

Systematical studies on the some *Bruchus* species from Mediterranean Region of Turkey (Coleoptera, Bruchidae)*

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Summary

In this study which comprises *Bruchus signaticornis*, *B. ulicis*, *B. tristis*, *B. tristiculus*, *B. atomarius* of the genus *Bruchus* were taxonomically studied.

The detailed body morphologies and distribution of them were given. And also the median lobe, internal sac and lateral lobe of these species were illustrated and described.

Introduction

In the Palaearctic region, the *Bruchus* L. (Coleoptera, Bruchidae) which is the second largest genus in the family after the *Bruchidus* is known with their damages to leguminous plants. The taxonomic studies on this genus which made by Herford (1935), Hoffmann (1945), Lukjanovitch and Ter-Minassian (1957), Calderon (1962) and Singh (1979) were limited by external morphologies. The only study that includes the male genitalia on Poland Bruchidies done by Borowiec (1988). In that study the structure of the median and lateral lobe were

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shown but the distribution of the armature sclerites were not given fully. In Türkiye this genus were not taxonomically worked except the study by Mergen and Çağatay (1990, 1996). Distributions, host plants and short biologies were given in the studies done by Zampetti (1981, 1984), Borowiec (1984) and Decelle and Lodos (1989). In this paper, it was aimed solving the problems which were appeared in the determinations based on the external characters, so added to the morphology the male genitalia of five species were examined and taxonomic significance were discussed with the figures.

Material and Method

The studied material were collected from Mediterranean region of Türkiye. For the study of male genitalia the technique and terminology follows that proposed by Kingsolver (1970).

Results

Bruchus tristis Boheman, 1833

Male

Body black; head short and broad, densely punctulate; 1 to 5 antennal segments reddish, remaining segments black, antenna reaching almost to humerus (Fig. 6); prothorax about 1.5 times as broad as long, with a strong lateral tooth, situated just anterior to medial, sides before lateral tooth evenly curved, disk convex with sparse yellowish hairs; elytra about 0.25 times as long as broad, with slightly convex lateral margin, stria deep, punctate, dorsal surface with sparse yellow-whitish hairs, humerus slight (Fig. 1); first legs, second tibiae and tarsi reddish, remaining segments and third legs black, second tibiae with blunt internal tooth just anterior to sharp and small terminal tooth (Fig. 11); third femur with a conspicuous distal tooth, mucro about 0.3 times longer than lateral cronal denticle (Fig. 16); last sternit emarginate; pygidium black without hairs; 3-4.2 mm in length.

Male genitalia - Median lobe about seven or eight times as long as width at middle, slightly narrowing to distal, round at apex; in ventral view, ventral valve convex on lateral margin with round apical part, base 0.8 times as broad as apical of median lobe, slightly curved in lateral view; internal sac with denticle shaped sclerites, medio-apical ones forming two short and parallel denticle-like mess, while other denticles

sparsly scattered on main body besides there is a mass of plumose spines-like mess sclerits at apex (Fig. 21); lateral lobes broad, parellel sides on lateral margin, slightly expanded at apex, velum with short and fine setae, apical 0.3 of inner sides moderatelly dense convered with short hairs, cleft to about 0.5 their length (Fig. 22).

Female

Similar to the male except basal margin of antennal segment six brown to black, second tibiae without tooth at inner margin, last abdominal sternit not emarginate.

Material examined: Burdur (Çeltikci), 26.VI.1993, 1 male 1 female, (Kızılkaya), 26.VI.1993, 2 males, (Göhlhisar), 25.V.1994, 1 female, Hatay (Kırıkhan), 23.VI.1992, 2 males 2 females, (Hassa), 24.VI.1992, 3 males, (Altınözü), 24.VI.1992, 1 female, (Samandağ), 25.VI.1992, 3 females, (İskenderun), 6.VI.1993, 1 male 1 female, Isparta (Uluborlu), 2.VII.1992, 1 male 2 females, (Sütlüce), 30.VI.1992, 3 males 1 female (Yalvaç), 1.VII.1992, 2 males, 25.VI.1993, 3 females, (Şarkikaraağaç), 25.VI.1993, 2 males 1 female, İçel (Çamlıyayla), 4.V.1994 2 males.

Bruchus tristriculus Fahraeus, 1839

Syn. ***Bruchus gyllenhali*** Hochhut 1847

Male

Body black; head broad, densely punctulate; posterior margin of eye protruding; 1 to 4 antennal segments orange, remaining black (Fig. 7); prothorax about twice as long as broad with a small lateral tooth situated medially, sides behind it concave, disk slightly convex with sparse light brown hairs; elytra about 0.20 times as long as broad with slightly convex lateral margin, dorsal surface almost flat, covered with dull brown hairs except small greyish patches (Fig. 2); first legs and second tarsi reddish, remaining segments and third legs black, second tibiae with small preapical tooth just anterior to sharp terminal tooth (Fig. 12), third femur with medium sized tooth distally, tibiae straight, with three carina, mucro as long as coronal denticle (Fig. 17); last sternit emarginate; pygidium with sparse greyish hairs without patches; 2.5-4 mm in length.

Male genitalia - Median lobe about eight or nine times as long as width at middle, proximally and anteriorly narrowed; in ventral view, ventral valve straight on lateral margins, with acute apex, base nearly as broad as apical of median lobe, straight in lateral view; sclerites of

internal sac denticle shaped, medio-apical ones forming triangle-shaped two mass while other denticle lining sac from distal to about base (Fig. 23); lateral lobe rather broad, straight on lateral margin, acute at apex, apex with very dense setae, velum distinct, apical 0.30 of inner side densely covered with long hairs, cleft to about 0.40 their length (Fig. 24).

Female

Similar to the male except second tibiae without tooth at inner margin, last abdominal sternit not emarginate.

Material examined: Adana (Bahçe), 12.V.1993, 1 male 2 females, (Kozan), 21.IV.1994, 2 males; Antalya (Elmalı), 28.IV.1994, 2 females; Burdur (Bucak), 26.VI.1994, 2 males 1 female (Ağlasun), 26.V.1994, 2 males 2 females; Hatay (Yayladağ), 24.VI.1992, 2 females, (Reyhanlı), 24.VI.1992, 1 male, Isparta (Senirkent), 2.VII.1992, 1 female, (Gelendost), 25.VI.1993, 2 males, İçel (Çamlıyayla), 4.V.1994, 1 male.

Bruchus signaticornis Gylenhall, 1833

Syn. ***Bruchus pallidicornis*** Boheman, 1833

Bruchus ruficornis Allard, 1868

Male

Body and head black to dark brown; head short and broad, densely punctulate; eyes prominent, not sexually dimorphic, incised to 1/3 length; antennae red-orange (Fig. 8); pronotum about twice as broad as long, with a small and sharp lateral tooth, situated just anterior to medial, disk moderately convex, with many coarse punctures; elytra about 0.25 times as long as broad, with dark brown pubescence, dorsal surface with medial longitudinal bands made of whitish hairs and white oblique band in the anterior half, humerus slight (Fig. 3); first legs reddish-brown, tibiae nearly as broad as the femur flattened and with outer edge convex, second legs black excepting tarsus and tibiae with apical part, tibiae with a pre-apical lamella just anterior to terminal tooth (Fig. 13), third legs black, femur with a strong, acute distal tooth, tibiae with three carinae, antero-lateral carinae absent, mucro as long as lateral cronal denticle (Fig. 18); last abdominal sternum slightly emarginate; pygidium with whitish hairs and two patches of dark hairs; 2.8-4.0 mm in length.

Male genitalia-Median lobe about seven or eight times as long as width at middle, just anterior to medially narrowed; in ventral view,

ventral valve slightly convex on lateral margins, with acute apex, base nearly as broad as apical of median lobe, slightly curved in lateral view; sclerits of median lobe spines shaped, medio-apical ones forming about triangle-shaped two rows while other spines lining sac from distal to base (Fig. 25); lateral lobe parallel sides from proximally to apical, rounded at apex, velum with dense setae, cleft to about 0.40 their length (Fig. 26).

Female

Similar to the male except basal four and 11th antennal segments reddish, remaining black, first tibiae slightly expanded, second tibiae without lamella and tooth at inner margin, last abdominal sternit not emarginate.

Material examined: Adana (Osmaniye), 11.V.1993, 2 males, (Kozan), 21.IV.1994, 1 male 1 female, Antalya (Manavgat), 30.IV.1994, 2 females, (Elmalı), 28.IV.1994, 2 males 2 females Burdur (Bucak), 24.IV.1992, 1 female, (Çavdar), 25.V.1994, 1 male, Hatay (Samandağ), 25.VI.1992, 1 male 1 female, Isparta (Keçiborlu), 2.VII.1992, 1 male, (Uluborlu), 2.VII.1992, 2 males 2 females.

Bruchus ulicis Mulsant et Rey, 1858

Male

Body brown; head short and broad; 1 to 3 antennal segments red-orange remaining segments black, 5 to 10 broader than long, antennae beyond humerus (Fig. 9); prothorax with moderately prominent lateral tooth, sides behind tooth almost parallel, disk convex with sparse tawny hairs; elytra about 0.25 times as long as broad, dorsal surface with light-brown and white hairs, patches of dense brown hairs situated on third striae posteriorly and between striae 7, 8 and 9 medially, humeral callosity prominent (Fig. 4); first legs reddish, tibiae expanded; second legs black excepting tarsi with reddish, tibiae with narrow blade at apex, bearing two terminal spinules (Fig. 14); third legs black, femur with conspicuous distal tooth, mucro as long as lateral cronal denticle (Fig. 19); last abdominal sternit emarginate; pygidium with ashy hairs and two patches of brown hairs; 2.6-3.3 in length.

Male genitalia - Median lobe about six times as long as width at middle, slightly narrowing to distal; in ventral view, ventral valve triangle-shaped, with convex sides, curving to ventral aspect and acute apex, base nearly as broad as apical of median lobe; sclerits of median

lobe mainly denticle shaped, medio-apical ones forming two parallel rows while other denticles densely scattered but more densely placed at distal (Fig. 27); lateral lobes long, medially narrowed, broadly rounded at apex, velum with dense and long setae, sparse and short hairs at inner sides anteriorly, cleft to about 0.40 their length (Fig. 28).

Female

Similar to the male except 1 to 4 antennal segments orange, remaining black, antennae almost to humerus, first legs reddish-brown excepting coxa and femur with black basal part, tibiae slightly expanded, second tibiae without tooth at inner margin, last abdominal sternit not emarginate.

Material examined: Adana (Bahçe), 12.V.1993, 1 male 1 female, (Yumurtalık) 22.IV.1994, 3 males 2 females Antalya (Terme), 25.V.1993, 2 females, (Aksu), 27.IV.1994, 3 males, (Belek), 27.IV. 1994, 2 males 4 females, Burdur (Çeltikci), 26.VI.1993, 3 males (Kızılkaya), 26.VI.1993, 1 male, (Göhlisar), 25.V.1994, 2 males 2 females, Hatay (Hassa), 24.VI.1992, 1 male 1 female, (Yayladağ), 5.VI.1993, 2 females, Isparta (Sütlüce), 30.VI.1992, 2 females, İçel (Çamlıyayla), 25.V.1993, 1 male 2 females.

Bruchus atomarius (Linnaeus, 1761)

Syn. ***Bruchus granarius*** Linnaeus, 1767

Male

Body and head black; head short and broad with many punctulations; eyes moderately bulbing, slightly incised; 1 to 4 antennal segments reddish-brown, remaining black to dark brown, 6-10 broader than long (Fig. 10); pronotum about 0.4 times as broad as long, diverging behind the small and blunt lateral tooth, disk slightly convex, with sparse punctures, covered with moderately dense tawny-brown hairs and four white patches form a square; elytra with small punctures, covered with densely brownish hairs except small whitish patches scattered over the surface (Fig. 5); first legs reddish brown excepting femur with black basal part; second and third legs black, second tibiae slightly curved with sharp internal tooth just anterior to terminal tooth (Fig. 15), third femur with a small and blunt distal tooth, tibiae with three carinae and small and sharp apical tooth (Fig. 20); last sternit emarginate; pygidium with sparse greyish hairs and two dark patches; 2.3-4.0 mm in length.

Male genitalia - Median lobe about five or six times as long as width at middle, with tape-like base, parallel sides at the medial to distal part, apex gently rounded; in ventral view, ventral valve broad, slightly convex on lateral margin, apex acute, base nearly as wide as apical of median lobe, moderately curved in lateral view; internal sac with spine and denticle-shaped sclerites, medio-apical ones forming two somewhat triangler spines-like mass, others on medial to apical forming two parallel rows, denticulate sclerites proximally and base of sac also only at one side there is denticulate sclerites (Fig. 29); lateral lobe broad, rather convex on lateral margin, rounded at apex, apex with dense setae, apical 0.60 of inner side densely covered with short hairs, cleft to about 0.50 their length (Fig. 30).

Female

Similar to the male except 1 to 5 antennal segments reddish, remaining black, second tibiae without tooth at inner margin, last abdominal sternit not emarginate.

Material examined: Adana (Bahçe), 12.V.1993, 1 male, (Osmaniye), 11.V.1993, 2 females; Antalya (Belek), 27.IV.1994, 2 males, (Elmalı), 28.IV.1994, 1 female (Alanya), 30.IV.1994, 1 male 1 female, (Manavgat), 30.IV.1994, 1 female; Burdur (Kızılkaya), 26.VI.1993, 2 males, (Gölkhisar), 25.V.1994, 1 male 1 female; Hatay (Altınözü), 24.VI.1992, 1 female, (Samandağ), 26.VI.1993, 2 females, Isparta (Şarkikaraağaç), 1.VII.1992, 1 female, (Senirkent), 2.VII.1992, 1 male 1 female, (Gelendost), 25.VI.1993, 2 males 2 females, (Yalvaç), 25.VI.1993, 2 females.

Discussion

B. tristis and *B. tristiculus* are in the group *Tristis*. *B. tristiculus* quite resembles to *B. tristis*. Small body, concave lateral margin of pronotum behind the small tooth, almost flat elytral surface, black middle tibiae with sparse greyish hairs of pygidium, straight lateral margin of ventral valve, acute apex, having rows of tooth from the basal to the distal internal sac, spatulate-shaped apex of the lateral lobe, long row of the setae of the velum are the main characters that differs *B. tristiculus* from the *B. tristis*. As to *B. tristis* lateral margin of ventral valve is convex, round at the apex, armature sclerites of the internal sac are sparsely scarted, apex of lateral lobe is rounded, velum with short and fine setae.

Bruchus signaticornis is in the *Brachialis* group. The characters which separates *B. signaticornis* from the other species of *Bruchus* are reddish 11th antennal segment, small lateral tooth of pronotum, middle tibiae with a preapical lamella just anterior to apical tooth in males, hind femur with a strong distal tooth. The male genitalia are typical of *Bruchus* in most characters excepting the narrow and elongate ventral valve, the long cleft in the lateral lobes and the unique velum. *B. ulicis* is also in the *Brachialis* species group. It is closely related to *B. signaticornis* because they both have front tibiae broad as the femur in males, but they differ with the pattern of elytron and teeth of inner margin of the middle tibiae. The ventral valve of *B. ulicis* is not emarginate, lateral lobes have a cleft only 0.50 of their length and the apical part spatulate-shaped.

B. atomarius is in *Atomarius* species group. It differs from the other groups of *Bruchus* by having the basal part of internal sac with irregular shaped denticules, which are only at one side. The distal surface of median lobe is slightly rounded, it also resembles to the *B. rufimanus* by having black middle and hind legs, and hind tibiae with conspicuous tooth apically; but it differs having no longitudinal depression on the ventral side of the middle tibiae, and having two tooth at the pre-apical part, also to that of smaller tooth at the apical part of the hind tibiae. Its genitalia also resembles the *B. rufimanus* but they are separated by the sparsely scatted denticules in basal part of the internal sac and the distal portion of lateral lobe straight, rounded and turned inward at the apical part.

Özet

Türkiye'nin Akdeniz Bölgesindeki bazı *Bruchus* (Coleoptera, Bruchidae) türleri üzerine sistematik çalışmalar

Bruchus cinsi türlerinin ele alındığı çalışmada *Bruchus signaticornis*, *B. ulicis*, *B. tristis*, *B. tristiculus*, *B. atomarius* türlerinin tanımları ve yayılışları verilerek erkek genital organa ait median lob, iç kese ve lateral lobun taksonomik önemleri tartışılmıştır.

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Figures *Bruchus tristis* Boh.: 1. Pronotum and elytra, 6. Antenna, 11. Middle leg in male, 16. Hind leg, 21. Median lobe (ventral view), 22. Lateral lobe (ventral view)

Figures *B. tristiculus* Fahr.: 2. Pronotum and elytra, 7. Antenna, 12. Middle leg in male, 17. Hind leg, 23. Median lobe (ventral view), 24. Lateral lobe (ventral view)

Figures *B. signaticornis* Gyll.: 3. Pronotum and elytra, 8. Antenna, 13. Middle leg in male, 18. Hind leg, 25. Median lobe (ventral view), 26. Lateral lobe (ventral view)

Figures *B. ulicis* Muls. et Rey: 4. Pronotum and elytra, 9. Antenna, 14. Middle leg in male, 19. Hind leg, 27. Median lobe (ventral view), 28. Lateral lobe (ventral view)

Figures *B. atomarius* (L.): 5. Pronotum and elytra, 10. Antenna, 15. Middle leg in male, 20. Hind leg, 29. Median lobe (entral view), 30. Lateral lobe (ventral view).





