hemiptera: Cicadomorpha: Fulgoromorpha). *Annales de la Société Entomologique de France (Nouvelle série)*, 43: 159–163. doi: 10.1080/00379271.2007.10697506
- BOURGOIN, T. (1985) Une association méconnue: des fourmis (Hym. Formicidae) et des tettigomètres (Hem., Fulgoromorpha, Tettigometridae). *Entomol. Gall.*, 1: 233–234.
- DELLA GIUSTINA, W. (1989) 73 Faune de France Homoptères Cicadellidae volume 3, compléments aux ouvrages d’Henri Ribaut. *Faune de France* 73. Fédération Française des Sociétés de Sciences naturelle, 350 pp.
- DEMIR, E. (2006) Contributions to the knowledge of Turkish Auchenorrhyncha with twelve new records (Homoptera: Cicadellidae). *Munis Entomology & Zoology*, 1: 215–236.
- DLABOLA, J. (1954) Doplňky faunistiky ČSR a Maďarska s popisem nového druhu rodu *Typhlocyba* Germar. (Ergänzungen zur Faunistik der ČSR und Ungarns mit der Beschreibung einer neuen *Typhlocyba*-Art). (Hom., Auchenorrhyncha). *Acta Societatis Entomologicae Cechosloveniae*, 51: 149–155.
- DLABOLA, J. (1957) Results of the zoological expedition of the National Museum in Prague to Turkey. 20. Homoptera Auchenorrhyncha. *Acta Entomologica Musei Nationalis Pragae*, 31: 19–68.
- DLABOLA, J. (1961) Die Zikaden von Zentralasien, Dagestan und Transkaukasien (Homopt. Auchenorrhyncha). *Acta Entomologica Musei Nationalis Pragae*, 34: 241–358.
- DLABOLA, J. (1977) Chorologische Ergänzungen zur Zikadenfauna des Mittelmeergebietes (Homoptera, Auchenorrhyncha). *Sborník Národního Muzea v Praze, Řada B, Přírodní Vědy*, 33: 21–40.

- DLABOLA, J. (1980) Neue Zikadenarten der Gattungen *Siculus* gen. n., *Mycterodus* und *Adarrus* aus Südeuropa und 6 neue *Mycterodus* aus Iran (Homoptera, Auchenorrhyncha). *Acta Faunistica Entomologica Musei Nationalis Pragae*, 16: 55–71.
- DMITRIEV, D.A. (2003–present) World Auchenorrhyncha Database. Available from: <http://dmitriev.speciesfile.org/>
- DROSOPOULOS, S. (1982) Hemipterological Studies in Greece. Part II. Homoptera-Auchenorrhyncha. On the family Delphacidae. *Marburger Entomologische Publikationen*, 1(6): 35–88.
- D'URSO, V. (1986) On the Auchenorrhyncha (Heteoptera) from Aeolian Island (Sicily, Italy). In: *Proceedings 2nd International Congress concerning the Rhynchota Fauna of Balkan and Adjacent Regions*, Mikrolimni, Greece, 23–27.
- D'URSO, V. (1995) Homoptera Auchenorrhyncha. In: Minelli, A., Ruffo, S. & La Porta, S. [eds.], *Checklist delle specie della fauna italiana*, Fascicolo 42, 1–35.
- D'URSO, V. (2016) *Austroagallia avicula* (Ribaut, 1935) (Hemiptera, Auchenorrhyncha, Cicadellidae) – a new record from the Maltese Islands. *Bulletin of the Entomological Society of Malta*, 8: 83–84.
- D'URSO, V. & GUGLIELMINO, A. (1995) Homoptera Auchenorrhyncha. In: *Arthropoda di Lampedusa, Linosa e Pantelleria, Naturalista sicil.*, 19(suppl.), 279–301.
- D'URSO, V. & MIFSUD, D. (2012) A preliminary account of the Auchenorrhyncha of the Maltese Islands (Hemiptera). *Bulletin of the Entomological Society of Malta*, 5: 57–72.
- EPPO (2018) EPPO Global Database (available online at <https://gd.eppo.int>).
- FATHI, S.A.A., NOURI-GANBALANI, G. & RAFIEE-DASTJERDI, H. (2009) Life cycle parameter of *Empoasca decipiens* Paoli (Hom.: Cicadellidae) on four potato cultivars (*Solanum tuberosum* L.) in Iran. *Journal of Entomology*, 6 (2): 96–101
- FREITAS, N. & AGUIN-POMBO, D. (2005) Distribution, food plants and control of *Asymmetrasca decedens* (Paoli, 1932) (Hemiptera: Cicadellidae). *Boletim do Museu Municipal do Funchal* 56 (315): 23–39.
- GALETTO, L., MARZACHI, C., DEMICHELIS, S. & BOSCO, D. (2011) Host plant determines the phytoplasma transmission competence of *Empoasca decipiens* (Hemiptera: Cicadellidae). *J. Economic Entomol.*, 104 (2): 360–366.
- GEŹBICKI, C., ŚWIERCZEWSKI, D. & SZWEDO, J. (2013) Planthoppers and Leafhoppers of Poland (Hemiptera: Fulgoromorpha et Cicadomorpha) Systematics. Check-list. Bionomy. *Annals of the Upper Silesian Museum in Bytom. Entomology*, 21–22: 5–259.
- GNEZDILOV, V.M., HOLZINGER, W.E. & WILSON, M.R. (2014) The Western Palaearctic Issidae (Hemiptera, Fulgoroidea). An illustrated checklist with keys to genera and subgenera. *Proceedings of the Zoological Institute of the Russian Academy of Sciences*, 318: 1–121.
- GNEZDILOV, V. & MAZZONI, V. (2003) Notes on the *Latilica maculiceps* (Melichar, 1906) species group (Homoptera, Issidae). *Redia*, LXXXVI, 147–151.
- HOLZINGER, W.E. (1996) Kritisches Verzeichnis der Zikaden Österreichs (Ins.: Homoptera, Auchenorrhyncha). *Carinthia II*, 186: 501–507.
- HOLZINGER, W.E., KAMMERLANDER, I. & NICKEL, H. (2003) The Auchenorrhyncha of Central Europe. Vol 1: Fulgoromorpha, Cicadomorpha excl. Cicadellidae. Brill ed., 1-665
- HOLZINGER W.E. & SELJAK G. (2001) New Records of Planthoppers and Leafhoppers from Slovenia, with a checklist of hitherto recorded species (Hemiptera: Auchenorrhyncha). *Acta Entomologica Slovenica*, 9: 39–66.
- ISHIHARA, T. (1982) Notes on a leafhopper of economic importance, *Orosius orientalis* (Matsumura, 1914) (Hemiptera: Cicadellidae). *Appl. Ent. Zool.*, 17 (3): 364–367.
- LEHOUCQ, V.S, BONTEV, D.B., DEKONINCKW, W. & MAELFAIT, J.P. (2004) Trophobiotic relationships between ants (Hymenoptera: Formicidae) and Tettigometridae (Hemiptera: Fulgoromorpha) in the grey dunes of Belgium. *Eur. J. Entomol.*, 101: 547–553.
- LINNAVUORI, R.E. (1965) Studies on the South- and East-Mediterranean Hemipterous Fauna. *Acta Entomologica Fennica*, 21: 1–69.

- LINNAVUORI, R.E. (1971) A leafhopper material from Tunisia, with remarks on some species of the adjacent countries. *Annales de la Société Entomologique de France (Nouvelle série)*, 7: 57–73.
- LODOS, N. & KALKANDELEN, A. (1985) Preliminary list of Auchenorrhyncha with notes on distribution and importance of species in Turkey XVII. Family Cicadellidae, Deltocephalinae: Grypotini, Goniagnathini and Opsiini (Part I). *Türkiye Bitki Koruma Dergisi*, 9: 79–90.
- MELICHAR, L. (1897) Einige neue Homopteren-Arten und -Varietäten aus Dalmatien und dem Küstenlande. *Wiener entomologische Zeitung*, 16: 67–72. doi: 10.5962/bhl.part.12835
- MIFSUD, D., COCQUEMOT, C., MÜHLETHALER, R., WILSON, M.R.M. & STREITO J.-C. (2010) Other Hemiptera Sternorrhyncha (Aleyrodidae, Phylloxeroidea, and Psylloidea) and Hemiptera Auchenorrhyncha. Chapter 9.4. *BIORISK – Biodiversity and Ecosystem Risk Assessment*, 4: 511–552. doi: 10.3897/biorisk.4.63
- MITYAEV, I.D. (1971) Cicadinea of Kazakhstan. *Keys for identification of species*. Alma-Ata, “Nauka” Publ. 211 pp. [in Russian].
- MOZAFFARIAN, F., BOURGOIN, T. & WILSON, M.R. (2018) Nomenclatural changes in the higher classification of the family Tettigometridae (Hemiptera: Fulgoroidea) with description of a new tribe and new species and review of the Iranian tettigometrid fauna. *Zootaxa*, 4392 (3): 469–490.
- MOZAFFARIAN, F. & WILSON, M.R.M. (2016) A checklist of the leafhoppers of Iran (Hemiptera: Auchenorrhyncha: Cicadellidae). *Zootaxa*, 4062: 1–63.
- NAST, J. (1987) The Auchenorrhyncha (Homoptera of Europe). *Annales Zoologici*, 40 (15): 536–661.
- NICKEL, H. (2003) The leafhoppers and planthoppers of Germany (Hemiptera, Auchenorrhyncha): Patterns and strategies in a highly diverse group of phytophagous insects. *Pensoft Series Faunistica* no 28, 1–460.
- NOVIKOV, D.V., NOVIKOVA, N.V., ANUFRIEV, G.A. & DIETRICH, C.H. (2006) Auchenorrhyncha (Hemiptera) of Kyrgyz Grasslands. *Russian Entomological Journal*, 15 (3): 303–310.
- ÖNDER, F., TEZCAN, S., KARSAVRAN, Y. & ZEYBEKOĞLU, Ü. (2011) Türkiye Cicadomorpha, Fulgoromorpha ve Sternorrhyncha (Insecta: Hemiptera) Kataloğu. *Meta Basım Matbaacılık Hizmetleri*, İzmir, 168 pp. Available from: <http://entomoloji.ege.edu.tr/files/e-library/onder-et-al-2011.pdf>
- OROSZ, A. & TÓTH, M. (2016) Contribution to the Auchenorrhyncha fauna of Şalaj county, Romania. *Studia Universitatis “Vasile Goldiş”, Seria Ştiinţele Vieţii*, 26: 117–123.
- PASTORE, M., RAFFONE, E., SANTONASTASO, M., PRIORE, P., PALTRINIERI, S., BERTACCINI, A. & SIMEONE A.M. (2003) Phytoplasma detection in *Empoasca decedens* and *Empoasca* spp. and their possible role as vectors of European Stone Fruit Yellows (16SrXB) Phytoplasma. *Acta Horticulturae*, 657: 507–511.
- RADOVIĆ, M. & PEŠIĆ, V. (2014) Contribution to the knowledge on Cicadomorpha (Hemiptera: Auchenorrhyncha) of Montenegro. *Ecologia Montenegrina*, 1: 113–116.
- RIBAUT, H. (1934) Nouveaux Delphacides (Homoptera-Fulgoroidea). *Bulletin de la Societe d’Histoire Naturelle de Toulouse*, 66: 281–301.
- RIBAUT, H. (1952) Faune de France. 57 Homopteres Auchenorhynques. Paris. 474 pp.
- SÖDERMAN, G., GILLERFORS, G. & ENDRESTÖL, A. (2009) An annotated catalogue of the Auchenorrhyncha of Northern Europe (Insecta, Hemiptera: Fulgoromorpha et Cicadomorpha). *Cicadina*. 10: 33–69.
- TISHECHKIN, D.Y. (2002) Review of the species of the genus *Macropsis* Lewis, 1834 (Homoptera: Cicadellidae: Macropsinae) from European Russia and adjacent territories. *Russian Entomological Journal*, 11: 123–184.
- WILSON, S.W. (2005) Keys to the families Fulgoromorpha with emphasis on planthoppers of potential economic importance in the Southeastern United States (Hemiptera: Auchenorrhyncha). *Florida Entomologist*, 88 (4): 464–481.
- ZAHNISER, J.N. (2007-present) An online interactive key and searchable database of Deltocephalinae (Hemiptera: Cicadellidae). <http://zahniser.speciesfile.org/>

**APPENDIX I** – Checklist of the Auchenorrhyncha of the Maltese Archipelago (species marked with an asterisk represent new records)

**CIXIIDAE Spinola, 1839**

- Hyalesthes obsoletus* Signoret, 1865
- Reptalus cf. panzeri* (Löw, 1883)
- Tachycixius remanei* D'Urso, 1999
- Tachycixius cf. osellai* (Dlabola, 1980)\*

**DELPHACIDAE Leach, 1815**

- Asiraca clavicornis* (Fabricius, 1794)
- Chloriona unicolor* (Herrich-Schäffer, 1835)
- Distantinus putoni* (A. Costa, 1888)
- Flastena fumipennis* (Fieber, 1866)
- Iubsoda stigmatica* (Melichar, 1897)\*
- Kelisia brucki* Fieber, 1878\*
- Kelisia ribauti* W. Wagner, 1938\*
- Kelisia sulcata* Ribaut, 1934\*
- Pseudaraeopus lethierryi* (Mulsant & Rey, 1879)
- Sogatella vibix* (Haupt, 1927)\*
- Toya obtusangula* (Linnavuori, 1957)
- Toya propinqua* (Fieber, 1866)

**MEENOPLIDAE Fieber, 1872**

- Nisia nervosa* (Motschulsky, 1863)

**DICTYOPHARIDAE Spinola, 1839**

- Dictyophara europaea* (Linnaeus, 1767)

**TETTIGOMETRIDAE Germar, 1821**

- Tettigometra atra* Hagenbach, 1822
- Tettigometra impressifrons* Mulsant & Rey, 1855\*
- Tettigometra laeta* Herrich-Schäffer, 1835\*
- Tettigometra picta* Fieber, 1865

**ISSIDAE Spinola, 1839**

- Clybeccus declivum* (Dlabola, 1986)
- Falcidius ebejeri* Gnezdilov & Wilson, 2008
- Latilica tunetana* (Matsumura, 1910)\*

**CICADIDAE Leach, 1815**

- Cicada orni* Linnaeus, 1758

**APHROPHORIDAE Amyot & Serville, 1843**

- Aphrophora alni* (Fallen, 1805)
- Philaenus spumarius* (Linnaeus, 1758)

**CICADELLIDAE Latreille, 1825**

- Anaceratagallia laevis* (Ribaut, 1935)  
*Anoscopus* gr. *albifrons* (Linnaeus, 1758)  
*Asymmetrasca decedens* (Paoli, 1932)\*  
*Austroagallia avicula* (Ribaut, 1935)  
*Austroagallia sinuata* (Mulsant & Rey, 1855)  
*Balclutha brevis* Lindberg, 1954  
*Balclutha frontalis* (Ferrari, 1882)\*  
*Balclutha punctata* (Fabricius, 1775)  
*Balclutha saltuella* (Kirschbaum, 1868)  
*Bugraia ocularis* (Mulsant & Rey, 1855)\*  
*Empoasca alsiosa* Ribaut, 1933  
*Empoasca decipiens* Paoli 1930\*  
*Eupelix cuspidata* (Fabricius, 1775)  
*Eupteryx andalusiaca* Ferrari, 1882  
*Eupteryx melissae* Curtis, 1837  
*Eupteryx salviae* Arzone & Vidano, 1994  
*Euscelis lineolatus* Brullé, 1832  
*Exitianus taeniaticeps* (Kirschbaum, 1868)\*  
*Ficocyba ficaria* (Horvath, 1897)  
*Fruticidia bisignata* (Mulsant & Rey, 1855)  
*Grypotes staurus* Ivanoff, 1885  
*Hauptidia distinguenda* (Kirschbaum, 1868)\*  
*Hauptidia lapidicola* (Vidano, 1964)  
*Hauptidia provincialis* (Ribaut, 1931)\*  
*Hecalus* sp.  
*Liguropia juniperi* (Lethierry, 1876)\*  
*Macropsis fuscula* (Zetterstedt, 1828)\*  
*Macrosteles ramosus* Ribaut, 1952\*  
*Maiestas schmidtgeni* (Wagner, 1939)\*  
*Megophthalmus scabripennis* Edwards, 1915  
*Melillaia desbrochersi* (Lethierry, 1899)\*  
*Neoliturus dubiosus* (Matsumura, 1908)\*  
*Neoliturus fenestratus* (Herrich-Schäffer, 1834)  
*Opsius lethierryi* Wagner, 1942  
*Opsius stactogalus* Fieber, 1866  
*Orosius orientalis* (Matsumura, 1914)\*  
*Psammotettix alienus* (Dahlbom, 1850)  
*Ribautiana tenerrima* (Herrich-Schäffer, 1834)\*  
*Synophropsis lauri* (Horvath, 1897)  
*Tamaricella complicata* Dworakowska, 1971  
*Tamaricella tamaricis* (Puton, 1872)  
*Zygina flammigera* (Fourcroy, 1785)  
*Zyginidia serpentina* (Matsumura, 1908)