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**MORPHOLOGICAL VARIATIONS IN THE *SELENOCEPHALUS* GERMAR, 1833 SPECIES IN THE BLACK SEA REGION OF TURKEY
(HOMOPTERA: AUCHENORRHYNCHA: CICADELLIDAE: DELTOCEPHALINAE)**

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Abstract - It had been determined that six species of *Selenocephalus* Germar, 1833 are present in the Black Sea region of Turkey: *Selenocephalus anatolicus* Dlabola, 1957; *Selenocephalus ankarae* Dlabola, 1957; *Selenocephalus armeniacus* Lindberg, 1960; *Selenocephalus conspersus* (Herrich-Schaffer, 1834); *Selenocephalus obsoletus* (Germar, 1837) and *Selenocephalus stenopterus* Signoret, 1880. The genital structure, color and spotting variability of these species were studied and are shown here with illustrations.

KEY WORDS: Auchenorrhyncha, Cicadellidae, *Selenocephalus*, Turkey.

Izvleček MORFOLOŠKA RAZNOLIKOST VRST RODU *SELENOCEPHALUS* GERMAR, 1833, NA ČRNOMORSKEM OBMOČJU TURČIJE (HOMOPTERA: AUCHENORRHYNCHA: CICADELLIDAE: DELTOCEPHALINAE)

Na črnemorskem območju Turčije je prisotnih šest vrst iz rodu *Selenocephalus* Germar, 1833: *Selenocephalus anatolicus* Dlabola, 1957; *Selenocephalus ankarae* Dlabola, 1957; *Selenocephalus armeniacus* Lindberg, 1960; *Selenocephalus conspersus* (Herrich-Schaffer, 1834); *Selenocephalus obsoletus* (Germar, 1837) in *Selenocephalus stenopterus* Signoret, 1880. Proučene so bile razlike v obliki spolnih organov, barvi in pegavosti teh vrst, prikazanih z risbami.

KLJUČNE BESEDE: Auchenorrhyncha, Cicadellidae, *Selenocephalus*, Turčija.

Introduction

Up to now, 13 species of the genus *Selenocephalus* are known from Turkey (Dlabola 1957, 1977a, 1977b, 1981; Kalkandelen 1974; Lodos and Kalkandelen 1986; Nast 1972; Zeybekoglu 1998). Of these, *Selenocephalus amasycus* Dlabola, 1977; *Selenocephalus anatolicus* Dlabola, 1957; *Selenocephalus ankarae* Dlabola, 1957 and *Selenocephalus uvarovi* Zachvatkin, 1946 had been described and some of them are known only from Turkey. The determination of the *Selenocephalus* species is based on the shape of their genital structures. Up to now no studies had been done on the variability of the genital structures, color, and spotting of the Turkish *Selenocephalus* species. For this reason, the aim of this study was to identify specimens of *Selenocephalus* and determine the variability of these species.

Material and methods

By means of the sweeping method, 520 adult specimens from different habitats had been picked between 1990 and 1996 at the Black Sea region of Turkey and prepared. Taxonomic characters seen in the material were compared with the published data of Dlabola (1957, 1977a), Emeljanov (1967), Kalkandelen (1974), Remane and Sittig (1988), Ribaut (1952) and Lindberg (1960). The species were identified and the measurements of some body parts were taken in each. Color, spotting, and the genital variability of the species were determined. Sample collection localities are shown in fig. 7.

Findings and discussion

Selenocephalus Germar, 1833

Type-species: *Jassus obsoletus* Germar, 1817, by monotypy.

The genus *Selenocephalus* is included in the subfamily Deltocephalinae, Cicadellidae, Homoptera, and its species are the largest members of the family Cicadellidae. The front body slopes to anterior. Front side of vertex makes an evident upward edge and has sharp ends. Ocelli are located on both anterior margins of the vertex, next to the eyes.

1. *Selenocephalus anatolicus* Dlabola, 1957

Body shape and structure: Head is a bit wider than the pronotum. Front side of vertex is parallel to the back side (Fig.1A). Head wide ♂ 2.19-♀ 2.24 mm, vertex length ♂ 0.58-♀ 0.61 mm, pronotum length ♂ 0.83-♀ 0.90 mm, mesonotum length ♂ 0.77-♀ 0.80 mm, total body length is ♂ 5.29 (5.27-5.32) - ♀ 5.70 (5.68-5.75) mm.

Male genital structure: Aedeagus extends from phallobase posteriorly forming a bow. It has two lateral denticles at the tip. Phallotrema is oval, subapically on the dorsal side (Fig.1B,C). The denticles are smaller than the ones described by Dlabola (1957), at the mid-point of aedeagus, where two symmetric lateral denticles are found,

and one denticle subapically on ventral side (Fig.1B,C). Pygofer's posterior part is long and thin (Fig.1D). Apical part of stylus is finger shaped (Fig.1E).

Female genital structure: The posterior margin of the seventh pregenital sternite is concave (Fig.1F).

Color and spotting: The basic color is light brown. There are some black spots and lines forming a net (Fig.1A). Male specimens have more spots than the females. The color and spotting corresponds well with the description given by Dlabola (1957).

General distribution: Iran, Turkey (Dlabola 1957; Lodos and Kalkandelen 1986; Nast 1972; Zeybekoglu 1998).

Examined material: Samsun 4♂-3♀, Sinop 6♂-9♀ (Fig. 7).

2. *Selinocephalus ankarae* Dlabola, 1957

Body shape and structure: Head is as wide as pronotum. Front side of vertex is prominently convex (Fig.2A). Head wide ♂2.55-2.70, vertex length ♂0.52-♀0.60, pronotum length ♂1.10-♀1.18, mesonotum length ♂1.00-♀1.12, total body length ♂7.10 (7.05-7.15), ♀8.60 (8.55-8.65) mm. Total body length is smaller than the values given by Dlabola (1957).

Male genital structure: Aedeagus comes out of the posterior part of the phallobase. It is wide at the basal part and its posterior part is convex and narrows distally (Fig.2B,C). Aedeagus is flattened laterally. Phallotrema is oval and small, at the sub-apical dorsal side (Fig.2B). In the original description of Dlabola (1957) it had been determined that there are three pairs of denticles at the aedeagus laterally, a tiny pair dorsally behind the phallotrema, and a leaf-like denticle subapically on the ventral side (Fig.2G,H). In the examined specimens, some differences in the number of denticles on the dorsal side were found. Behind the phallotrema, at the aedeagus' posterior side, two pairs of denticles with a regular interval had been found (Fig.2B,C). Kalkandelen (1974) also stated that she had seen this difference on the specimens that she examined. This difference is important from the taxonomic point of view. Pygofer is thin and long (Fig.2D). The end point of stylus extends like a finger (Fig.2E).

Female genital structure: Seventh pregenital sternite has acute corners, posterior margin is concave (Fig.2F).

Color and spotting: Basic color is brown. There are black spots, forming lines and a net but variability had been discovered, contrary to the definitions of Dlabola (1957) and Kalkandelen (1974), (Fig.2 A1,A2,A3,A4).

General distribution: Turkey (Dlabola 1957; Kalkandelen 1974; Lodos and Kalkandelen 1986; Nast 1972; Zeybekoglu 1998).

Examined material: Amasya 6♂-3♀, Tokat 8♂-6♀ (Fig. 7).

3. *Selinocephalus armeniacus* Lindberg, 1960

Body shape and structure: Head is a bit wider than pronotum. Vertex front side is parallel to pronotum front (Fig.3A). Head wide ♂2.35-♀2.68, vertex length ♂0.52-♀0.54, pronotum length ♂0.85-♀0.90, mesonotum length ♂1.05-♀1.06, total body

length is ♂ 6.37 (6.30-6.50) ♀ 7.23 (7.15-7.30) mm.

Male genital structure: Aedeagus comes out of the posterior part of the phallobase and is parallel to it. It carries three pairs of lateral denticles. Phallotrema is situated subapically on the dorsal side (Fig.3B,C). The end point of pygofer is sharp (Fig.3D), while the apex of stylus is blunt (Fig.3E).

Female genital structure: The posterior edge of the seventh pregenital sternite is concave medially (Fig.3F).

Color and spotting: Basic color is light brown. Dark brown areas have spots (Fig.3A). Wings are more densely spotted than the front body and female specimens have fewer spots than males.

General distribution: Armenia, Turkey (Dlabola 1977b; Lodos and Kalkandelen 1986; Zeybekoglu 1998).

Examined material: Ordu 14♂-10♀, Tokat 24♂-32♀ (Fig. 7).

4. *Selenocephalus conspersus* (Herrich-Schaffer, 1834)

Body shape and structure: Head is as wide as pronotum. The front edge of vertex is parallel to the front edge of pronotum (Fig.4A). Head wide ♂ 2.34-♀ 2.48, vertex length ♂ 0.52-♀ 0.58, pronotum length ♂ 0.86-♀ 0.96, mesonotum length ♂ 1.05-♀ 1.06, total body length ♂ 6.00 (5.95-6.10) ♀ 6.50 (6.45-6.55) mm. Values given above are smaller than the values given by Ribaut (1952) (♂ 6.30-6.70 ♀ 7.30-7.40), but similar to those in Remane and Sittig (1988).

Male genital structure: Aedeagus extends like a bow from the basal part of the phallobase (Fig.4C). It is flattened laterally. Phallotrema is oval and large, situated on the dorsal side. At the lateral side of aedeagus, two pairs of big denticles are situated, one at the end and the other in the middle. An additional pair of little denticles is in the middle on the dorsal side of aedeagus (Fig.4B,C1) in which variability had been found in their position. They can be next to phallotrema in some specimens or far from it in others (Fig.4C2,C3). Rodrigues (1968) and Remane and Sittig (1988) found similar variations. The end-point of pygofer is sharp (Fig.4D), while the apex of stylus looks like a finger (Fig.4E).

Female genital structure: The posterior margin of the seventh pregenital sternite is slightly depressed with a little dent medially (Fig.4F).

Color and spotting: Basic color is light brown. Slight spotting is observable in dark brown areas (Fig.4A). Spots are less numerous in female specimens.

General distribution: France, Italy, Poland, Spain, Turkey, Yugoslavia (Ribaut 1952; Zeybekoglu 1998).

Examined material: Amasya 4♂-4♀, Tokat 2♂-4♀ (Fig. 7).

5. *Selenocephalus obsoletus* (Germar, 1837)

Body shape and structure: Head is as wide as pronotum. Front side of vertex is parallel to the front side of pronotum (Fig.5A). Head wide ♂ 2.68-♀ 2.80, vertex length ♂ 0.61-♀ 0.68, pronotum length ♂ 1.23-♀ 1.28, mesonotum length ♂ 1.24-♀ 1.35, total

body length is ♂ 7.39 (6.78-7.75) ♀ 7.90 (7.70-8.10) mm. The values given above are similar to those found by Ribaut (1952).

Male genital structure: Aedeagus comes out of the posterior part of the phallobase making a bow and is parallel to it (Fig.5C). In front of phallotrema, a pair of symmetric denticles is situated at the lateral sides (Fig.5B1). In some specimens, an asymmetric condition had been found at the left lateral denticle (Fig.5B2). At the dorsal side of aedeagus, one denticle is present, and one bifid denticle is situated subapically on the ventral side of aedeagus (Fig.5C). The apex of pygofer is long and sharp-pointed (Fig.5D). Stylus is big and its apex is finger-like (Fig.5E).

Female genital structure: Posterior margin of the seventh pregenital sternite is slightly concave (Fig.5F).

Color and spotting: Basic color is brown. Black spots form thin lines and a net (Fig.5A). Male specimens are more densely spotted than females.

General distribution: Albania, Austria, Azerbaijan, Bulgaria, Czech Republic, France, Hungary, Greece, Iran, Italy, Morocco, Romania, Russia, Slovakia, Spain, Tunisia, Turkey, Ukraine (Dlabola 1957; Lodos and Kalkandelen 1986; Nast 1972; Zeybekoglu 1998).

Examined material: Amasya 8♂-11♀, Giresun 10♂-12♀, Ordu 4♂-6♀, Rize 8♂-10♀, Samsun 11♂-8♀, Tokat 10♂-8♀, Trabzon 6♂-10♀ (Fig. 7).

6. *Selenocephalus stenopterus* Signoret, 1880

Body shape and structure: Head is as wide as pronotum. Front side of vertex is parallel to the front side of pronotum (Fig.6A). Head wide ♂ 2.55-♀ 2.95, vertex length ♂ 0.51-♀ 0.61, pronotum length ♂ 1.04-♀ 1.11, mesonotum length ♂ 1.05-♀ 1.25, total body length ♂ 7.41 (7.35-7.50) ♀ 8.36 (8.20-8.50) mm. Total body height is similar as found by Kalkandelen (1974) and Emeljanov (1967).

Male genital structure: Aedeagus comes out of the mid-point of the phallobase and extends like a bow. It is very wide basally, but narrows quickly towards the distal part (Fig.6C). It carries a pair of small denticles at the apex. Phallotrema is oval and very big, situated on the posterior surface (Fig.6B). The apex of pygofer is thorn-like (Fig.6D), while the apex of stylus is finger-like (Fig.6E).

Female genital structure: Posterior margin of the seventh pregenital sternite is concave, with a small notch medially (Fig.6F).

Color and spotting: Basic color is light brown. Spots are small and brown (Fig.6A). Spotting on the wings is less obvious than on the head. In contrast to the males, females have only a few spots or none.

General distribution: Albania, Austria, Cyprus, France, Greece, Hungary, Iran, Iraq, Israel, Italy, Morocco, Palestine, Russia, Tunisia, Turkey, Ukraine, Yugoslavia (Dlabola 1957; Kalkandelen 1974; Zeybekoglu 1998).

Examined material: Amasya 16♂-22♀, Giresun 10♂-6♀, Ordu 7♂-8♀, Rize 7♂-8♀, Samsun 15♂-16♀, Sinop 10♂-14♀, Tokat 16♂-12♀, Trabzon 10♂-16♀ (Fig. 7).

Conclusions

From the Black Sea region of Turkey, 520 adult specimens of the genus *Selenocephalus* were collected and examined. Six different species were distributed at the Black Sea region. Taxonomic characters and morphological variability of each species were examined. We conclude that the variability must be taken into account.

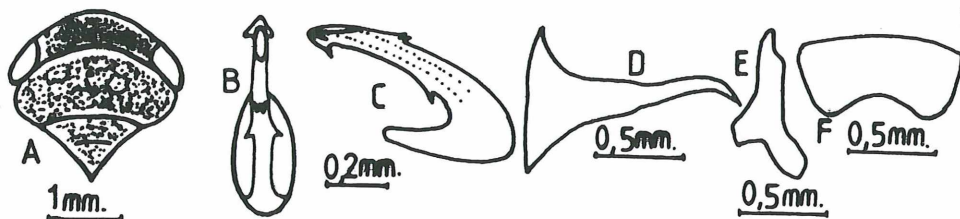


Fig.1: *Selenocephalus anatolicus* A. Head and thorax B. Aedeagus dorsal C. Aedeagus lateral D. Pygofer E. Stylus F. ♀ VII. Pregenital sternite.

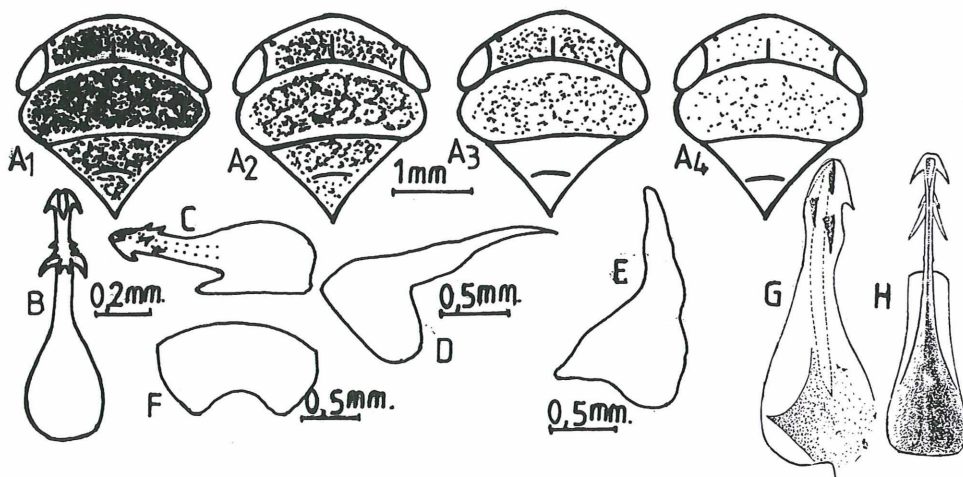


Fig. 2: *Selenocephalus ankarae* A. Head and thorax B. Aedeagus dorsal C. Aedeagus lateral D. Pygofer E. Stylus F. ♀ VII. Pregenital sternite. G, H. Aedeagus (Dlabola).

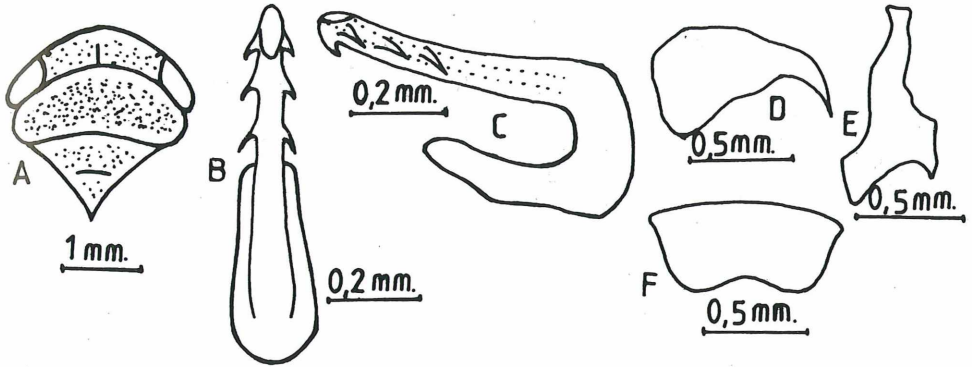


Fig. 3: *Selenocephalus armeniicus* A. Head and thorax B. Aedeagus dorsal C. Aedeagus lateral D. Pygofer E. Stylus F. ♀ VII. Pregenital sternite.

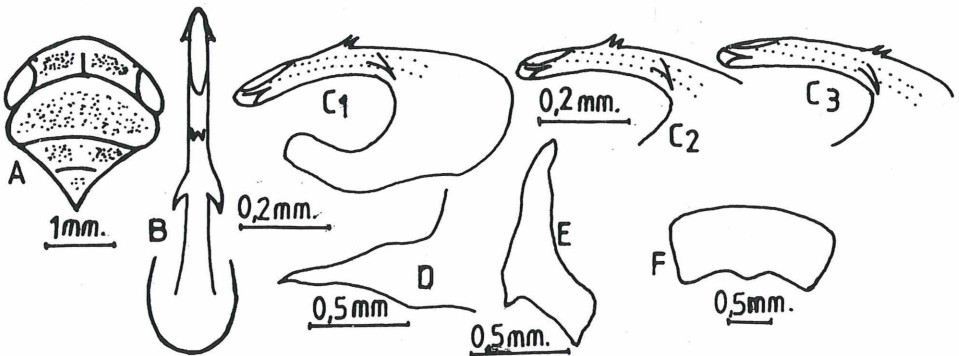


Fig. 4: *Selenocephalus conspersus* A. Head and thorax B. Aedeagus dorsal C. Aedeagus lateral D. Pygofer E. Stylus F. ♀ VII. Pregenital sternite.

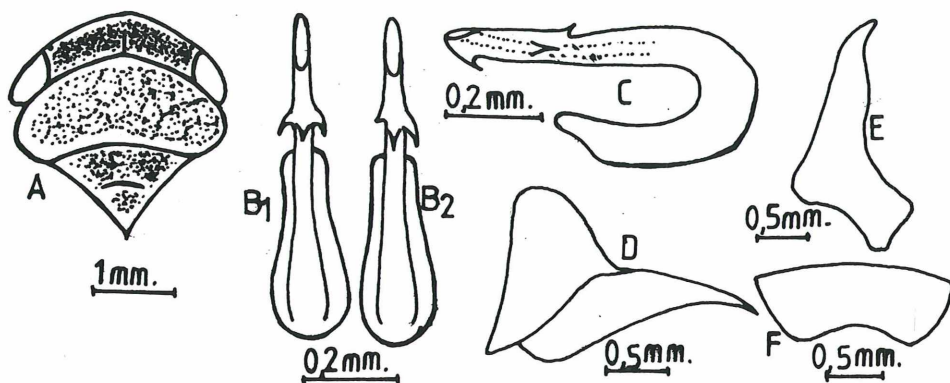


Fig. 5: *Selenocephalus obsoletus* A. Head and thorax B. Aedeagus dorsal C. Aedeagus lateral D. Pygofer E. Stylus F. ♀ VII. Pregenital sternite.

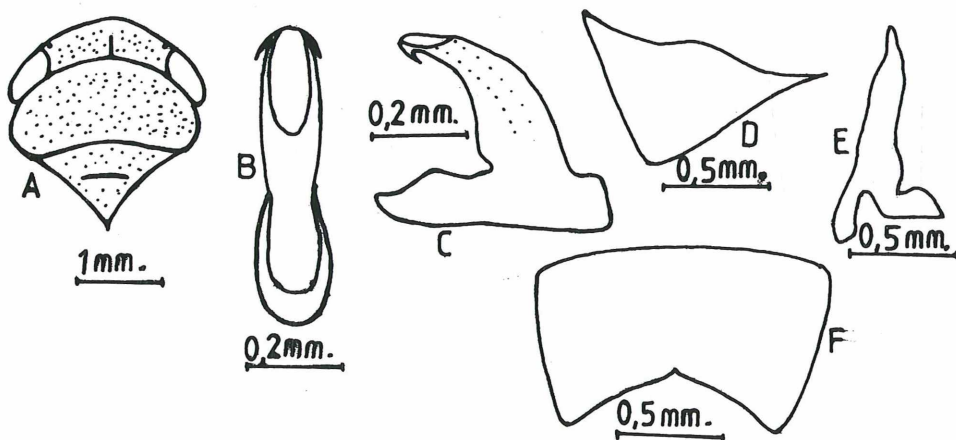


Fig. 6: *Selenocephalus stenopterus* A. Head and thorax B. Aedeagus dorsal C. Aedeagus lateral D. Pygofer E. Stylus F. ♀ VII. Pregenital sternite.

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