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## A representative of the *pulchella* group of *Alona* in Anatolia: *Alona cambouei* Guerne & Richard, 1893 (Cladocera: Chydoridae)

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**Abstract:** *Alona cambouei* of the *pulchella* group in Anatolia is considered in this study. A description of the species is supplemented with new data obtained from new specimens and necessary illustrations are provided. *A. cambouei* is diagnosed from other *Alona* species of Anatolia. Some conclusions are given about the distribution of the *pulchella* group and it is assumed that the group is Gondwana origin and Anatolia is the north-west end of the range of the group in Asia.

**Key Words:** Cladocera, Chydoridae, *Alona cambouei*, Distribution, Anatolia

### Anadolu'da *Alona* cinsinin *pulchella* grubunun bir temsilcisi: *Alona cambouei* Guerne & Richard, 1893 (Cladocera: Chydoridae)

**Özet:** Bu çalışmada, Anadolu'daki *pulchella* grubunun bir türü olan *A. cambouei* ele alınmıştır. Yeni örneklerden elde edilen yeni veriler ile türün deskripsiyonuna ekler yapıldı ve gerekli şekiller verildi. *A. cambouei*'nin Anadolu'daki diğer *Alona* türlerinden ayırt edici farkları verildi. *Pulchella* grubunun yayılışı, grubun Gondvana orijinli olduğuna ve Anadolu'nun, grubun Asya'daki yayılışının kuzey-batı ucunu oluşturduğuna işaret etmektedir.

**Anahtar Sözcükler:** Cladocera, Chydoridae, *Alona cambouei*, Yayılış, Anadolu

### Introduction

*Alona* Baird, 1843 (Branchiopoda, Anomopoda, Chydoridae) is a widespread genus and includes about 55 species worldwide (Smirnov, 1971; Dumont and Negrea, 1996; Sinev, 1997, 1999a, 1999b, 2001). Gündüz (1997, 1999), Yalım and Çıplak (1998) and Güher (2000, 2002) reported that this genus is represented by 9 species in Turkey. Of these species, *A. costata* Sars, 1862 has been recorded from north-west Turkey and Antalya (Mediterranean Anatolia); *A. guttata* Sars, 1862 from the central, Aegean and Mediterranean parts of Anatolia; *A. affinis* Baird, 1843 from the central, Aegean, Lakes Region, eastern and northern parts of Anatolia; *A. protzi* Hartwig, 1900 from a canal near Eğridir Lake (Lakes Region of Anatolia) and Terkos Lake (Turkish Thrace); *A. intermedia* Sars, 1862 from Edirne (Değirmenci pool, Başağıl pool and Kalkansöğüt pool; Thrachian Turkey); and *A. pulchella* King, 1853 and *A.*

*verrucosa* Sars, 1901 from Adıyaman (south-east Anatolia). The remaining species, *A. rectangula* Sars, 1862, is known from nearly the whole of Turkey. In 2002, Güher (2002) reported another species, *A. quadrangularis* (O.F. Müller, 1785), from Terkos Lake (Turkish Thrace) and this species was also observed during our field studies in the Mediterranean parts of Turkey (Yalım unpublished data).

Recently, in a detailed study on the *pulchella* group, Sinev (2001) included 3 species of *Alona* (*A. laevisima* Sars, 1898; *A. pulchella* King, 1853 and *A. cambouei* Guerne & Richard, 1893) in the *pulchella* group and placed *A. laevisima* in synonymy with *A. pulchella*. Furthermore; Sinev (2001) reported that *A. pulchella* King, 1853 is endemic to Australia and all previous records of this species from tropical Asia, the Near East and Africa should be deemed as *A. cambouei*, in addition to providing a detailed diagnosis of 2 species. Thus, it is

necessary to study the new specimens to decide which species of the *pulchella* group are present in Anatolia. Because there is no record of the *pulchella* group in Europe (Margaritora, 1983; Negrea, 1983; Sinev, 2001), such data will provide opportunities to define the limits of its range in the north-west end.

During our field studies in the western part of Mediterranean Anatolia some new specimens of *Alona* were collected and these specimens belong to the *pulchella* species group. In this study, a description based on new specimens from Anatolia is prepared, providing necessary illustrations and diagnoses with other species in Turkey. Additionally, some remarks about the *pulchella* group are presented.

## Materials and Methods

Samples were collected by using a 55 µm mesh plankton net in July 2001 and July, August and September 2002 from Kocagöl Lake (Boğazkent, Antalya) and in December 2002 from Titreyen Lake and Manavgat stream (Manavgat, Antalya). These waters are located in southern Anatolia. The slow-running parts of Manavgat stream and other waters have rich vegetation and they are located just beside or connecting to the Mediterranean Sea. Therefore, all of these waters have relatively high salinity.

The samples were fixed in formaldehyde (5%) in the field. Specimens were dissected in glycerol under a binocular stereomicroscope. Figures were drawn under a compound microscope with the aid of a camera lucida (Figures 1-8).

## Results

### *Alona cambouei* Guerne & Richard, 1893

*Specimens examined:* Ten parthenogenetic females (from Kocagöl Lake), 4 parthenogenetic females (from Titreyen Lake) and 2 parthenogenetic females (from Manavgat stream) were examined.

Description for the Anatolian population (parthenogenetic female): Body oval in lateral view (Figure 1), its length 1.53-1.63 times its maximum height in adult. Dorsal margin uniformly curved. Postero-dorsal and postero-ventral angles broadly rounded; posterior margin convex, with about 50-70 short setulae of equal length at postero-dorsal angle that are not

organised into groups, with a row of setulae along posterior margin. Ventral margin almost straight, with 38-39 setae, anteriormost 7 setae long, next 17 setae very short, posteriormost 15 setae intermediate length, with length of setae increasing posteriorly (Figure 2). Antero-ventral angle rounded. Carapace punctate (Figure 1).

Head shield elongated, rostrum short with broadly rounded apex. Ocellus slightly larger than the eye (Figure 1). Three major head pores without connection between them (Figure 3). Antennulae short, not reaching the tip of the rostrum, with 9 aesthetascs, 2 of them longer than others (Figure 4). Antennal formula, setae 0-0-3/1-1-3, spines 1-0-1/0-0-1 (Figure 5). Seta arising from basal segment of endopodite thin, projecting beyond the tip of distal segment. Spine on basal segment of exopodite shorter than mid segment. Labrum wide and rounded; distal labral plate without setae (Figure 6).

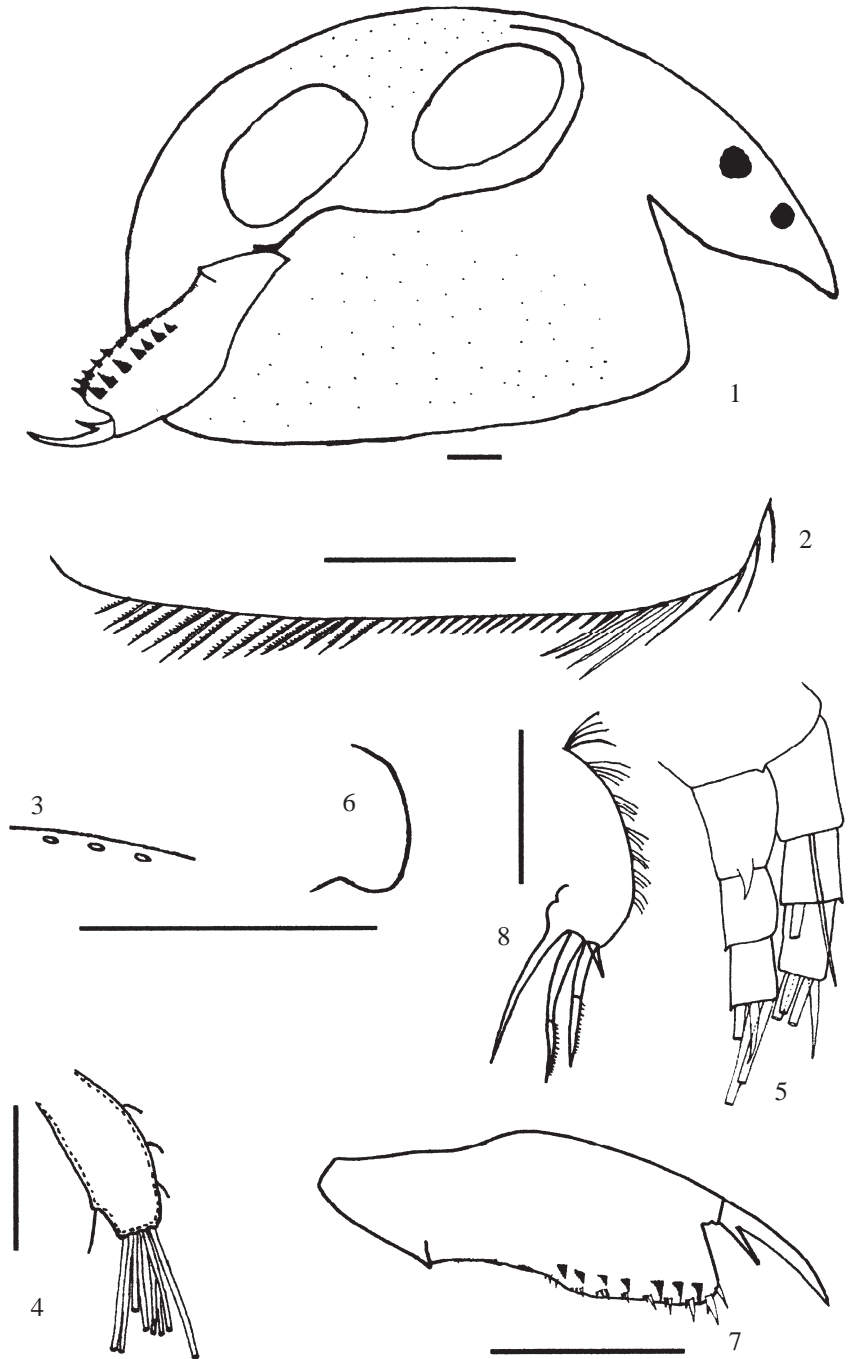
Postabdomen relatively narrow, with parallel margins, its length about 2.42-3 times its height (Figures 1 and 7), ventral margin from straight to slightly convex. Distal margin straight, bordered by a clear incision from inflated basis of claws; with a rounded angle between distal and dorsal margins. Preanal angle distinctly and postanal angle slightly projected. Postabdomen with 9 clusters of marginal denticules, each of which consist of 3-5 well developed-sharp denticules (Figures 1 and 7). There are 7-8 lateral setae clusters that end before preanal angle, posteriormost setae of each cluster thickest and longest, and longer than marginal denticules (Figure 7). Postabdominal claw with 1 basal spine. Basal spine 0.3-0.36 times the length of the claw.

Outer branch of endite of trunk limb I with 3 setae, the first seta of ventral side short, second and third setae 2 segmented; second and third setae subequal in length, both with brush-like setulae on distal segment (Figure 8).

## Discussion

The following account includes some remarks about the taxonomy, diagnoses with other Anatolian species (regarding species in the area) and distribution of *A. cambouei*.

Regarding *Alona* species in Turkey, *A. affinis*, *A. intermedia* and *A. verrucosa* have 2 head pores while other species have 3. *A. cambouei* (plus *A. pulchella*), and



1-8: *Alona cambouei*, parthenogenetic female:

- |   |  |
|---|--|
| 1. Lateral view of body, (scale = 0.1 mm)     | 5. Second antennae; antennal setae and antennal spines (scale = 0.02 mm) |
| 2. Ventral margin of valves (scale = 0.05 mm) | 6. Labrum (scale = 0.05 mm)  |
| 3. Head pores (scale = 0.05 mm)               | 7. Postabdomen and claw (scale = 0.05 mm)                                |
| 4. Antennulae (scale = 0.05 mm)               | 8. Leg I (scale = 0.02 mm)   |

*A. protzi* differ from *A. guttata*, *A. costata*, *A. quadrangularis* and *A. rectangula* by having valves with a dotted surface. *A. pulchella* and *A. cambouei*, named the *pulchella* group by Sinev (2001), differ from *A. protzi* in the postero-ventral corner of the valves not having setae. Although Fiers (1978) reported *A. pulchella* from Anatolia (from Adiyaman in south-east Anatolia), Sinev (2001) considered this species to be endemic to Australia and considered the Asian and African populations to be *A. cambouei*. According to the description and figures by Fiers (1978) and specimens in our laboratory, the Anatolian population of the *pulchella* group shows characteristics of *A. cambouei* (Sinev 2001), especially the presence of 3 disconnected head pores, typical autapomorphy used in the separation of *A. pulchella* and *A. cambouei*. Accepting this suggestion, the record of *A. pulchella* from Anatolia according to Fiers (1978) should be considered *A. cambouei*, although there is no information about *pulchella* group species in Anatolia in Sinev (2001).

Specimens from western Mediterranean Anatolia have fewer differences that can be considered variations than *A. cambouei* (according to the redescription by Sinev (2001)). The number of setae on the ventral margin of the valves is 30-35 in *A. cambouei*, while it is 37-38 in the Anatolian population (the number of setae is 40-45 in *A. pulchella*). Second, there are 8-10 clusters of lateral setae in *A. cambouei*, while there are 7-8 in the Anatolian population. All other morphological features of our new specimens fit those of *A. cambouei* and our data are consistent with those of Sinev (2001) in suggesting that all Asian and African populations are a single species of the *pulchella* group and disconnected head pores is the most important autapomorphy that defines *A. cambouei*.

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The *pulchella* group of *Alona* is known from Australia, tropical Asia, the Near East, Africa and South America (Smirnov, 1971; Sinev, 2001). Recently, Sinev (2001) reported that the group is represented by *A. pulchella* in Australia and *A. cambouei* in tropical Asia, the Near East and Africa. Because *A. cambouei* has not been recorded from Europe, Anatolia is the north-west end of the range of the species and also that of the *pulchella* group. Such a range may indicate 2 important conclusions. First, southern Anatolia includes a gliding fauna, especially by extension of Saharo-Arabian faunal elements into Anatolia or vice versa as suggested by Kosswig (1955) and Çıplak (2003a, 2003b). Second, it can be suggested that the *pulchella* group Gondwana origin, on the basis of its range, i.e. Australia, tropical Asia, Africa and South America [Sinev (2001) points out that South American population may be a different but related species]. However, it is not clear how *Alona cambouei* extended its range into Anatolia and in which kind of waters it lives. Since there is no representative of the *pulchella* group in Europe, a dispersal during Tethys is not seen to be a plausible assumption. This species has been recorded from freshwater lakes/ponds so far. However, the present records are from 2 lakes, located just beside the Mediterranean Sea (roughly 500 m from the sea) and have high salinity (salinity ca. 0.1%) compared with other freshwaters. Further ecological studies on the species will aid answering these questions.

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