

Two New Records of *Aulodrilus* Bretscher, 1899 (Oligochaeta, Tubificidae) for the Turkish Fauna

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Abstract: Two species of *Aulodrilus*, *A. pigueti* and *A. pluriseta*, collected from Sakarbaşı, Enne, Margialan and Kuşbaşı creeks (parts of the upper Sakarya river system), are new records for the Turkish Potamofauna. In addition, the genus *Aulodrilus* is also new for the Anatolian fauna. Their morphological features were examined under a scanning electron microscope and light microscope and diagrams of them were drawn.

Key Words: Oligochaeta, Tubificidae, *Aulodrilus*, new record, Turkey.

Türkiye Faunası İçin İki Yeni *Aulodrilus* Bretscher, 1899 (Oligochaeta, Tubificidae) Türü

Özet: Sakarbaşı, Enne, Margialan ve Kuşbaşı derelerinden (Yukarı Sakarya Nehir Sistemi'nin bir parçası) toplanan *Aulodrilus* cinsinin iki türü, *A. pigueti*, *A. pluriseta*, Türkiye Potamofaunası için yeni kayıttır. Ayrıca, *Aulodrilus* cinsi de Anadolu için yenidir. Bu türlerin morfolojik özellikleri ışık ve elektron misroskobunda (SEM) incelenerek şekilleri çizilmiştir.

Anahtar Sözcükler: Oligochaeta, Tubificidae, *Aulodrilus*, yeni kayıt, Türkiye

Introduction

The genus *Aulodrilus*, belonging to the family Tubificidae, was described by Bretscher, 1899, with the type species *Aulodrilus limnobius* (Brinkhurst and Jamieson, 1971). The subfamily Aulodrilinae is not rich according to the number of species in the family Tubificidae. Brinkhurst and Jamieson (1971) described five species of *Aulodrilus*: *A. pluriseta* (Piguet, 1906), *A. pigueti* Kowalewski, 1914, *A. pectinatus* Aiyer 1928, *A. limnobius* Bretscher, 1899, and *A. americanus* Brinkhurst and Cook, 1966. In 1985, Brinkhurst and Barbour (1985) defined a new species of *Aulodrilus*, *A. paucichaeta* Brinkhurst and Barbour, 1985, from North America. They also indicated that three of them, *Aulodrilus pluriseta*, *A. pigueti* and *A. limnobius* are cosmopolitan; three of them (*A. pectinatus*, *A. americanus* and *A. paucichaeta*) were recorded in only a few regions of Asia and North America (Brinkhurst and Jamieson, 1971; Brinkhurst and Barbour, 1985). Furthermore, Brinkhurst and Jamieson (1971) indicated that *A. japonicus* Yamaguchi, 1953, was a synonym of *A. pluriseta*. However, Finogenova and Arkhipova (1994) reported *A. japonicus* should be considered distinctly different from *A. pluriseta*, and they also noted that it

differs from *A. pluriseta* by the setal apparatus, the male gonoduct and the location of the male opening.

Our knowledge about the Tubificids of Turkey is insufficient. Naidu (1965), Geldiay and Tareen (1972) and Şahin and Baysal (1972) recorded for the first time three species of Tubificidae, *Limnodrilus hoffmeisteri* Claparede, 1862, *Tubifex tubifex* (Müller, 1774) and *Monopylephorus irroratus*, for the Turkish fauna respectively. Four species, *Tubifex tubifex*, *Peloscolex arganoi* Pop, 1974, *P. boitanii* Pop, 1974 and *P. cottarellii* Pop, 1974 were determined by Pop (1974), in Turkey, and except for *Tubifex tubifex*, were described as new species. *Peloscolex arganoi*, *P. boitanii* and *P. cottarellii* of Pop are dubious species (Brinkhurst and Wetzel, 1984) but they are retained here until the material was revised to confirm their validity and, in this case, their true taxonomic status (Martinez-Ansemil and Giani, 1987). There are few faunistic, taxonomical studies on aquatic Oligochaeta in Turkey. To date, the numbers of species recorded are as follows: two in Karagöl (Yamanlar, İzmir) (Ustaoglu, 1980); three in upper Euphrates, Ankara Stream, Antakya and Siverek (Martinez-Ansemil and Giani, 1987); four in Seyhan Dam Lake (Kırgız, 1988); four in Eğridir Lake (Turhan, 1992);

five in Ankara Stream (Kazancı and Girgin, 1998); one in Kesikköprü Dam Lake (Ahıska, 1999); one in Akşehir Lake (Sözen and Yiğit, 1999); 11 in Işıklı Lake (Balık et al., 2000); and 11 in Sazlıgöl (Menemen, İzmir (Balık et al., 2001). Four of them, *Tubifex nerthus* Michaelsen, 1908, *Psammoryctides albicola* (Michaelsen, 1901), *Psammoryctides deserticola* (Grimm, 1877) and *Quistadrilus multisetosus* (Smith, 1900) were identified as new for the inland water Oligochaeta fauna of Turkey. So far, a total of 23 Tubificidae species have been recorded from Turkey; however, *Aulodrilus* species have not been recorded from Turkey. With this study, the number of recorded Tubificidae species is increased from 23 to 25.

Materials and Methods

Samples were collected between August 2001 and July 2002 from the upper Sakarya river system (Figure 1). *A. pigueti* samples were fixed in 4% formalin in the field and transferred to 70% ethyl alcohol in the laboratory. Samples were mounted in polyvinyl lactophenol after dehydration. Setal apparatus of *Aulodrilus pigueti* was examined using a light microscope (Olympus CH-20). *A. plurisetata* samples were examined in a scanning electron microscope (SEM, Jsm-5600) in order to observe whether the bifid setae had intermediate teeth. The samples were fixed in cold 3% buffered glutaraldehyde, washed in 0.1 M phosphate buffer and post-fixed in 1% buffered osmium tetroxide for 30 min at room temperature. Specimens were prepared for the SEM according to Chapman and Brinkhurst (1986).

To identify the samples, Brinkhurst and Jamieson (1971), Brinkhurst (1986), and Timm (1999) were used. All material is deposited in the Department of Biology, Faculty of Science, Osmangazi University.



Figure 1. Map of the sampling sites: (O) *Aulodrilus plurisetata*; (Δ) *Aulodrilus pigueti*.

Results and Discussion

The following two *Aulodrilus* species were recorded for the first time from Anatolia:

Abbreviations: The following abbreviations are used in the text: $l(p)$ = body length (preserved), $d(p)$ = diameter (preserved), s = number of segments, Roman numeral = segmental number.

Family: Tubificidae

Subfamily: Aulodrilinae Bretscher

Genus: *Aulodrilus* Bretscher, 1899

Aulodrilus plurisetata (Piguet, 1906)

Examined materials: Enne Creek, on 10.08.2001 (one sample); Margialan Creek, on 13.07.2002 (two samples); Kuşbaşı Creek, on 13.07.2002 (15 samples).

$l(p)$: 3-6 mm; $d(p)$: up to 0.4 mm; s : up to 40.

Prostomium short and rounded (Figure 2a). Diameter of body up to 0.5 mm but decreasing in pygidial zone and tail unsegmented. Dorsal bundles consist of 5-8 hair setae, 142-200 mm long and 5-8 bifid crotchets with upper tooth shorter and thinner than lower, 50-70 mm. In posterior segment, dorsal bundles composed of 2-3 hairs and 3-4 bifid setae but to end of the body with only 2-3 bifid setae (Figure 2b). In ventral bundles composed of up to 8 bifid setae, 50-70 mm long and similar to dorsal bifid crotchets (Figure 2c). Ventral setae in II- XIII composed of 5-9 bifid setae. Posteriorly, the numbers of setae decrease without any change in their shape (Figure 2d). However, in only one sample, collected in Enne Creek, ventral bundles of II with 3 bifid setae, 48 mm long, behind 5, 50-60 mm long. Distal part of bifid setae under teeth dilated (Figure 2e). This characteristic is observed only when viewed from the front or behind. No modified genital setae.

The substrates the two out of the three stations, namely Enne and Margialan Creek, were muddy. The substrate of Kuşbaşı Creek was sandy and an admixture of gravel. *A. plurisetata* is found in large numbers in Kuşbaşı Creek.

Finegenova and Arkipova (1994) and Timm (1999) described the features of Russian and Estonian *A. plurisetata* samples as follows: length of body 14-17 mm, 107-112 segments, dorsal bundles with 6-8 hair setae and 6-8 bifid in anterior segments, 4-5 hairs and 5-6 bifids in the midbody, hair setae 2-2.5 times

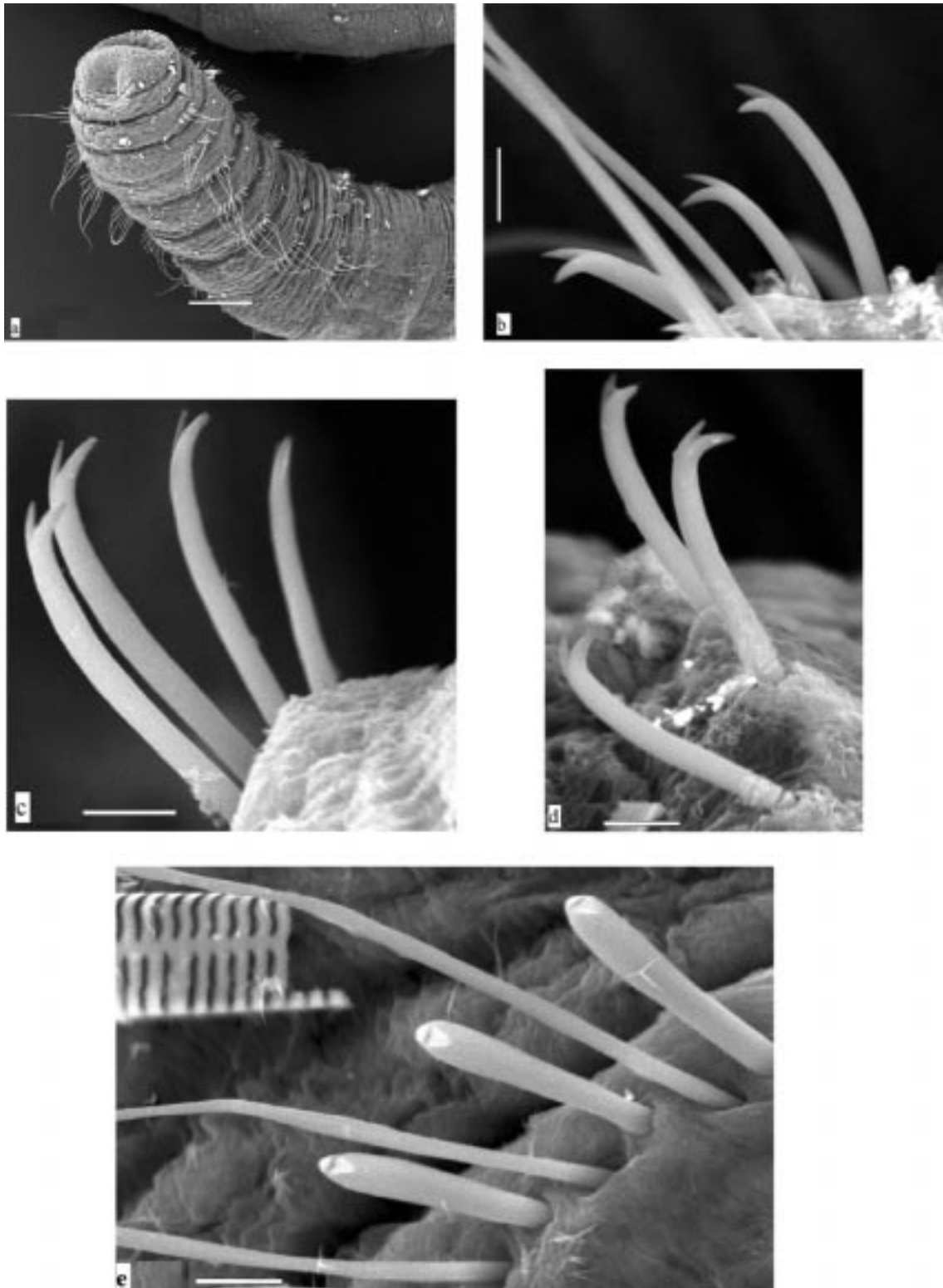


Figure 2. *Aulodrilus plurisetus* a- anterior end of body, b- anterior dorsal seta, c- ventral setae in segment II, d- ventral setae in posterior segment, e- dorsal setae in posterior segment. Scales: a- 100 µm, b, c, d and e-5 µm.

longer than bifids, and in dorsal bundles of anterior end up to 8 hair chaetae, 100-250 μm long, and up to 9 bifid crotchets, 74-105 μm , in ventral bundles 13-17 crochets, 66-86 μm long, respectively. By comparison, the length of dorsal bifid setae and the minimal length of the ventral setae of the present samples are shorter than those of Timm's Estonian samples while the hair setae are about the same size. However, Brinkhurst and Jamieson (1971) and Brinkhurst (1986) indicated that the dorsal bifid setae of *A. plurisetia* have up to 10 setae with short thin upper teeth that are frequently replicate, but we did not observe this feature in the present samples. Our *A. plurisetia* specimens are more similar to Russian and Estonian samples.

World distribution: See Figure 3.

Aulodrilus pigueti Kowalewski, 1914

Examined Material: Sakarbaşı, on 10.11. 2001 (two samples)

l(p): 3 mm d(p): 0.2 mm s: 30.

Body surface is smooth. Ventral setae are 3-5 per bundle, 45-50 μm long and with upper tooth shorter and

thinner than the lower (Figures 4a-b). Dorsal bundles composed of only 3 bifid crotchets in segments II and III, 45 μm long, hair setae in dorsal bundles start in IV, smooth and 75 μm , beyond 4-5 hair setae up to 80 μm . Dorsal bifid crotchets in segments IV, V and VI 2-4 and 40-45 μm (Figure 4c). Beginning in VII dorsal crotchets are replaced by oar-shaped pectinate chaetae, up to 45-50 μm .

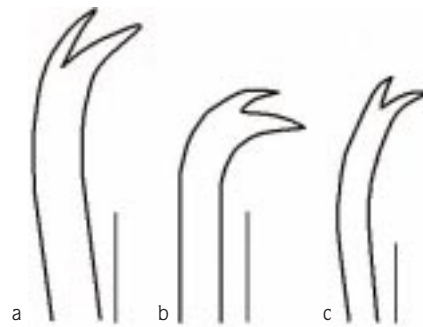


Figure 4. *Aulodrilus pigueti* a- distal end of anterior ventral setae, b- distal end of posterior ventral setae, c- distal end of dorsal seta in segment V. Scales: a, b and c- 5 μm .



Figure 3. The worldwide distribution of *Aulodrilus plurisetia* (this map is taken from Dr. Tarmo Timm's unpublished works with his cordial permission).

Samples were collected from mud and sandy substratum.

The length of the hair and ventral setae are within the published range. However, Naidu and Srivastava (1980) described dorsal bundles with 2-3 hair setae, 95-110 µm long and 2-3 oar-shaped needle setae, 66 µm long. By comparison, the hair and oar-shaped needle setae in the present specimen are shorter than those described by Naidu and Srivastava.

World distribution: See Figure 5.

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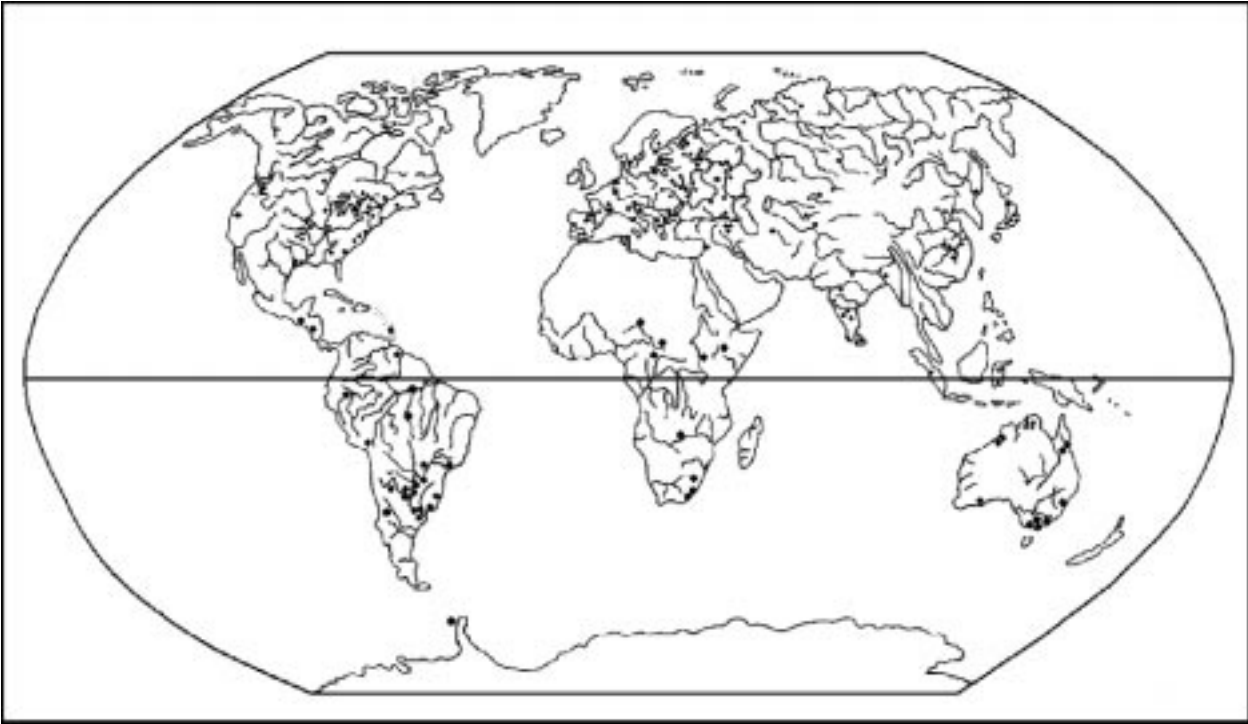


Figure 5. The worldwide distribution of *Aulodrilus pigueti* (this map is taken from Dr. Tarmo Timm's unpublished works with his cordial permission)

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