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Systematic and faunistic study of the species of the tribe Carpocorini (Heteroptera: Pentatomidae: Pentatominae) in Turkey Part I: ***Holcogaster*** Fb., ***Staria*** D. & ***Cnephosa*** Jak.

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Summary

This study deals with the systematic and faunistic aspects of the tribe Carpocorini. For this purpose, all the specimens belonging to this tribe, that were collected from the different parts of Turkey and deposited in Prof. Dr. Niyazi Lodos Museum of the Department of Plant Protection, Faculty of Agriculture, University of Ege, were checked and studied. It was found that, in Turkey, this tribe consists of 14 genera. These genera consist of 37 species.

Identification keys for these species as well as the genera of Carpocorini were prepared. Information about synonyms, description, distribution, host plants, occurrence and some biological notes for each species are presented. Detailed diagrams for the main diagnostic features are given. Maps of Turkey showing the distribution of each species are also provided.

This work will be presented in a series of publications. This paper covers the introduction, material and methods, key to the genera of Carpocorini and information about the species of the genera: ***Holcogaster***, ***Staria*** and ***Cnephosa***. The following papers will cover the rest of the genera that will be presented according to their arrangement in the key to the genera of Carpocorini.

Key words: Turkey, ***Holcogaster***, ***Staria***, ***Cnephosa***, Heteroptera, Pentatomidae

Anahtar sözcükler: Türkiye, ***Holcogaster***, ***Staria***, ***Cnephosa***, Heteroptera, Pentatomidae

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Introduction

The unique geographical position of Turkey as a bridge between Europe and Asia has resulted in variety of ecological and environmental conditions that have helped this country to aquire a very rich and diverse flora and fauna. This richness has captured the attention of both Turkish and foreign scientists long time ago.

Among the different insects fauna of Turkey, the heteropterous fauna has recieved much attention and considered as relatively known compared with neighbouring areas in the Middle East.

In comparison with other groups of Heteroptera, the Turkish Pentatomoidea has been keenly studied. In earlier studies, Fairmaire (1866), Puton (1892), Hoberlandt (1955), Seidenstücker (1957, 1958, 1960), Wagner (1959, 1966) and Linnavuori (1965) presented some faunistic records of the Turkish Pentatomoidea.

Recently comprehensive studies were carried out by Lodos & Önder (1978 b) on Plataspidae; Lodos & Önder (1979) on Acanthosomatidae; Lodos & Önder (1980) on Cydnidae; Abbas & Önder (1991) on Scutelleridae; Awel (1977), Lodos et al., (1978), Lodos & Önder (1978 a, 1983) on Pentatomidae. The most recent study of the Turkish Pentatomoidea was presented by Lodos et al., (1998). Yet, some groups were relatively less studied among these is the tribe Carpocorini. With exception of few scattered taxonomic, systematic and faunistic records, there is few published information about the species of Carpocorini of Turkey. The scarcity of studies on this group is due to the insufficiency of worldwide literature of this group. Moreover, the available references are in languages other than English especially in Italian, French, German, Russian and Spanish. In addition, the species of the main genera of Carpocorini, specially, ***Carpocoris*** Kol. and ***Codophila*** M.-R., are morphologically very simillar and can not be identified by morphological characters. Thus, their identification is very difficult and time consuming because the main reliable diagnostic character adopted is the male genitalia which should be dissected to identify its various parts specially the parameres.

Since the systematic aspects of the Carpocorini of Turkey has not yet received sufficient attention, it seems justifiable that any contribution to highlight and elucidate the different systematic aspects of this group will be of great value specially when providing effective, uptodate and simple identification keys to meet the need of an ever-increasing flow of unidentified materials of this group not only from different parts of Turkey but also from the four corners of the globe.

In the persent study, key for the genera and their various species of the Turkish Carpocorini is provided. In addition, general descriptions of the species of each genus are presented. Over and above, detailed synonyms, general distribution, distribution in Turkey, host plants, occurrence and some biological notes of each species are presented.

Materials and Methods

Most of the materials studied were collected from different parts of Turkey by the scientists of the Department of Plant Protection, Faculty of Agriculture, University of Ege, Bornova, İzmir, Turkey. These specimens have been presented in "Prof. Dr. Niyazi Lodos Museum" of the same department. In addition to other materials sent from different parts of Turkey for identification.

For preparation of the keys for the different taxa, we benefited from the keys presented by Tamanini (1959), Stichel (1961), Kerzhner & Yachevskii (1964), Puchkov (1965), de la Fuente (1972), Ghauri & Önder (1980) and Derzhansky (1990). For synonyms we used the synonyms presented by Stichel (1961) and by de la Fuente (1972).

For studying the male genitalia, the pygophore was removed from the male abdomen with insect pins under the microscope. After examination and drawing, the pygophore was glued with adult specimen. Another pygophore was kept overnight in 10% KOH solution then dissected under the microscope and the parameres were detached using insect pins. After examination and drawing, the parameres were either glued with another complete pygophore or placed in microvial with a drop of glycerine and pinned with the specimen.

For microscopic examination of the insect specimens and genitalia (X100) SMXX model Carl Zeiss Jena Stereoscopic binocular microscope was used. For drawings, L-type Jena Camera lucida was used.

To complete the picture of the faunistic position of the tribe Carpocorini in Turkey, previous faunistic records as well as localities of the studied materials in this work, are given together in maps of Turkey. Data from literature is shown as empty circles, squares, triangles etc., while data from the studied materials is shown as filled circles, squares, triangles etc.

For illustrating the terms of morphological characteristics of the members of the tribe Carpocorini, labeled diagram showing these features is also provided (Figure 1).

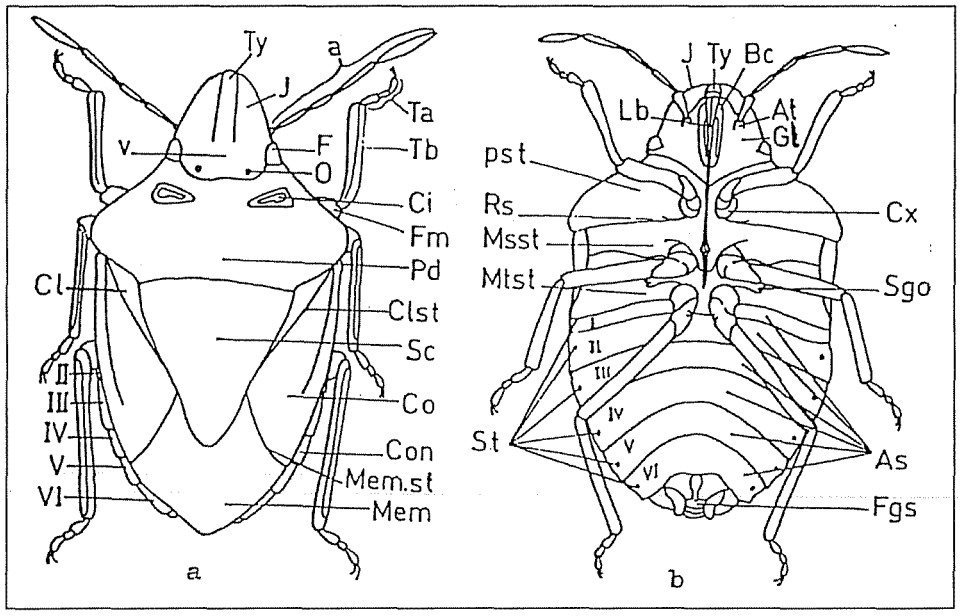

Figure 1. General characteristics of the species of the tribe Carpocorini. eg. ***Holcostethus vernalis*** (a, dorsal; b, ventral) (After Ghauri & Önder, 1980). a, antenna; As, abdominal segments; At, antenniferous; Bc, buccula; Ci, cicartice; Cl, clavus; clst, claval suture; Co, corium; Con, connexivum; Cx, coxa; F, compound eye; Fgs, female genital segment; Fm, femur; Gl, gula; J, jugum; Lb, labrum; Mem, membrane; Mam. st, membranal suture; Msst, mesosternum; Mtst, metasternum; O, ocellus; Pd, pronotal disc; pst, prosternum; Rs, rostrum; Sc, scutellum; Sgo, scent gland orifice; St, stigmata; Ta, tarsus; Tb, tibia; Ty, tylus; V, vertex.

Results

Keys to the genera of Carpocorini and the detailed information on taxa were given below.

Keys to the genera of Carpocorini

1. Venter with medial lengthwise furrow.....***Holcogaster*** Fb.
 - Venter without medial lengthwise furrow.....2
2. 2nd antennal segment not or just little longer than 3rd segment.....3
 - 2nd antennal segment 1.3x-1.5x or more as long as 3rd antennal segment.....8
3. Anterior margin of prosternum with leaflike appendage (Fig. 2a).....4
 - Anterior margin of prosternum without leaflike appendage (Fig. 2b).....5
4. Rostrum reaching 2nd abdominal sternum.....***Staria*** D.
 - Rostrum not reachig 2nd abdominal sternum.....***Cnephosa*** Jak.
5. Genal plates converging anterior to clypeus, but not contiguous (a thin slit remains between them) (Fig. 2e).....***Rubiconia*** D.
 - Genal plates usually not converging anterior to clypeus, if converge they are contiguous and no slit between them (***Holcostethus***) (Fig. 2f, g).....6
6. Subcoxa with black spot.....***Holcostethus*** Fb.
 - Subcoxa without black spot.....7
7. 4th antennal segment 1.5x as long as 2nd segment.....***Risibia*** Hv.
 - 4th antennal segment just little longer than 2nd segment, never 1.5x as long as 2nd segment .....***Palomena*** M.-R.

8. Rostrum reaching or towering the mid coxae..... ....***Brachynema*** M.-R.
- Rostrum reaching at least hindcoxa.....9
9. Rostrum reaching 2nd or 3rd sternum.....10
- Rostrum towering above hindcoxa.....12
10. Head laterally slightly bayed, genal plates distally rounded..... 11
- Head laterally with large bay, genal plates distally pointed..... ***Chroantha*** Stal.
11. Distal margins of pronotum deeply bayed, distal corners with clearly visible blunt tooth (Fig. 2c)..... ***Rhombocoris*** Mayr
- Distal margins of pronotum slightly bayed, distal corners with unclearly visible blunt tooth (Fig. 2d)..... ***Pitedia*** Rt.
12. Buccula very broad extending to fore coxae.....***Agatharchus*** Stal.
- Buccula normal not extending to forecoxae.....13
13. Opening of scent gland continued in a long groove on an outword descending ridge (Fig. 2h)..... ***Carpocoris*** Kol.
- Opening of scent gland with as hort groove (Fig. 2i, j).....14
14. 3rd or 5th antennal segments uniformly black or light with no white base, body bare, rearly pubescent..... ***Codophila*** M.-R.
- 3rd to 5th antennal segments black with white base, head, pronotum and scutellum with long vertical hairs.....***Dolycoris*** M.-R.

Genus: *Holcogaster* Fieb., 1860

Holcogaster Fieber, 1860. Die Europaischen Hemiptera, pag. 80, 1861, op. cit., pag. 337 (Type species: ***Pentatoma fibulatum*** Germar, 1831).

Syn.: ***Aulacetrus*** Mulsant & Rey, 1866.

H. exilis Horvath, 1903

General description: Head proximally with 2 black spots, clypeus with dense black pores, distally whitishyellow, genal plates proximally with reddish yellow spots. Antennae black, 3rd. segment 1.5-1.6x as long as the 2nd and about 1.0x as long as the 4th, the 5th segment little shorter than the fourth. Lateral borders of pronotum thin and reddish yellow, lateral angles with margin of dense black pores. Scutellum proximally with several black spots, distal angle whitish. Corium latro-proximally with a thin reddish margin, membrane light grey, anal angle with dark spot. Dorsum black. Connexiva proximally black, distally yellow grey. Rostum yellowish, distally black reaching the 5th sternum. Legs light yellowish or yellowish green. Venter yellowish grey with black pores. Length 4.9-6.6 mm.

General distribution: Algeria, Balear Islands, Cyprus, Greece, Morocco, Tunisia, Turkey, Yugoslavia (Seidenstücker, 1957; Stichel, 1961; Linnavuori, 1965).

Distribution in Turkey: Adana (Pozantı), Antalya (Demre, Korkuteli, Saklıkent), Çorum (Kargı), Eskişehir (Mihalıççık, Sarıcakaya), Hatay (Harbiye), İçel (Anamur, Gözne), Kahramanmaraş (Andırın), Karaman (Ermenek), Sinop (Boyabat) (Seidentücker, 1957; Linnavuori, 1965; Lodos et al., 1998).

Material studied: Adana (Kozan), Amasya, Antalya (Demre, Gündoğmuş, Korkuteli, Saklıkent), Balıkesir (Sındırgı), Burdur, Çanakkale (Ezine), Çorum (Kargı), Eskişehir (Mihalıççık, Sarıcakaya), Hatay (Harbiye), İçel (Anamur), İzmir (Bornova, Torbalı, Urla, Yamanlar), Kahramanmaraş (Andırın), Kırklareli (Lüleburgaz), Manisa

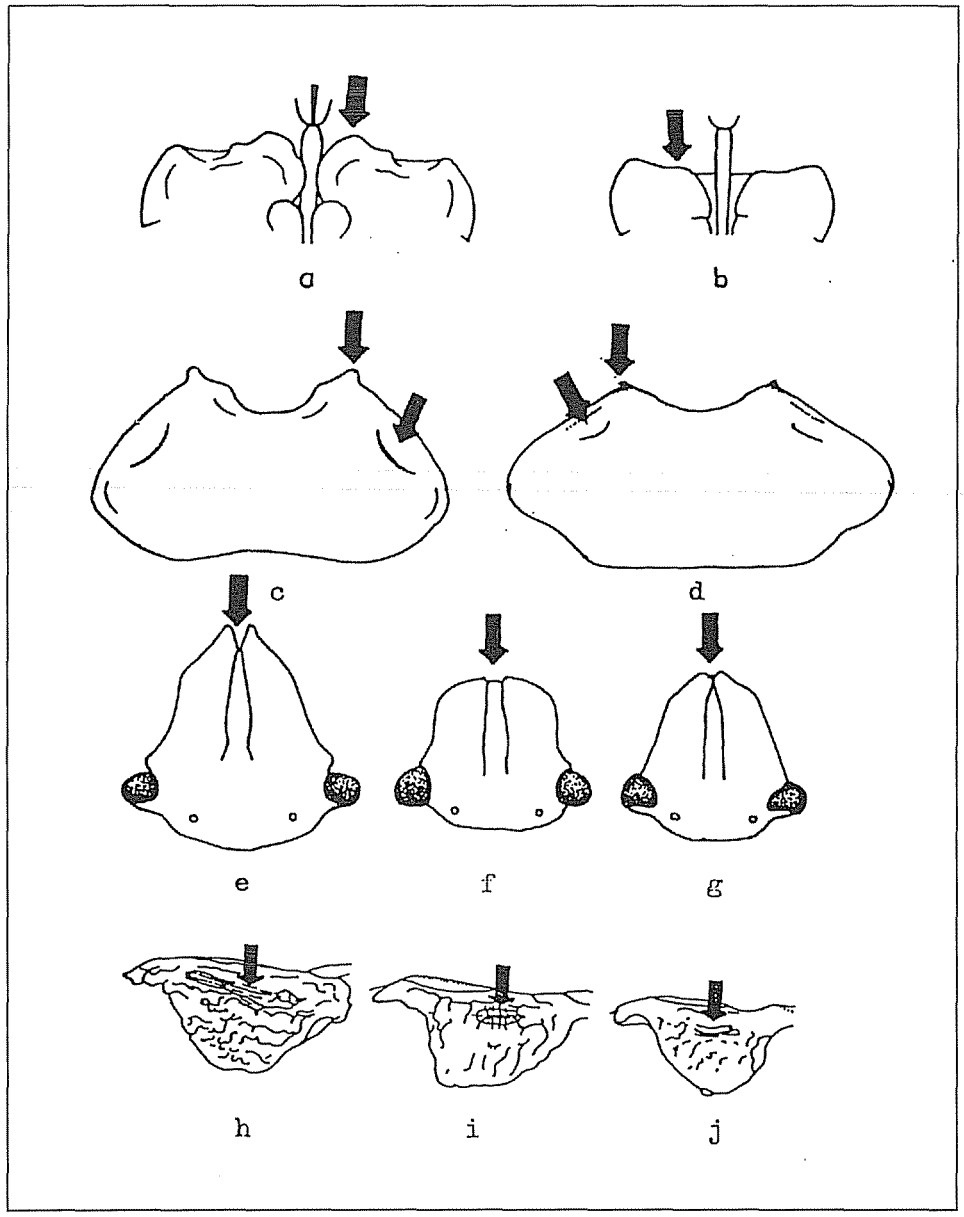

Figure 2. Morphological characters presented in the keys of the genera of Carpocorini. Anterior margin of prosternum with a, leaflike appendage; b, without leaflike appendage; pronotum of: c, ***Rhombocoris***; d, ***Pitedia***; e, f and g: genal plate and clypeus; openings of scent glands of h, ***Carpocoris***; i, ***Codophila***; j, ***Dolycoris***.

(Akhisar), Muğla (Fethiye, Milas), Sakarya (Sapanca), Sinop (Boyabat), Sivas (Suşehri), Tekirdağ (Şarköy). 122 specimens. The distribution of this species is presented in Figure 3.

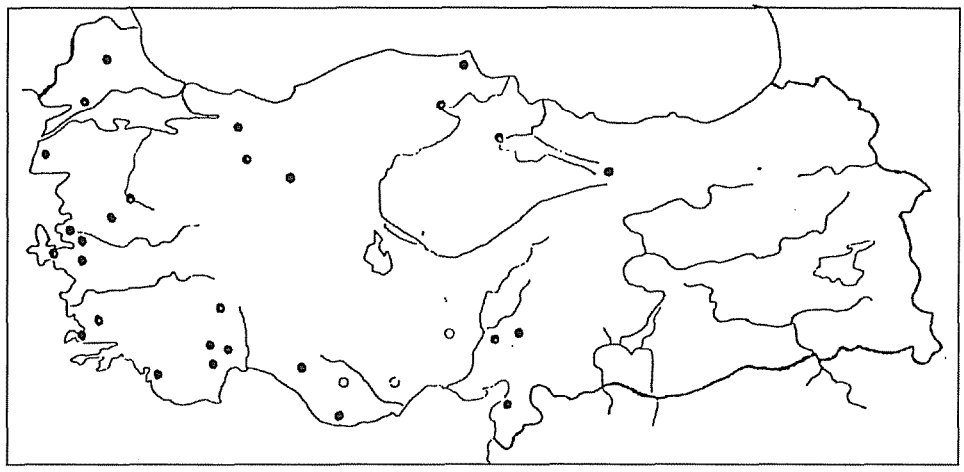

Figure 3. Map of Turkey showing the distribution of ***Holcogaster exilis***. Material studied ●, from literature o.

Occurrence: Nearly common.

Host plants: ***Cedrus*** sp., ***Cupressus*** sp., ***Juniperus excelsa***, ***J. phoenica***, ***Nicotiana tabacum*** and ***Pinus*** sp. (Seidenstücker 1957; Stichel, 1961; Linnavuori, 1965; Lodos et al., 1978; Lodos et al., 1998).

Biological note: Adults were collected from the mid of April up to the beginning of December. They were taken from ***Arbutus chamomilla***, ***A. unedo***, ***Cedrus*** sp., ***Cirsium*** sp., ***Cupressus*** sp., ***Juniperus*** sp., ***Medicago sativa***, ***Pinus*** sp., ***Poterium*** sp., ***Quercus*** sp., ***Thuja*** sp. and weeds.

Genus: *Staria* Dohran, 1860

Staria Dohrn, 1860. Hemipterologische Miscellaneen. In Stettin. Ent. Ztg., t. XXI, pag. 101 (Type species: ***Eysarcoris lunatus*** Hahn, 1834. Monotipico).

Staria lunata (Hahn, 1834)

Eysarcoris lunatus Hahn, 1834. Dic wanzenartigen Insecten, t. II, pag.127.

Syn.: ***Pentatoma impressum*** Herrich & Schaeffer, 1835; ***Cimex lobulatus*** Rambur, 1842.

General description: Body hairy, yellowish brown with black punctures. Head laterally with flat extended farrow, genal plates distally rather broad and rounded. Antennae light yellowish brown 1st, 2nd and 3rd antennal segments redbrown. Anterior margin of prosternum with clear leaf-like projection. Pronotum distally with 2 obvious yellow spots. Scutellum as long as broad, latro-proximally and medio-proximally with conspicious yellow spots. Rostrum light yellow, dorsally with dark-brown lengthwise line, distally dark brown or black, extending to the distal margin of metasternum. Legs light yellow or dark brown

with black dots, femora ventrally with 2 large spots as aggregation of small black dots. Venter light yellow with spreading black dots. Stigma black. Length 7.0-7.5 mm.

General distribution: Albania, Algeria, Austria, Bulgaria, Caucasia, Corsica, Cyprus, Czech Republic, Germany, Greece, Greenland, Hungary, Iran, Israel, Italy, Morocco, Portugal, Romania, Sicily, Slovakia, South France, South Russia, Spain, Switzerland, Transcaucasia, Turkey, Yugoslavia (Hoberlandt, 1955; Wagner, 1959; Stichel, 1961; Linnavuori, 1965).

Distribution in Turkey: Adana (Karatepe, Seyhan), Antalya (Alanya, Olympos Mountain, Gazipaşa, Gündoğmuş, Kaş, Sinekçibeli 1545 m.), Bartın (Kurucaşile), Bilecik, Bolu, Bursa (Uludağ), Çankırı (Çerkeş), Düzce, Gaziantep, Hatay (Antakya, Akbez-Hassa, Belen), İçel (Gülnar, Kırobası 1100 m., Mut, Silifke), Kahramanmaraş (Andırın), Mardin (Kızıltepe), Osmaniye (Düziçi, Kadirli) (Hoberlandt, 1955; Wagner, 1959; Linnavuori, 1965; Önder et al., 1995).

Material studied: Adana (Gezbeli, Karatepe, Kozan), Afyon (Şuhut), Antalya (Kaş, Sinekçibeli), Aydın (Germencik, Kuşadası), Balıkesir (Erdek), Bartın (Kurucaşile), Bilecik (Söğüt), Bolu, Bursa (Mudanya), Çanakkale (Biga, Eceabat, Gelibolu, Gökçeada), Çankırı (Çerkeş), Düzce, Hatay (Antakya, Samandağı), İçel (Mut, Silifke), İstanbul (Küçükçekmece), İzmir (Bergama, Beydağ, Bornova, Çeşme, Efes, Kınık, Selçuk), Kars (Kağızman), Manisa (Demirköprü), Muğla (Bodrum, Marmaris), Osmaniye (Kadirli), Tekirdağ. 80 specimens. The distribution of this species is presented in Figure 4.

Occurrence: Nearly common.

Host plants: ***Achillea nobilis***, ***Centaurea iberica***, ***C. jacea***, ***Galium*** sp., ***Glechoma hederacea***, ***Juniperus*** sp., ***Phloemis*** sp., ***Salvia*** sp.,

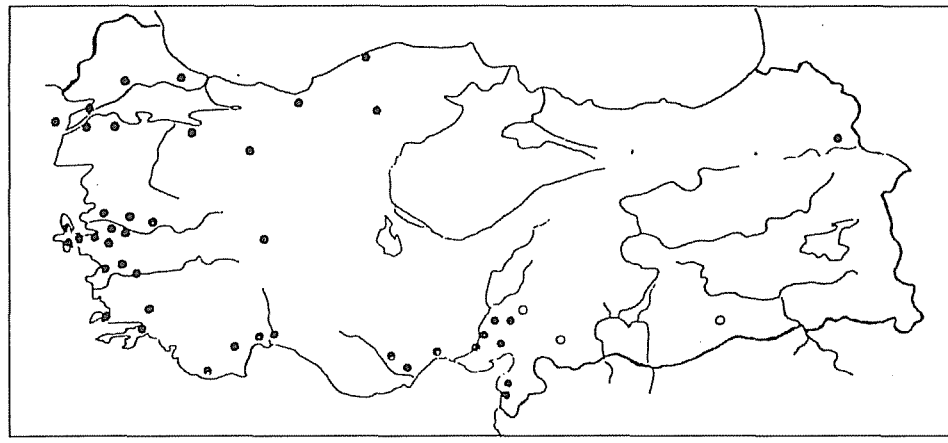

Figure 4. Map of Turkey showing the distribution of ***Staria lunata***. Material studied ●, from literature ○.

Scrophularia scopolii, ***Styrax*** sp., ***Thymus chamaedrys***, ***T. serpyllum***, ***Triticum sativa***, ***Verbascum glomeratum***, umbelliferous plants, different species of weeds and from soil (Wagner, 1959; Stichel, 1961; Önder et al., 1995).

Biological note: Adults were collected from the mid of April up to the first week of September. They were taken from ***Cirsium*** sp., ***Medicago sativa***, ***Nicotiana tabacum***, ***Paliurus orientalis***, ***Phloemis*** sp., ***Pinus*** sp., ***Plantago*** sp., ***Poterium*** sp., ***Styrax*** sp., ***Trifolium*** sp., ***Triticum*** sp., ***Verbascum*** sp. and weeds.

Genus: *Cnephosa* Jakovlev, 1880

Type Species: ***Cnephosa flavomarginata*** Jak., 1880. Trudi Russ. Ent. Ob., V. 11(1878-80), p. 221.

Cnephosa flavomarginata Jakovlev, 1880

General description: Black, dark brown with whitish hairs. Head black with yellowish median stripe. Antennae black. Pronotum black with thin yellowish lateral margins. Scutellum black, medio-proximally with small smooth yellow spot. Corium with yellow margin. Legs black. Venter yellow. Stigma black. Length 12.5-14.5 mm.

General distribution: Armenia, Caucasia, Iran, Transcaucasia, Turkey (Hoberlandt 1954, 1955, 1995; Stichel, 1961; Puchkov, 1965).

Distribution in Turkey: Kahramanmaraş (Göksun 1340 m.), Kars (Sarıbaba), Muş (Derebasançay), Niğde (Çamardı), Zonguldak (Ereğli) (Hoberlandt, 1955; Wagner, 1959; Lodos et al., 1998).

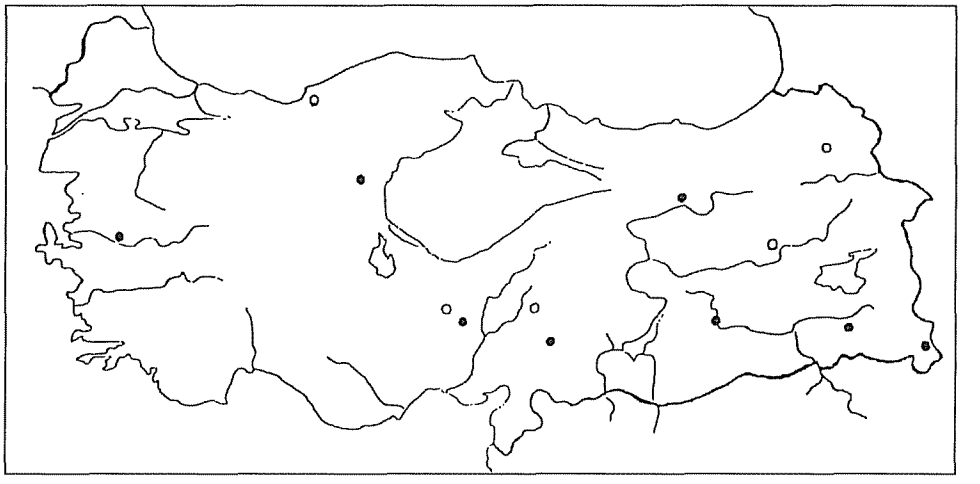

Figure 5. Map of Turkey showing the distribution of ***Cnephosa flavomarginata.*** Material studied •, from literature o.

Material studied: Ankara, Diyarbakır, Erzincan, Hakkari (Şemdinli), Kahramanmaraş (Göksun 1340 m.), Manisa (Mermere), Niğde (Çamardı), Şırnak (Beytülşebap). 11 specimens. The distribution of this species is presented in Figure 5.

Occurrence: Very occasionally.

Host plants: ***Astragalus*** sp. (Lodos et al., 1998).

Biological note: Adults were collected from the first week of June up to the mid of September. They were taken from ***Astragalus*** sp., ***Euphorbia*** sp. and weeds.

Özet

Türkiye Carpocorini (Heteroptera: Pentatomidae: Pentatominae) tribus'u türleri üzerinde sistematik ve faunistik çalışmalar
Kısım I: *Holcogaster* **Fb.,** *Staria* **D.** & *Cnephosa* **Jak.**

Bu çalışmada, tanılarında her zaman güçlük çekilen ve üzerinde yeterince çalışma yapılmamış olan Carpocorini tribusuna bağlı türlerin tanılarının yapılması, tür tanı anahtarlarının verilmesi, yayılışlarının belirlenmesi ve konukçularıyla üzerinden toplandığı bitkilerin saptanması amaçlanmıştır. Bunun için E. Ü. Ziraat Fakültesi Bitki Koruma Bölümü Entomoloji Anabilim Dalı, Prof. Dr. Niyazi Lodos Müzesinde bulunan ve Türkiye'nin hemen hemen her tarafından toplanmış olan örnekler incelenmiştir.

Çalışma sonucunda, Türkiye'de bu tribusa bağlı 14 cins içinde yer alan 37 tür saptanmıştır. Bu türlerin sinonimleri, tanımları, yayılışları ve konukçuları ile üzerinden toplandığı bitkiler incelenerek cins ve tür tanı anahtarları verilmiştir. İncelenen türlerin tanılarında önemli olan karakterlerin şekilleri çizilmiş, ayrıca türlerin Türkiye'deki yayılışları haritalar üzerinde gösterilmiştir.

Kısımlar halinde hazırlanan bu serinin ilk kısmını oluşturan bu çalışmada, materyal ve metoda ek olarak Carpocorini tribus'unun cinsler anahtarı verilmiş ve daha sonra da ***Holcogaster***, ***Staria*** ve ***Cnephosa*** cinslerine bağlı toplam 3 tür incelenmiştir.

Acknowledgements

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