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A review of the tribe Halyini in Turkey (Hemiptera: Heteroptera: Pentatomidae) with two new records: *Apodiphus integriceps* and *Mustha vicina*

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ABSTRACT

The tribe Halyini Amyot & Serville, 1843 (Hemiptera: Heteroptera: Pentatomidae) which has been represented in Turkey so far by 6 species from 3 genera is reviewed and identification keys, morphological figures and the distributional patterns in Turkey and Palaearctic region of the formerly determined species (*Carenoplistus acutus* (Signoret, 1880), *Apodiphus amygdali* (Germar, 1817), *Mustha spinosula* (Lefebvre, 1831), *M. longispinis* Reuter, 1890, *M. izmirensis* Memon & Ahmad, 2008) as well as of two new records (*Apodiphus integriceps* Horváth, 1888 and *Mustha vicina* Hoberlandt, 1997) are given. The possibility of introduction of *A. integriceps* to Turkey with plant saplings and thus its alien status is discussed. Previously recorded *M. incana* Stål, 1876 in Turkish Heteroptera fauna is proved to be actually *M. vicina* and therefore *M. incana* is excluded from the faunal list of the Turkish Heteroptera. Furthermore, the distribution of the tribe Halyini in Turkey was presented by ascertaining the exact identification of some species given with wrong information in previous studies.

Key words: Halyini, Pentatomidae, fauna, Turkey, new records, identification keys, morphology, distribution.

INTRODUCTION

Tribe Halyini Amyot & Serville 1843 is distributed widely in the subtropical and tropical regions of the Old World, less abundantly in the Nearctic region. In the Palaearctic region there are 51 species-group taxa belonging to 19 genera (Rider, 2006).

Up to now, *Apodiphus amygdali* (Germar, 1817) belonging to the genus *Apodiphus* Spinola, 1837, *Mustha spinosula* (Lefebvre, l831), *M. longispinis* Reuter, 1890, *M. incana* Stål, 1876 and *M. izmirensis* Memon & Ahmad, 2008 of the genus *Mustha* Amyot & Serville, 1843, and *Carenoplistus acutus* (Signoret, 1880) of the genus *Carenoplistus* Jakovlev, 1882 have been reported from Turkey as representatives of Halyini (Önder *et al*., 2006).

Fahringer (1922), Hoberlandt (1955), Linnavuori (1965), Wagner (1966), Lodos *et al*. (1978, 1998), Önder *et al*. (1983), Kıyak (1990), Fent & Aktaç (1999), and

Dursun & Kartal (2008) reported a number of records for *Apodiphus amygdali* and *Mustha spinosula* from many localities in Turkey. *Mustha longispinis* Reuter, 1890 was described from Amasya in Turkey based on single specimen and there is no other confirmed record of the species untill now (Horváth 1890; Hoberlandt 1997). The record from Ankara by Escherich (1897) cannot be accepted without revision.

Records of *M. longispinis* were given in studies of Özgen *et al*. (2005) in Southeast Anatolia and of Bolu *et al*. (2006) in East and Southeast Anatolia. However, the present examination of the material revealed that these records belong in fact to *M. vicina*. Moreover, the specimens reported as *M. incana* and *M. longispinis* by Önder *et al*. (1995; 2006) from Gaziantep were also revaluated within this study by comparing with the museum material and they were identified as *M. vicina.*

Mustha izmirensis has recently been described as a new species by Memon & Ahmad (2008) from İzmir-Bornova. However, İzmir is also the type locality of *M. spinosula*, which cause some doubts about the validity of the species, especially as Memon & Ahmad (2008) concluded that these two species are similar to each other. Unfortunatelly individuals of *M. spinosula* show certain variation and thus an extensive revision of this species within its entire distribution area is needed to clarify its status as well as the validity of *M. izmirensis*. Having no specimens of *M. izmirensis* at hand we refrain from giving more information on this species here.

The only representative of the genus *Carenoplistus*, *C. acutus*, throughout Turkey has been recorded by Önder *et al*. (1995; 2006) from Gaziantep-Ömerli and Kment & Jindra (2005) from three localities in Mardin, Adıyaman and Bitlis provinces.

MATERIAL AND METHODS

The research material consist of specimens obtained from different provinces in various geographical regions in Turkey between the years 1961–2008.

The species of Halyini are generally arboreal species and they are known to feed on fruit trees such as almond, apricot and mulberry and on forest trees such as sycamore, elm and pine. Samples were collected either by beating tray and by hand.

The distributional information is listed under four subheadings: Europe (EU), North Africa (NA), Asia (AS).

Key to the genera of Halyini of Turkey and keys to species of *Mustha* and *Apodiphus* were prepared. The localities where the specimens were collected and their former distributions both in Turkey and Palaearctic region were shown on maps (Figs. 5, 6, 7) and also known and new determined host plants and drawings showing general and diagnostic characters of the species (Figs. 1, 2, 3, 4) were given.

RESULTS

Tribus: Halyini Amyot & Serville, 1843

Key to genera of tribe Halyini

1. Antennae with 5 segments……..... 2

– Antennae with 4 segments..... *Carenoplistus* Jakovlev

2. Margins of head, pronotum and abdomen denticulated; one median furrow on the mesosternum (Fig. 4a)……..... *Mustha* Amyot & Serville

– Margins of head and abdomen not denticulated; latero-distal margins of pronotum sawtoothed. One median carina on mesosternum (Figs. 1a, 2a)..... ..... *Apodiphus* Spinola

***Apodiphus* Spinola, 1837**

Key to species of genus *Apodiphus*

1. Anterior margin of juga straight, each of jugum gradually rising laterally forming a V-shaped channel at apex (Fig. 1a); ventral margin of pygophore deeply emarginated (Fig. 1b), lateral margin of hypophysis of paramere even (Fig. 1c); body wider than that of *A. integriceps*…..... *A. amygdali* (Germar)

– Head narrower at juga, apex of jugum sinuate, longer at its inner angle than at its outer angle (Fig. 2a); ventral margin of pygophore shallowly emarginate (Fig. 2b), lateral margin of hypophysis of paramere notched (Fig. 2c); body narrower than *A. amygdali*..... *A. integriceps* Horváth

***Apodiphus amygdali* (Germar, 1817)**

General distribution: EU: Albania, Bosnia and Hercegovina, Bulgaria, Croatia, Greece, Italy, Macedonia, Yugoslavia (Serbia, Montenegro), Turkey (Europian part). **AS:** Azerbaijan, Armenia, Georgia, Iran, Iraq, Israel, Lebanon, Syria, Turkey (Asian part), Turkmenistan (Rider, 2006).

Distribution in Turkey: Adana (Saimbeyli, Seyhan-Toros: Feke), Antalya (Kemer), Eskişehir (Sarıcakaya), Artvin (Çoruh-Ardanuç, Central province), Aydın (Karacasu), Burdur (Gölhisar), Bursa (İznik), Çorum (İskilip-Saraylı), Denizli (Central province), Diyarbakır (Ergani, Lice, Central province) Edirne (Central province), Elazığ (Baskil, Central province-Hazar Lake shore, Sivrice), Gaziantep (Central province, Oğuzeli), İstanbul (Bahçeköy, Büyükada, Büyükdere, Heybeliada, Kartal), İzmir (Karaburun, Menemen, Ödemiş-Bozdağ, Urla), Kahramanmaraş (Central province), Kars (Aralık), Kilis (Central province), Malatya (Doğanşehir, Kale), Manisa (Central province-Sultanyayla), Mardin (Derik, Central province, Ömerli) Mersin (Gözne, Mut), Muğla (Köyceğiz), Şanlıurfa (Suruç), Tokat (Artova) (Horváth, 1883; Puton & Noualhier, 1895; Kiritshenko, 1918; Fahringer, 1922; Schmitschek 1944; Hoberlandt, 1955; Ghauri, 1977; Lodos *et al*., 1978, 1998; Önder *et al*., 1983, 1995; Kıyak, 1990; Özgen *et al*., 2005; Bolu, *et al*., 2006; Fent & Aktaç, 2008; Dursun & Kartal, 2008).

Material examined: Artvin-Central province, 01.VII.1970, 1 ♂; 25.V.1972, 2 ♀♀; Çanakkale-Eceabat-Kabatepe, 11.VII.2002, 2 ♀♀, 3 ♂♂; Diyarbakır-Lice, 30.VII.1977, 2 ♀♀; Silvan, 23.V.1976, 2 ♂♂; Edirne-Central province- Söğütlük, 07.IX.2001, 1 ♂; Erzincan-Central province, 04.VIII.1977, 1 ♂; Gaziantep-Central province, 01.VI.1971, 2 ♂♂; 12.VI.1971, 1 ♀; 22.IV.1977, 1 ♂; İzmir-Balçova, 15.V.1988, 1 ♂; Bornova, 16.VI.1961, 1 ♂; 04.VI.1976, 1 ♂; 03.XI.1990, 1 ♀; Gültepe, 22.IV.1977, 1 ♂; Ege Univercity Campus, 01.VIII.1985, 1 ♀; 09.VIII.1990, 1 ♂; 10.VIII.1991, 1 ♂; Buca, 15.V.1992, 3 ♀♀; Güzelbahçe, 23.IV.1993, 1 ♂; Mordoğan, 13.VIII.1976, 2 ♀♀, 2 ♂♂; 17.VIII.1976 1 ♀, 1 ♂; 17.VIII.1976, 1 ♂; Ödemiş, 23.III.19982, 1 ♂; Menderes-Özdere, 27.IX.1993, 1 ♂; Hatay-Central province, 05.VIII.1972, 1 ♂; Mardin-Nusaybin, 13.VIII.1977, 1 ♂; Tekirdağ-Central province-Hoşköy, 07.VIII.2003, 1 ♂; Oruçbeyli, 07.VIII.2003, 1 ♀; Tunceli-Central province, 03.VIII.1977, 1 ♂.

Host plants: In this study the specimens were found on *Cydonia oblonga*, *Malus* sp., *Olea europae*, *Platanus orientalis*, *Populus* sp., *Prunus amygdalus*, *P. armeniaca, P. avium, Ulmus* sp., *Quercus* sp., *Salix* sp., cruciferous plants and unidentified herbaceous plants. This species was reported also on fruit trees, maquis, *Castanea* sp., *Cupressus sempervirens, Eleagnus angustifolia, Ficus* sp., *Juglans regia, Olea* sp., *Pistacia lentiscus, Platanus* sp., *Prunus amygdalus, Prunus armeniaca, Pyrus communis, Quercus* sp., *Robinia pseudoacacia, Rubus* sp., *Solanum melongena* and *Vitis* sp. (Fahringer, 1922; Hoberlandt, 1955; Ghauri, 1977; Lodos et al., 1998; Derjanschi & Péricart, 2005; Dursun & Kartal, 2008).

Bionomic note: The species, overwintering as adults, was observed among the leaves of *Verbascum* sp. as their wintering location in this study.

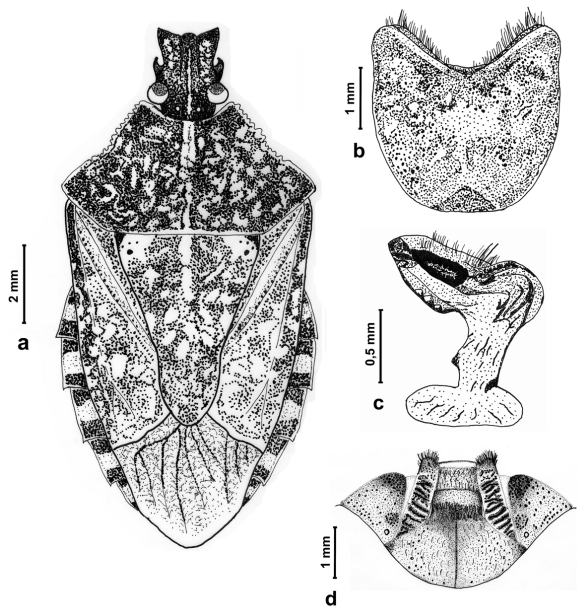

Fig. 1. *Apodiphus amygdali*: a. habitus, dorsal view; b. pygophore, ventral view; c. right paramere, lateral view; d. genital plates of female, ventral view.

Apodiphus integriceps Horváth, 1888

General distribution: AS: Afghanistan, Kazakhstan (Asian part), India, Iran, Kirgizia, Pakistan, Saudi Arabia, Syria, Tadzhikistan, Turkmenistan, Uzbekistan, Yemen (Hoberlandt, 1997). This species is recorded for Turkish fauna in the first time.

Material examined: Adana-Balcalı, 07.VII.2005, 1 ♀; **Akşehir**-Central province, 19.VII.2004, 1 ♂; **Amasya**-Central province, 11.X.2007, 1 ♀; 30.XII.2007, 1 ♀; 02.I.2008 1 ♂; 13.IV.2008, 1 ♀; 25.VI.2008, 1 ♀; 07.VIII.2008, 1 ♀; 22.VIII.2008, 1 ♂; 29.X.2008, 1 ♀; **Antalya**-Central province, 21.VIII.2003, 1 ♀; 08.VIII.2004, 1 ♀, 1 ♂; 30.VIII.2005, 1 ♀; Elmalı, 03.IX.2004, 1 ♂; **Aydın**-Central province, 05.VI.1982, 3 ♀♀, 6 ♂♂; Didim-Akyeni Village, 24.VIII.2004, 2 ♀♀; 30.VIII.2004, 1 ♀; **Diyarbakır**-Central province, 27.VII.1982, 1 ♂; 20.VII.1984, 1 ♀; **Isparta**-Central province, 06.VII.2003, 1 ♂; 04.X.2005, 1 ♂; Dere Village, 07.VII.2004, 1 ♂; Atabey, 12.X.2000, 1 ♀, 2 ♂♂; Gölcük, 17.X.2003, 1 ♀; Gönen, 12.VIII.2002, 1 ♀; **İzmir**-Central province, 01.X.1992, 1 ♂; Bornova, 08.V.1991, 2 ♀♀; 02.V.1993, 1 ♀; 23.VIII.2003, 1 ♀;

18.VII.2004, 1 ♂; 15.VII.2004, 1 ♀; 18.VII.2004, 1 ♀; Buca, 15.V.1992, 1 ♀; Çiğli-Balatçık 15.VIII.1993, 19 ♀♀, 13 ♂♂; Ege Univercity Campus, 04.IV.1993, 1 ♂; 28.IV.1993, 2 ♂♂; 22.IV.1993, 2 ♂♂; Güzelyalı, 23.IV.1990, 1 ♀; Kemeraltı, 10.V.1993, 1 ♂; **Kahramanmaraş**-Central province, 27.VI.1972, 1 ♂; **Konya**-Akşehir, 19.VIII.2004, 1 ♂.

Host plants: In this study the specimens were found on *Brassica* sp., *Cupressus* sp., *Malus* sp*., Malva* sp., *Morus alba, Olea europaea*, *Prunus persica*, *P. amygdalus, P. domestica, Punica granatum*, *Quercus* sp*., Triticum* sp., poaceous plants and unidentified herbage. Reported on fruit trees, *Malus pumila*, *M. sylvestris* and *Prunus armeniaca* by Ghauri (1977).

Bionomic note: This species was also collected on stones, in soil and inside buildings in winter period.

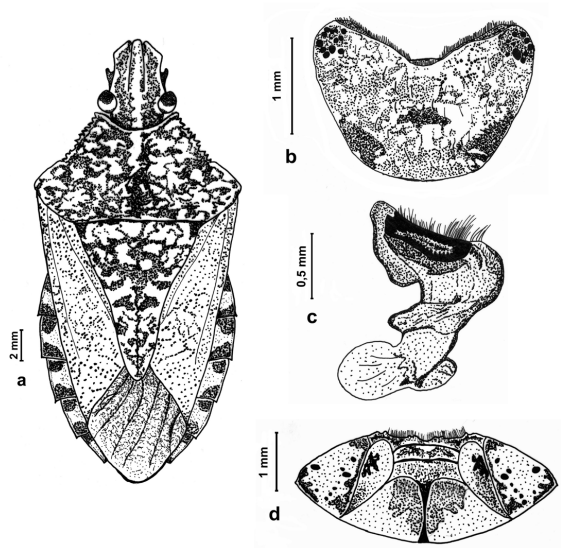

Fig. 2. *Apodiphus integriceps*: a. habitus, dorsal view; b. pygophore, ventral view; c. right paramere, lateral view; d. genital plates of female, ventral view.

Carenoplistus Jakovlev, 1882

Carenoplistus acutus (Signoret, 1880)

General distribution: AS: Afghanistan, Armenia, Azerbaijan, Iran, Pakistan, Turkey (Asian part) (Rider, 2006).

Distribution in Turkey: Mardin (Ömerli) (Önder *et al*., 1995); Mardin-Hop pass (Çınaraltı Village), Adıyaman (Nemrut Mountain), Bitlis (Kment & Jindra, 2005)

Material examined: Hakkari-Çukurca, 14.V.1976, 1 ♂; **Mardin**-Mazıdağı, 05.VI.1976, 1 ♀; Ömerli, 12.VI.1972, 1 ♀, 2 ♂♂.

Host plants: In this study the specimens were found on *Prunus armeniaca*, *Salix* sp. and unidentified herbage.

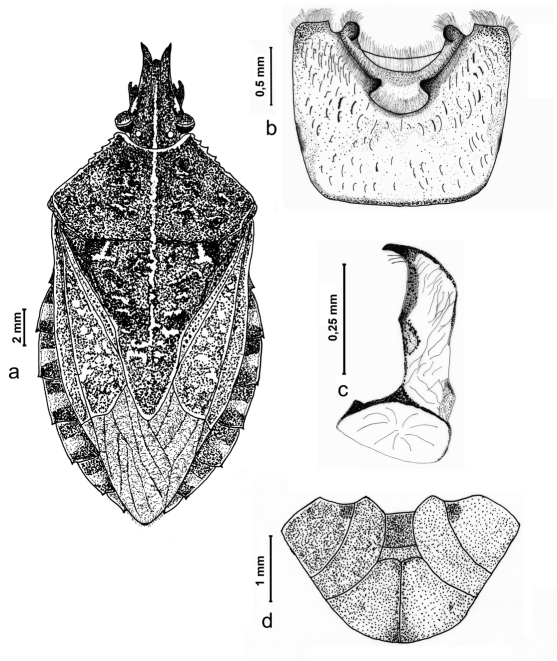

Fig. 3. *Carenoplistus acutus*: a. habitus, dorsal view; b. pygophore, ventral view; c. right paramere, lateral view; d. genital plates of female, ventral view.

Mustha Amyot & Serville, 1843

Key to species of genus *Mustha*

1. Head distinctly narrowing from its base to its apex.....2

– Head not narrowing apically, almost truncated; spines of the pronotum and of the connexivum very large, longer than the width of one eye from above (Fig. 4a) ..... *M. vicina* Hoberlandt

2. Head as long as pronotum or longer; its lateral spines rather slender and distinctly longer than those of abdomen; lateral spines of pronotum as long or longer than the transversal diameter of an eye ……..... *M. longispinis* Reuter

– Head distinctly shorter than pronotum; its lateral spines about as long as those of abdomen; lateral spines of pronotum shorter than the transversal diameter of an eye ……..... *M. spinosula* (Lefebvre)

Mustha vicina Hoberlandt, 1997

General distribution: Iran (Hoberlandt, 1997). This species is recorded for Turkish fauna in the first time.

Material examined: Gaziantep-Central province, 15.VI.1971, 4 ♂♂, 1 ♀; 13.VI.1973, 2 ♀♀; Araban-Başpınar Village, 25.IX.2001.

Host plants: *Amygdalus scoparia* (Hoberlandt, 1997; Bolu *et al*., 2006), *Pistacia vera* (Özgen *et al*., 2005).

Records given as *Mustha vicina* in the present study are actually the records of *M. incana* and *M. longispinis* reported in the study of Önder *et al*. (1995) from Gaziantep-Central province. These researchers gave no detailed information about the locality and sex of the specimens. In this study, however, after identifying both species as *M. vicina,* the missing locality and sex data for them are given above. Similarly, the specimens recorded from Şanlıurfa (Central province, Bozova-Tülmen) by Özgen *et al*. (2005), and from Diyarbakır (Çermik-Saray) Elazığ (Gezin) and Mardin (Akbağ, Yeşilli) by Bolu *et al* (2006) as *M. longispinis* reidentified as *M. vicina.*

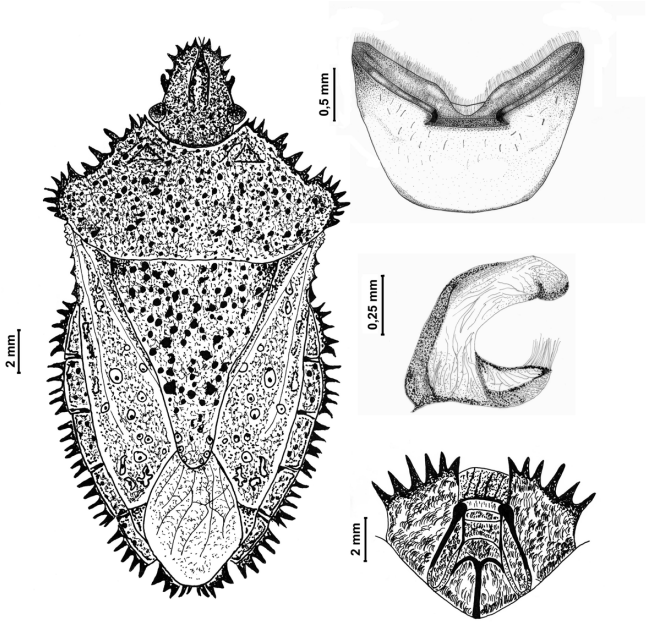

Fig. 4. *Mustha vicina*: a. habitus, dorsal view; b. pygophore, ventral view; c - left paramere, lateral view; d - genital plates of female, ventral view.

Mustha longispinis Reuter, 1890

General distribution: Turkey (Asian part) (Rider, 2006).

Distribution in Turkey: Amasya (Reuter, 1890), ?Ankara (Escherich, 1897).

Host plants: There is no data regarding the host plant of this species.

Mustha spinosula (Lefebvre, l831)

General distribution: EU: Albania, Bosnia and Hercegovina, Bulgaria, Greece, Macedonia, Russia (Caucasus), Turkey (European part). **NA:** Egypt. **AS:** Armenia, Azerbaijan, Cyprus, Georgia, Iran, Iraq, Israel, Syria, Turkey (Asian part), Turkmenistan (Rider, 2006).

Distribution in Turkey: Adana (Central province, Seyhan-Amanus), Amasya (Kale), Ankara (Bağlum, Baraj, Kızılcahamam, Central province), Antalya (Akseki, Demre, Elmalı, Güllük Mountain, Gündoğmuş, Central province, Kalediran-Gazipaşa,

Serik, Kaş), Artvin (Çoruh-Ardanuç, Central province), Aydın (Kuşadası, Nazilli, Söke), Bursa (Central province–Uludağ, Mudanya, İznik), Çanakkale (Çan, Eceabat, Gelibolu, Central province), Çorum (Ayvalı, İskilip, Osmancık-Yeni Danişment), Diyarbakır, Edirne (Central province, Keşan, Central province), Elazığ (Hazar Gölü-Fırat Üniv. Misafirhanesi, Tacer Village) Eskişehir, Gaziantep, Isparta (Eğirdir), İstanbul (Boğaziçi, Polu Çiftliği), İzmir (Bayındır, Bornova, Menemen, Central province-Yamanlar Mountain, Selçuk), Kahramanmaraş (Ahır Mountain, Gavur Mountains: Göksun), Karaman (Ermenek), Kilis (Toros-Eibes), Konya, Manisa (Central province, Kula, Sultanyayla) Mardin, Mersin (Gülek), Muğla (Bodrum, Fethiye-Seki, Central province), Muş (Dum-Kurtuk Mountain), Ordu (Fatsa-Kılıçlı), Samsun (Bafra-Başkaya, Bengü, Central province-Kurupelit Yerleşkesi), Tokat (Artova, Sulusaray, Taşlıçiftlik), Uşak (Eşme) (Horváth, 1883, 1890, 1901, 1919; Kiritshenko, 1918, 1924; Fahringer, 1922; Hoberlandt, 1955; Linnavuori, 1965; Wagner, 1966; Lodos *et al*., 1978, 1998; Kıyak, 1990; Önder *et al*., 1995; Fent & Aktaç, 2008; Dursun & Kartal, 2008).

Material examined: Antalya-Akseki, 22.VI.1981, 1 ♀; Kaş, 01.VIII.1986, 1 ♂; **Çanakkale**-Eceabat-Kabatepe, 11.VII.2002, 1 ♀; **Edirne**-Central province-Sarayiçi (Tavukormanı), 10.IX.1996, 1 ♀, 2 ♂♂; Güllapoğlu Campus, 01.VII.2007, 1 ♂; Enez, 21.VII.1994, 1 ♀, 1 ♂; Keşan (Korudağı), 13.VII.2002, 1 ♀; Uzunköprü-Sığırcılı, 26.VIII.1993, 2 ♂♂; **Hakkari**-Çukurca, 05.VI.1975, 1 ♀, 1 ♂; 16.VI.1975, 1 ♂; **Hatay**-Samandağ, 25.VI.1993, 1 ♂; 05.VII.1993, 1 ♂; **İzmir**-Bornova, 02.VI.1977, 1 ♀; 29.VI.1978, 1 ♂; 16.VI.1983, 1 ♀; Kemalpaşa, 16.VI.1992, 1 ♀; **Kırklareli**-Pınarhisar (Mahya Tepesi), 17.VII.2002, 2 ♂♂; **Muğla**-Central province, 06.VI.1973, 1 ♂; **Bodrum**-Central province, 05.VI.1973, 1 ♂.

Host plants: In this study the specimens were found on *Ceratonia ciliqua*, *Crataegus* sp., *Myrtus communis*, *Pinus* sp., *Pyrus elaeagnifolia*, *Platanus orientalis*, *Populus* sp., *Quercus* sp. and unidentified herbage. Also this species has been reported on *Cupressus pyramidalis*, *Quercus lusitanica*, (Fahringer, 1922), fruit trees (Hoberlandt, 1955), *Juniperus* sp., *Pyrus malus*, *Prunus amygdalus* (Lodos *et al*., 1998); *Acacia* sp., *Crataegus* sp., *Quercus* sp., *Prunus sp. (Derjanschi & Péricart, 2005), Cotoneaster nummularia, Crataegus monogyna, Phillyrea latifolia, Pistacia terebinthus and Quercus pubescens (Dursun & Kartal, 2008).*

***Mustha izmirensis* Memon & Ahmad, 2008**

General distribution: Turkey (Asian part).

Distribution in Turkey: İzmir-Bornova (Memon &Ahmad, 2008).

Host plant: Unknown.

DISCUSSION AND CONCLUSION

This study evaluated the material obtained by different field studies in various regions of Turkey between the years 1961 and 2008, and two new records for Turkish Halyini fauna were given. Distributional ranges of already known species were expanded with addition of new records.

Apodiphus has a distributional range from Balkan Peninsula and Italy in west to Pakistan and India in east and is represented in Eastern Mediterranean region with only a single species, *Apodiphus amygdali*. The westernmost border of *A. integriceps* is Aden located at the end of Arabian Peninsula while its eastern border is Saharanpur

Region in India (Ghauri, 1977). Our present results showed that the species has a wide distribution in Turkey from East Anatolia, South Eastern Anatolia, Central Anatolia, Central Black Sea and Mediterranean Regions and even in İzmir and Aydın in Aegean Region in the west, a pattern pointing out that the species expanded its borders. As the species has not been recorded from Europe, İzmir, located at the westernmost part of Anatolia, constitutes its western border. Our investigations during our study showed that the very first *A. integriceps* specimens in Turkey were collected in 1972 and that more specimens have recently been started to be obtained more frequently and especially in agricultural plantantion areas. Kahramanmaraş, Isparta, İzmir and Antalya, in which we found the specimens of *A. integriceps*, are the main sapling centres in Turkey and provides saplings to other parts of the country in great numbers. Because of the lack of the historical records, it is possible that *A. integriceps* was introduced to Turkey from the east with tree saplings. It is very probable that recent spread of *A. integriceps* throughout Turkey might have been fastened with transportations on these saplings. *Apodiphus amygdali*, the other species recorded in this study, is distributed in Asia, North Africa, and especially in the Balkan Peninsula in Europe (Rider, 2006). This species was also recorded from various localities in Thrace Region and Anatolia (Önder *et al*., 2006). We determined this species in both Anatolia and Turkish Thrace Region in this present study.

Mustha, represented with three species in Turkey, is known to have eight species in Palaearctic region. When one takes into consideration the distributional area of these species it is apparent that they occur generally in Asia and partially in North Africa like the species of genus *Apodiphus*. Only *Mustha spinosula,* among the species of this genus, distributes along a wide area in Europe as well as Asia and North Africa (Rider, 2006). *Mustha vicina,* recorded in this study for the first time in Turkey, has so far been known in Iran, Fars, Mian Jangal, (type locality) (Hoberlandt, 1997). The specimens collected from almond trees by Bolu *et al*. (2006) in Diyarbakır (Çermik-Saray), Elazığ (Gezin) and Mardin (Akbağ, Yeşilli) and the ones collected from pistachio by Özgen *et al*. (2005) in Şanlıurfa (Central province) and Bozova (Tülmen) was identified as *M. longispinis.* However, by recent evaluation of these specimens and personal communications with Petr Kment (Praha National Museum) revealed that they were misidentified and were indeed *M. vicina*. This is the case also for the specimens misidentified as *M. longispinis* by Lodos *et al*. (1995) from Gaziantep. This species was also recorded in Gaziantep (Central province, Araban-Başpınar Village) in this study.

Mustha longispinis, frequently confused in Turkey with *M. vicina,* is an endemic species and has a rare distribution limited to Amasya (type locality) (Horváth, 1890; Hoberlandt, 1997) and possybly Ankara (Escherich, 1897). This species could not be found throughout our present study.

Mustha incana is another species confused with *M. vicina*. This species is known from Egypt in North Africa and Sinai Peninsula, Afghanistan, Iran, Israel, Syria, and Yemen in Asia (Rider, 2006). There is no record for this species from Turkey except the one given mistakenly by Lodos *et al*. (1995).

Most significant characteristic of *M. vicina*, differing from *M. longispinis* and *M. incana*, is that its head is not narrowing apically as a triangle but instead it is truncated apically. Also, lateral spines on head, pronotum and abdomen of *M. vicina* are wide and they are longer than eye diameter. On the other hand, head of *M. longispinis* and *M. incana* is getting narrow as a triangle; the spines on head and pronotum of *M. longispinis* are rare, longer than eye diameter, thinner compared to those of *M. vicina*, but those on abdomen in the former species are rather short and teeth shaped. The spines on head and pronotum of *M. incana* are shorter than the other two species (shorter than eye diameter) and dense (Hoberlandt, 1997, Derjanschi & Péricart, 2005).

Mustha spinosula, the most prevalent species of the genus *Mustha,* has a wide distributional area especially in Caucasus, in Balkans, in North African countries and neighbouring countries of Turkey: Iraq, Iran and Syria (Rider, 2006). In Turkey, this species has been recorded both in Thrace Region and in Anatolia in a number of localities.

Carenoplistus is represented with three species in Palaearctic region and with a single species in Turkey. Among these species, *C. breviceps* Kiritshenko, 1963 and *C. karachiensis* Ahmad & Memon, 2002 distributes in Afghanistan, Tajikistan and Pakistan whereas *C. acutus* present in Turkey also shows a distribution in Afghanistan, Azerbaijan, Pakistan and Turkey's eastern neighbours, Armenia and Iran (Rider, 2006). *C. acutus*, known to exist in a narrow area in Turkey, was reported from Mardin, Adıyaman, Bitlis (Önder *et al*. 1995; Kment & Jindra, 2005) and also determined from Mardin (Mazıdağı) and Hakkari (Çukurca) in this study.

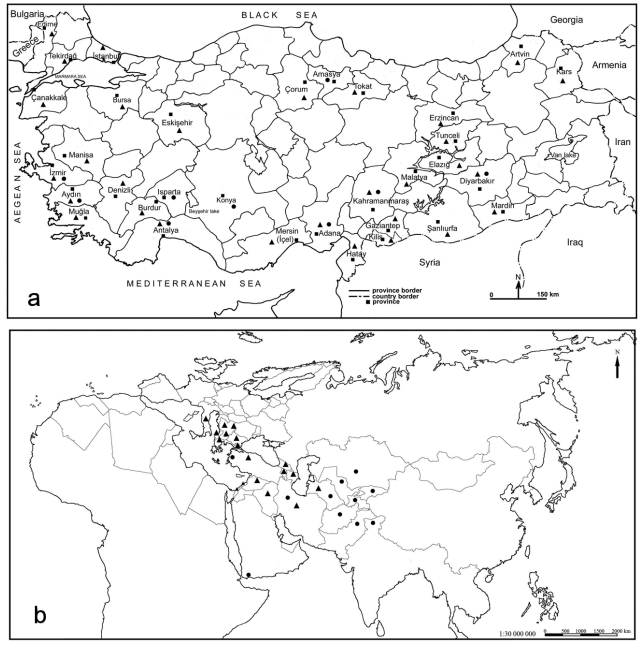

Fig. 5. Distribution of the species of *Apodiphus*: a - Turkey; b - Palaearctic; ▲ -*A. amygdali*; ● - *A. integriceps*.

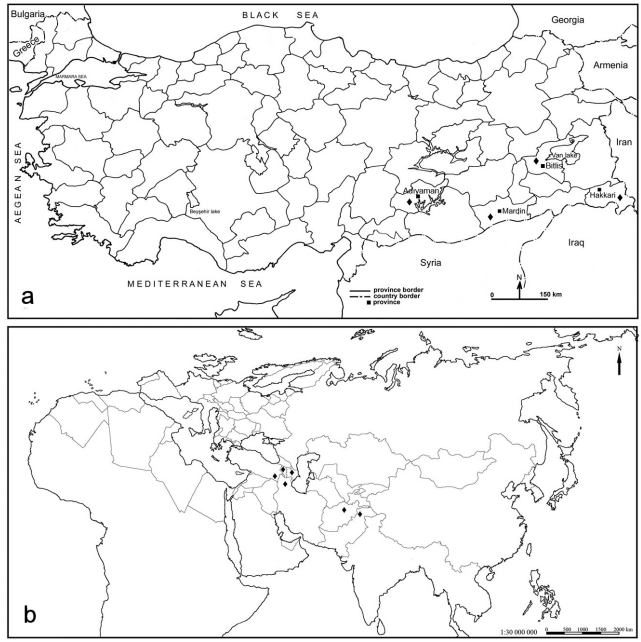

Fig. 6. Distribution of *Carenoplistus acutus*: a - Turkey; b - Palaearctic.

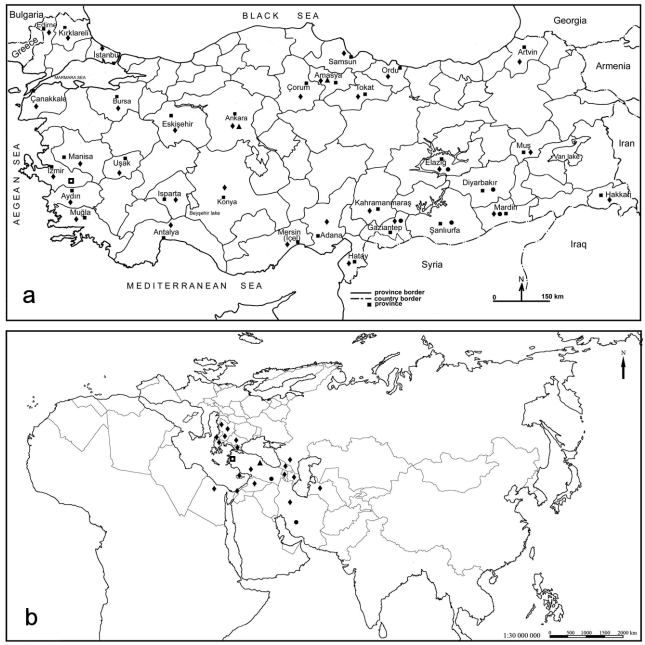

Fig. 7. Distribution of the species of *Mustha*: a - Turkey; b - Palaearctic; ▲ - *M. longispinis*; ● - *M. vicina*; ♦ - *M. spinosula*; ◘ - *M . izmirensis.*

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