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First Records of Some Naididae (Oligochaeta) Species for Turkey*

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Abstract: Samples were collected from 79 stations in the Sakarya River Basin between September 1995 and August 1998. A total of 34 species of aquatic Oligochaeta were determined and 15 of them (*Chaetogaster langi* Bretscher, 1896, *Paranais frici* Hrabce, 1941, *Nais communis* Piguët, 1906, *N. bretscheri* Michaelsen, 1899, *N. barbata* Müller 1773, *N. simplex* Piguët, 1906, *N. pseudobtusa* Piguët, 1906, *Dero (Aulophorus) furcatus* (O. F. Müller, 1773), *Dero (Aulophorus) borellii* Michaelsen, 1900, *Spericaria josinae* (Vejdovsky, 1883), *Pristinella rosea* (Piguët, 1906), *P. amphibiotica* Lastockin, 1927, *Pristinella sima* (Marcus, 1944), *Allonais pectinata* (Stephenson, 1910) and *A. gwaliorensis* (Stephenson, 1920), are new records for the inland water Oligochaeta fauna of Turkey. In addition, the genera *Paranais*, *Spericaria* and *Allonais* are also new for Turkey.

Key Words: Oligochaeta, Naididae, Sakarya River, Turkey.

Türkiye İçin Bazı Naididae (Oligochaeta) Türlerinin İlk Kayıtları

Özet: Sakarya Nehir sisteminde Eylül 1995-Ağustos 1998 tarihleri arasında 79 istasyondan toplanan örnekler içinde toplam 34 sucul Oligochaeta türü tespit edilmiştir. Tespit edilen türlerden 15 tanesi (*Chaetogaster langi* Bretscher, 1896, *Paranais frici* Hrabce, 1941, *Nais communis* Piguët, 1906, *N. bretscheri* Michaelsen, 1899, *N. barbata* Müller 1773, *N. simplex* Piguët, 1906, *N. pseudobtusa* Piguët, 1906, *Dero (Aulophorus) furcatus* (O. F. Müller, 1773), *Dero (Aulophorus) borellii* Michaelsen, 1900, *Spericaria josinae* (Vejdovsky, 1883), *Pristinella sima* (Marcus, 1944), *Pristinella rosea* (Piguët, 1906), *P. amphibiotica* Lastockin, 1927, *Allonais pectinata* (Stephenson, 1910), ve *A. gwaliorensis* (Stephenson, 1920), Türkiye iç su Oligochaeta Faunası için yeni kayıttır. Aynı zamanda *Paranais*, *Spericaria* ve *Allonais* cinsleri de Türkiye için yenidir.

Anahtar Sözcükler: Oligochaeta, Naididae, Sakarya Nehri, Türkiye.

Introduction

Oligochaeta are mainly found as true benthos in fresh water. Turkey has very rich inland water sources. However, few studies have been carried out with the purpose of identifying Oligochaeta species in fresh water. Our knowledge on the freshwater Oligochaeta fauna of the subcontinent is due to the studies by Sperber (1958), Geldiay and Tareen (1972), Şahin and Baysal (1972), Pop (1974), Ustaoglu (1980), Moubayed et al. (1987), Omodeo (1987), Turhan (1992), Kırgız (1988), Kazancı and Girgin (1998), Ahıska (1999), Sözen and Yiğit (1999), Balık et al. (1999), Balık et al. (2000), Balık et al. (2001), Polatdemir Arslan and Şahin (2003), and Arslan and Şahin (2003).

Literature data

The first record of freshwater Oligochaeta in Turkey was documented by Sperber (1958). He identified species of Naididae in the material collected in Turkey by Dr. K. Lindberg (Lund): *Ophidonais serpentina* (Müller, 1773), *Nais pardalis* Piguët, 1906, *Nais variabilis* Piguët, 1906, *Vejdovskyaella intermedia* (Bretscher, 1896), *Pristina jenkinae* (Stephenson, 1931), *Pr. foreli* (Piguët, 1906) and *Pr. menoni* (Aiyer, 1929). Pop (1974) recorded 10 species collected in Turkey: *Pristina arcaliae* Pop, 1974, *Pristina foreli*, *Pristina longiseta* Ehrenberg, 1828, *Pristina proboscidea* Beddard, 1896, *Peloscolex arganoi* Pop, 1974, *P. boitanii* Pop, 1974, *P. cottarelli* Pop, 1974, *Tubifex tubifex* (Müller, 1774), *Enchytraeus*

* This study is based partly on the PhD thesis of Naime Arslan, supervised by Yalçın Şahin.

buchholzi (Vejdovsky, 1879) and *Marionina argentea* (Michealsen, 1889). Moubayed et al. (1987) indicated that the presence of *Limnodrilus hoffmeisteri* Claparede, 1862 and *Tubifex tubifex* in Turkey was mentioned by Naidu (1965). Moubayed et al. (1987) listed 7 Oligochaeta species from Turkey: *Ophidonais serpentina*, *Nais elinguis* Müller, 1773, *Stylaria lacustris* (Linnaeus, 1767), *Tubifex tubifex* f. *tubifex*, *Limnodrilus hoffmeisteri*, *Psammoryctides longicapillatus* Martinez-Ansemil and Giani, 1983 and *Friderica* sp. Among these 7 species *Nais elinguis*, *Psammoryctides longicapillatus* and *Friderica* sp. were new records for Turkey. Omodeo (1987) identified *Haplotaxis gordioides* Hartman, 1821 as new for Turkey, in the material collected in Antakya (? Narlikaköy cave) by C. Kosswig in 1946. Martinez-Ansemil and Giani (1987) listed Oligochaeta species: *O. serpentina*, *N. elinguis*, *N. pardalis*, *N. variabilis*, *Slavina appendiculata* (d'Udekem, 1855), *Pristina aequiseta* f. *foreli* Piguët, *Pristinella jenkiniae*, *Pristina longiseta*, *Tubifex tubifex*, *Limnodrilus hoffmeisteri* and *Enchytraeus buchholzi* were determined as cosmopolitan species; *Pr. menoni* and *Haplotaxis gordioides* as species with a large distribution; and *P. proboscidea*, *Pelosclex arganoi*, *P. boitanii* and *P. cottarelli* as species with southern affinities. However, in agreement with the authors in the literature, we decided that the presence of *Slavina appendiculata* has not been detected in Turkey as Martinez-Ansemil and Giani (1987) reported earlier.

The studies on Oligochaeta fauna in Turkey are rather limited but 7 species; (*Chaetogaster limnaei* von Bear, 1827, *Stylaria fossularis* Leidy, 1852, *Ophidonais* sp., *Nais* sp., *Enchytraeus* sp. and *Lumbriculus* sp. were determined as a result of the fauna research of Lake Gölcük (Geldiay and Tareen, 1972). *Monopylephorus irroratus* was recorded from Lake Hazar by Şahin and Baysal (1972). Ustaoglu (1980) reported *Tubifex tubifex* and *Limnodrilus hoffmeisteri* in Karagöl (Yamanlar, İzmir). *Nais* sp., *Tubifex tubifex*, *Psammoryctides moravicus*, *Limnodrilus hoffmeisteri*, *Limnodrilus udekemianus*, *Pelosclex ferox*, *Haplotaxis gordioides* and *Eiseniella tetraedra* were reported by Kazancı and Girgin (1998) in Ankara Stream. Kirgiz (1988) cited 4 species of Oligochaeta, *Potamothrix hammoniensis*, *P. bavaricus*, *Tubifex* sp. I and *Tubifex* sp. II, in Seyhan Dam Lake. Turhan (1992) determined 7 Oligochaeta species in Lake Eğirdir. Five species of Naididae (*Stylaria lacustris*, *Homochaeta naidina* Bretschler, 1896, *Pristinella menoni*,

P. bilobata and *Uncinaiis uncinata* Ørsted, 1942) and 4 Aeolosomatid species (*Potamodrilus fluviatilis* Lastockin, 1935, *Aeolosoma tenebrarum* Vejdovsky, 1880, *A. headleyi* Beddard, 1888 and *A. variegatum* Vejdovsky, 1885) were recorded by Balık et al. (1999). Thirty-five Naididae species were listed in a zoogeography course book by Naime Arslan (Demirsoy, 1999). However, *Chaetogaster limnaei* was not found in the Sakarya river system: this is a printing error. Balık et al. (2000) reported 2-3 species of Oligochaeta from Lake Işıkli and 2 of them, *Pristinella acuminata* (Liang, 1958) and *Vejdovskyaella comata* (Vejdovsky, 1883), were determined as new records for Turkey. In addition, Balık et al. (2001) determined 16 species from Sazlıgöl (Menemen, İzmir) and 7 of them, *Enchytraeus albidus* Henle 1837, *Tubifex nerthus*, *Dero dorsalis* Ferroniere, 1899, *Dero digitata* (Müller, 1773), *Psammoryctides albicola* (Michaelsen, 1901), *P. deserticola* (Grimm, 1877) and *Quistadrilus multisetosus* (Smith, 1900), were determined as new for Turkey. Due to, the lack of literature, only 9 Naididae species were determined as new for Sakarya River by Polatdemir Arslan and Şahin (2003). *Aulodrilus pigueti* and *A. pluriseta* were identified by Arslan and Şahin (2003) from the upper part of Sakarya River as new records for Turkey.

Materials and Methods

Samples were collected from 79 stations (Figure 1 and Table) by dip net and grab samplers from September 1995 to August 1998. Oligochaeta samples were preserved with 4% formaldehyde in the field and transferred to 70% ethyl alcohol in the laboratory. Temporary preparation was made by Amman's lactophenol and Oligochaetes were mounted in polyvinyl lactophenol solution or Canada balsam after dehydration. Species were identified mainly according to Sperber (1948), Hiltunen and Klemm (1980), and Brinkhurst and Jamieson (1971). The body length and width were measured using an ocular micrometer. All figures were drawn by means of a camera lucida.

Among the 79 stations in the Sakarya River Basin where the Oligochaeta samples were collected, the 42 stations where new Oligochaeta species for the fauna of Turkey were found are indicated in the Table.

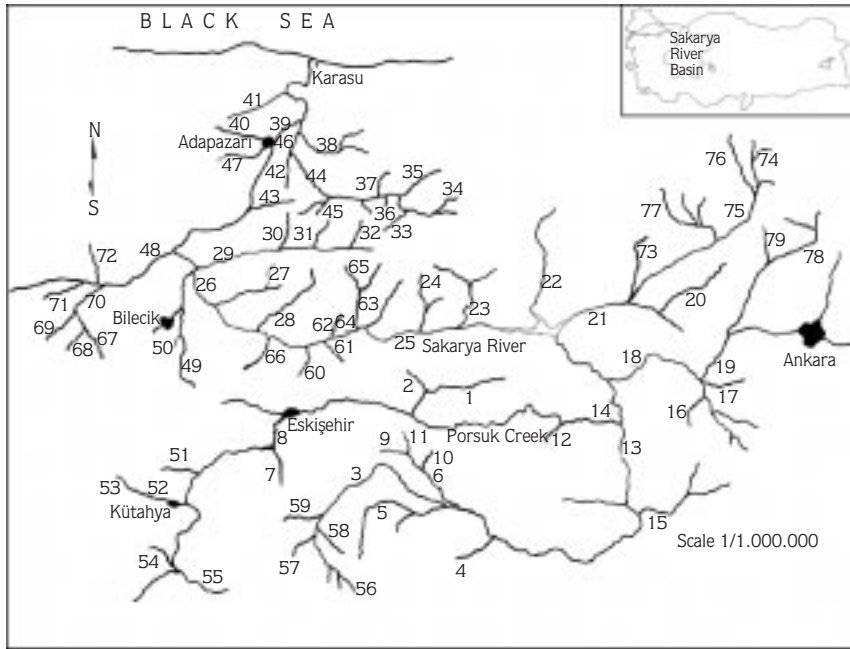


Figure 1. Map showing of the Sakarya River Basin and corresponding sample stations.

Results

Thirty-four species of Naididae were determined from Sakarya River Basin. Due to the lack of literature, only 9 Naididae species (*Ophidonais serpentina* (Müller, 1773), *Stylaria lacustris* Lamarck, 1816, *Nais pardalis* Piguët, 1906, *Nais variabilis* Piguët, 1906, *Pristinella jenkinæ* (Stephenson, 1931), *Pristina foreli* (Piguët, 1906), *P. longiseta longiseta* Ehrenberg, 1824, *P. proboscidea* Beddard, 1896 and *P. aquiseta* Bourne, 1891) were published as new for the Sakarya River by Polatdemir Arslan and Şahin (2003). Ten species of Naididae, i.e. *Chaetogaster diaphanus*, *Homochaeta naidina*, *Stylaria fossularis*, *Uncinais uncinata*, *Nais elinguis*, *Pristina longiseta (leidyi form)*, *Slavina appendiculata*, *Pristinella osborni*, *P. menoni* and *P. bilobata*, should have been added; therefore, these 10 species are also new for the study area. Among the 34 Naididae species, 15 are new records for the inland water Oligochaeta fauna of Turkey. In addition, 3 genera, *Paranais*, *Spericaria* and *Allonais*, are also new for Turkey.

The morphological characteristics of the species are as follows:

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: Naididae

Genus: *Chaetogaster* von Bear, 1827.

Chaetogaster langi Bretscher, 1896

Material examined: In the samples collected during the research period, *C. langi* was found at 1 station only, Sarıcalar Stream (Table).

Description: $l(p)$: 2 mm; $d(p)$: 0.5 mm; s : 20.

Prostomium is inconspicuous. Ventral setae are in segment II 6 (Figure 2a) and 3-4 per bundle in other segments. The lengths of setae in II are less than 90 μ m, upper tooth longer than the lower, and ventral setae of VI up to 60 μ m long, slightly thicker than the others. All measurements are within the published range.

Brinkhurst and Wetzel (1984) suggested that *C. langi* and *C. diastrophus* are synonyms.

Genus: *Paranais* Czerniavsky, 1880

Paranais frici Hrabec, 1941

Material examined: Nineteen samples collected from mud and among aquatic plants (Table).

Table. The stations at which new Naididae species for Turkish fauna were found, in Sakarya River Basin.

Sn	Stream/River	Cl	Pf	Nc	Nb	Np	Ns	Nbr	Df	Db	Sj	Pa	Pr	Ps	Ap	Ag	A	L
1	Başören S.					2											39° 53	31° 06
2	Osmaniye S.				2												30° 53	39° 52
6	Sarısu S.			3													31° 07	39° 28
7	Porsuk S.				5			11						1			30° 18	39° 38
8	Porsuk S.				6			20									30° 28	39° 44
9	Akyurt S.					2											31° 01	39° 23
10	Şerefiye S.					5						4		1			31° 03	39° 39
11	Sarısu C.				3							3					30° 50	39° 32
13	Sakarya R.			3	2												31° 59	39° 40
15	Ilıcaözü S.				2												32° 07	39° 23
17	Ankara S.										2			1	1		39° 52	39° 52
20	Ayaş S.				3												32° 23	40° 09
22	Aladağ S.				4												31° 42	40° 17
23	Nallı S.				4												31° 21	40° 15
25	Çolak S.														1		30° 46	40° 06
28	Akçay S.					3											30° 33	40° 18
30	Güllük S.							5									30° 42	40° 29
32	Akçaalan S.				7												30° 56	40° 31
33	Mudurnu S.				5			6									31° 04	40° 29
38	Dinsiz S.						2	4									30° 45	40° 45
41	Acıemlalık S													2			30° 20	40° 54
42	Kayalar S.						2										30° 29	40° 43
44	Kanlıçay S.					4											30° 30	40° 34
46	Göcek S.						3										30° 34	40° 43
48	Göksu S.		3						2	1							29° 56	40° 22
51	Sobran S.			4											2		29° 57	39° 44
52	Akse S.														2		29° 50	39° 28
53	Enne S.														2		29° 39	39° 32
55	Alibeyköy S.										2						30° 07	39° 06
57	Akın S.			5													30° 24	39° 20
58	Kayır S.			3													30° 37	39° 12
59	Seydi S.			5													30° 45	39° 30
63	Çatak S.			3													30° 48	40° 13
64	Sakarya R.		5														30° 52	40° 03
65	Sarıcalar S.	1															30° 42	40° 18
68	Akçasu S.			2													29° 31	40° 03
70	Kocasu S.				8			8									29° 30	40° 09
71	Çeltikçi S.													1			29° 32	40° 16
72	Göksu S.		5	3													29° 37	40° 19
73	Süvari S.				7												32° 05	40° 16
75	Kocaçay S.				11												32° 37	40° 35
76	Bulak S.		6	2													32° 35	40° 36
Total		1	19	33	69	16	7	54	2	1	4	7	6	3	3	2		

Abbreviations: Sn: Station number, S: Stream, R. River, A: Altitude, L: Latitude, Cl: *Chaetogaster langi*; Pf: *Paranais frici*; Nc: *Nais communis*; Nb: *Nais barbata*; Np: *Nais pseudobtusa*; Ns: *Nais simplex*; Nbr: *Nais btretscheri*; Df: *Dero (Aulophorus) furcata*; Db: *D.(A.) borellii*; Sj: *Spericaria josinae*; Pa: *Pristinella amphibiota*; Pr: *P. rosea*; Ps: *P. sima*; Ap: *Allonais pectinata*; Ag: *A. gwaliorensis*.

Description: l (p): 2-2.5 mm; d(p): 0.3 mm; s: 16-21.

Prostomium inconspicuous. Eyes absent. Worms are dark yellow, body wall with thin layer of foreign matter. Ventral setae of II 2 or 4 per bundle, 90-100 µm long, with median nodulus and upper tooth at least twice as

long as the lower (Figure 2b), the ratio of teeth 6-7 µm /2.5-3.5 µm. In all other bundles apart from ventral of V, 2 setae per bundle, all with upper tooth distinctly longer than lower (Figures 2c-e). In II-IV ventral setae are 87-93 µm long and with teeth 5-6 µm/2-2.5 µm. Ventral setae of V, 3 per bundle, 87-90 µm long with distal

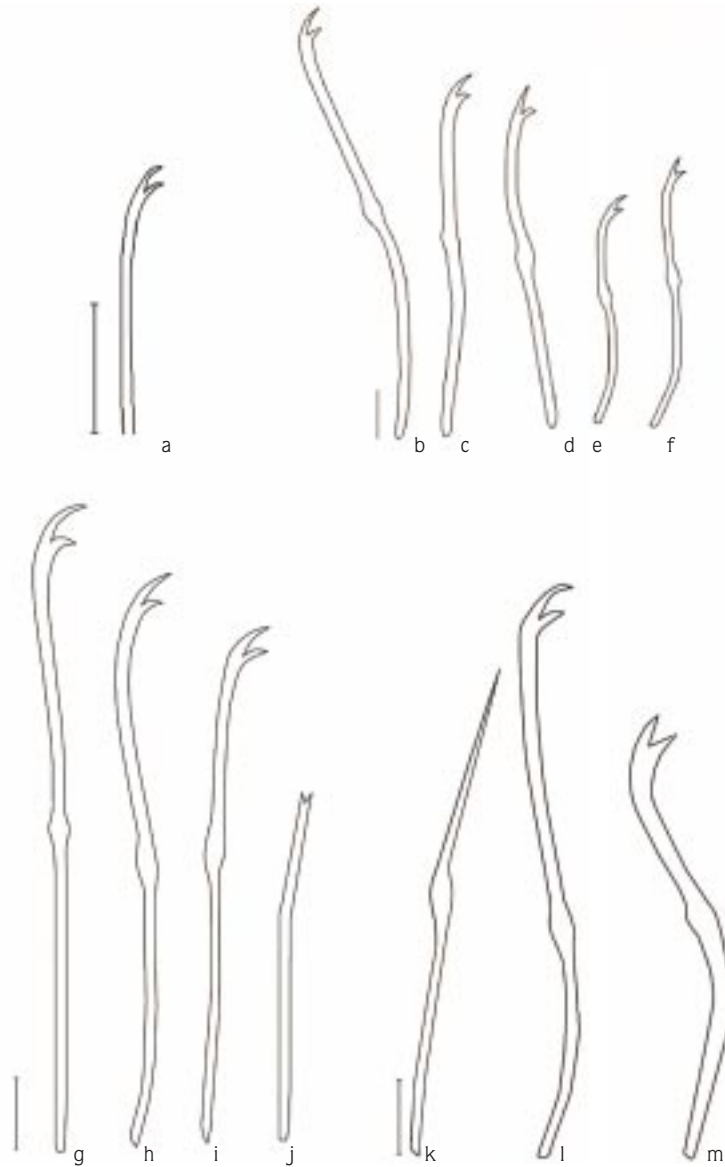


Figure 2. *Chaetogaster langi* a-distal end of ventral setae; *Paranais frici* (b-f): b-ventral setae in II, c-ventral setae in III, d-posterior ventral setae, e-posterior ventral setae, f-dorsal setae in V; *Nais communis* (g-j): g-ventral setae in II, h-ventral setae in V, i-posterior ventral setae, j-dorsal setae in VII; *N. barbata* (k-m): k-needle setae in VII, l-ventral setae in II, m-ventral setae in VII. Scales: a, 20 µm; b,c,d,g,h and i, 10 µm; e,f,j,k,l and m 15 µm.

nodulus. Dorsal setae from V. Dorsal bundles in V composed of 3 bifid setae (Figure 2f), 80-85 µm long, with distal nodulus, upper tooth longer than lower. Those of the following segments 2 per bundle, 70-80 µm long, with distal nodulus, upper tooth longer than lower and number of dorsal setae decreasing towards posterior segments.

All measurements are within the published range. Sperber (1948) indicated that the setae of *P. frici* reached 105 µm in II, the others being a little shorter. Brinkhurst and Coates (1985) reported that the length of setae in II was 99 µm, 87 µm in III-IV and after VI, 93 µm long. Timm (1999) cited ventral setae in II 2-4, almost straight, 85-105 µm long, dorsal bundles of V 1-3, 73-90 µm; further back only 1-2 setae per bundle. The form, structure and length of setae in the Sakarya River sample closely agree with previous descriptions.

Genus: *Nais* Müller, 1773

Nais communis Pignet, 1906

Material examined: Thirty-three samples were collected from both sandy-gravel substrata and filamentous algae from 10 stations (Table).

Description: l(p): 1.4-2.35 mm; d(p): 0.25-0.33 mm; s: 18-20.

Worms light yellow. Eyes present (except 1). Ventral setae are 4 per bundle, not decreasing in posterior segments; 80-92 µm long, with proximal nodulus in II-V and upper tooth longer, thinner than lower (Figures 2g-h), in others 64-81 µm long, with distal nodulus and upper tooth thinner and slightly longer than lower (Figure 2i). Dorsal setae from VI, 1(2) hair setae and 2 needle setae per bundle. Hair setae 95-200 µm long; needle setae, 52-70 µm long, with nodulus 1/3 distal end, the divergent teeth of the needle clearly visible at 40x (Figure 2j).

Harman et al. (1979) indicated that the length of hair setae was 240-290 µm long, needle setae 67-70 µm; Naidu and Naidu (1981) reported that they reached a maximum of 140-180 µm and 50-60 µm long respectively. Grimm (1987, 1988) described the setal characteristics as follows: ventral setae between II and V 2-6, 83-94 µm, others 2-9, 62-85 µm (mean 76 µm), needle setae 48-68 µm (mean 58 µm) and hair setae 146-203 µm (mean 185 µm) long. All measurements are within the published range but the needle setae in the

present samples are longer (only 2 µm) than those in African samples described by Reinmar.

Nais communis samples were collected from sandy and gravel substratum from 10 different stations. One of them was a stream in which sewage is discharged. Learner et al. (1978) reported an increase in abundance on stony substrates of rivers under conditions of organic enrichment. Our findings support this result.

Nais communis can be confused with *N. variabilis* samples. The latter was identified by Polatdemir Arslan and Şahin (2003). The largest difference between the 2 species can be observed when the worms are alive, because *N. variabilis* swims with spiral movements with the oesophagus abruptly dilating to the midgut while *N. communis* is not able to swim and the oesophagus gradually dilates to the midgut. In addition, in the former, teeth of needle setae finely bifid and sometimes hardly distinguishable; latter needle setae with divergent teeth and distinct.

Nais barbata Müller, 1773

Material examined: Worms were collected from sandy and muddy substratum.

Description: l (p): 1.4-2.3 mm; d (p): 0.2-0.3 mm; s: 18-22.

Worms are yellow with light brown pigment in anterior segments. Eyes present (except in 2 specimens). Dorsal setae begin in VI, each bundle with 1(2) stiff hair setae 200-252 µm long and 2(3) simple-pointed, sharp tip needle setae of 80-110 µm long, with median nodulus (Figure 2k). Ventral setae are 3(4) per bundle, decreasing to 2-1 in posterior segments; in II-V thin, long, straight and distinct from the rest, 105-120 µm long, with proximal nodulus and less curved with upper tooth longer and thinner than the lower (Figure 2l); in others thicker than the preceding ones, 70-90 µm long, with median or slightly distal nodulus and with teeth about equally long (or lower tooth slightly shorter than the upper), lower tooth much stouter (Figure 2m).

All measurements are within the published range except for the minimal length of ventral setae and hairs.

Nais pseudobtusa Pignet, 1906

Material examined: Sixteen samples were collected from 5 stations (Table).

Description: l (p): 1.5-5.5 mm; d(p): 0.2-0.3 mm; s: 18-22.

Ventral setae of II-V, 3-5 per bundle, up to 100 µm long, longer and straighter than the rest (Figure 3a). From VI on, shorter and slightly thicker than the former, 50-85 µm (Figure 3b). Upper teeth of all ventral setae 1-1.5 longer than the lower one. Dorsal setae begin in VI and consist of 2-3 hair setae and 2-3 needle setae. Hair setae non-serrated and up to 250 µm long, hair-like and simple pointed needle setae are 70-90 µm long, with distinct nodulus at 1/3 of the setal length (Figure 3c).

The measurements in the present sample do not deviate significantly from those published.

N. pseudobtusa is much less common in our research area than *N. barbata*. Furthermore, the number of samples is lower (Table).

Nais simplex Piguët, 1906

Material examined: Seven samples were collected from 3 stations (Table).

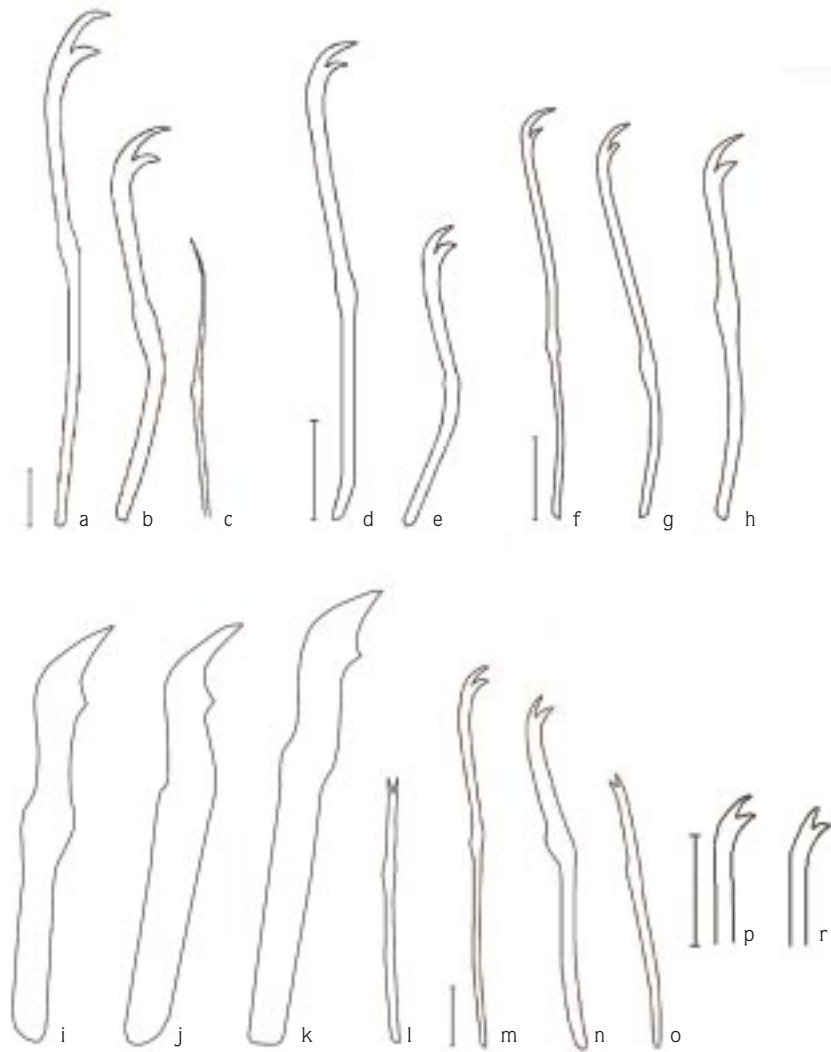


Figure 3. *Nais pseudobtusa* (a-c): a-ventral setae in II, b-posterior ventral setae, c-distal end of the needle setae; *N. simplex* (d-e): d-ventral setae in II, e-ventral setae in VII; *N. bretscheri* (f-l): f-ventral setae in II, g-ventral setae in IV, h-ventral setae in VI, i,j,k-single giant setae, VIII, IX and X respectively, l-needle setae; *Dero (Aulophorus) furcatus* (m-o): m-ventral setae in II, n-posterior ventral setae, o-needle setae; *Dero (Aulophorus) borellii*: p-distal end of ventral setae in anterior, r-distal end of ventral setae in posterior. Scales: a-c and m-r 10 µm; h-l 15 µm; d-g 20 µm.

Description: l (p): 3.4-5.1 mm; d (p): 0.2-0.3 mm; s: 20-30.

Body surface is smooth. Ventral setae between II and V 3-5 per bundle, up to 110 µm, upper tooth about twice as long as lower. Ventral setae of II-V are longer, straighter and thinner than the rest (Figure 3d). From VI on, the ventral setae in each bundle are shorter and thicker than anterior ones (Figure 3e). In addition, their teeth are equally long. Ventral setae of VI up to 90 µm long, those of following segments up to 85 µm long. Dorsal bundles consist of 1-2 non-serrated hair setae and 2 needle setae, 60-72 µm long. Hair setae up to 220 µm.

The form, structure and length of setae in Sakarya River samples closely agree with previous descriptions.

Nais bretscheri Michaelsen, 1899

Material examined: Fifty-four samples were collected from sandy-gravel substrates and among aquatic plants (Table).

Description: l (p): 2-3 mm; d (p): 0.2-0.3 mm; s: 20-39.

Whole body of worms brown pigmented or dark yellow and anterior end pigmented. Eyes present (except in 2 specimens). Ventral setae (Figures 3f-g) are 4-6 in II-V, 100-110 µm long, very thin, 1.5-1.7 µm thick, upper tooth about 2-3 times as long as lower and curved, ratio of teeth in II-V, 7-8/2.5-3 µm; those of following segments 1-4 per bundle, ventral setae in VI, 3-4 per bundle, 60-70 µm long, 2.5-3 µm thick, with upper tooth 2-3 times as long as lower, but thinner (Figure 3h); in VII, 2 per bundle, longer and thicker than the former, 85-92 µm long, 4.5-6 µm thickness with distal nodulus, with upper tooth 3-4 times as long as lower; in VIII, IX, X (XI, XII) single giant setae, 100-110 µm long, 7-9 µm thick, with distal tooth more or less bent at the base, distal tooth 12-13 µm long and proximal tooth reduced (Figures 3i-k). Ventral setae are 1-2 per bundle in posterior segments. All samples are with giant setae. Dorsal setae from VI, 1 hair and 1 needle setae per bundle. Hair setae simple, short, 92-105 µm long, needle setae (Figure 3l) bifid, with equal, parallel teeth, 55-65 µm long, with nodulus 1/3 from distal end.

Sperber (1948) stated that this species was extremely variable with respect to its ventral seta and the distal tooth of giant setae reached 15 µm in VIII-IX (in present samples the maximal length of the distal tooth was up to

13 µm). He also described the length of setae as follows: ventral setae of II-V 75-100 µm, thick setae 78-86 µm, giant setae 112-120 µm, needles 73 µm and hairs about 135 µm. The ventral setae of II-V and needles are longer but the ventral setae in VI are shorter than those given by Sperber.

Nais bretscheri is one of the most common and abundant species in many freshwater habitats in the research area. Samples were collected from sandy-gravel substrates and among aquatic plants from 6 stations (Table). In addition, *Nais bretscheri* was less abundant, especially in gravel substratum. Chekanovskaya (1962) indicated that stony substrata (rocky and pebbly) have the lowest population density (especially of *N. bretscheri*). Our findings support this finding.

Genus: *Dero* Oken, 1815.

Subgenus: *Aulophorus* Schmarda, 1861.

Dero (Aulophorus) furcatus (O. F. Müller, 1773)

Material examined: Two worms were found at only 1 station, collected from muddy substratum (Table).

Description: l (p): 3.5-4 mm; d (p): 0.2 mm; s: 35-39 +Branchial organ.

Prostomium is roughly triangular. Eyes absent. Ventral setae are 4-5 per bundle, in II-V up to 75 µm long with median nodulus, upper tooth slightly longer than lower; in other segments equal to the lower tooth and thinner (Figures 3m-n). Branchial fossa with 3 pairs of gills and 1 pair of palps. Dorsal bundles start in V, each with 1 hair seta 150-155 µm long, and 1 bifid needle (Figure 3o) 47-55 µm long with distal nodulus 2/5 from distal end and upper tooth slightly shorter and thinner than lower.

All measurements fall well within the published ranges. In addition, Grimm (1989) observed that the length of needle setae shorter than 60 µm in many African *Aulophorus furcatus* samples (87.5%); the needle setae in the present samples are also shorter than 60 µm.

The species is reported to be tolerant of severe pollution, and has been found in a stream degraded by industrial effluents (Maciorowski et al., 1977; Harman, 1979). Our samples were also found in the muddy substratum at 1 station in which wastewater was discharged.

Dero (Aulophorus) borellii Michaelson, 1900

Material examined: One sample was found in only 1 station, collected from muddy substratum (Table).

Description: l (p): 3.7 mm; d (p): 0.2 mm; s: 33.

Eyes absent. Dorsal setae beginning in V and each bundle composed of 1 hair and 1 bifid needle seta, up to 50 µm, with teeth equally long. Ventral setae are 4 per bundle, in II-V, with median or slightly distal nodulus, upper tooth as long as or slightly longer and thinner than lower teeth. In posterior segments the number of ventral setae decrease, nodulus at distal and teeth equal (Figures 3p-r). Four pairs of ridge-like gills.

Genus: *Spericaria* Sperber, 1939

Spericaria josinae (Vejdovsky, 1883)

Material examined: Four samples were collected from 2 stations (Table).

Description: l (p): 4-4.5 mm; d (p): 0.3-0.4 mm; s: 20-28.

Eyes absent. Ventral bundles consist of 4-8 setae per bundle, up to 80 µm, similar in all segments and with slightly distal nodulus. Distal teeth of ventral setae are slightly longer than lower ones (Figure 4a). Dorsal setal bundles composed of 3-5 hair setae, 140-170 µm, and 3-5 bifid needle setae, up to 70 µm long and teeth about equally long (Figure 4b). Needle setae are similar to ventral setae but finer and straighter than the ventral setae. All measurements fall well within the published ranges.

Genus: *Pristinella* Brinkhurst, 1985

At present, the subfamily Pristinane consists of *Pristina* Ehrenberg, 1828 and *Pristinella* Brinkhurst, 1985 (Brinkhurst, 1985). The main difference between the 2 genera is the presence of a proboscis on the prostomium in *Pristina* and its absence in *Pristinella* (Collado and Schmelz, 2000). Authors in the literature indicated that the combination of characters in the new species, *Pristina silvicola*, invalidates *Pristinella* as a genus

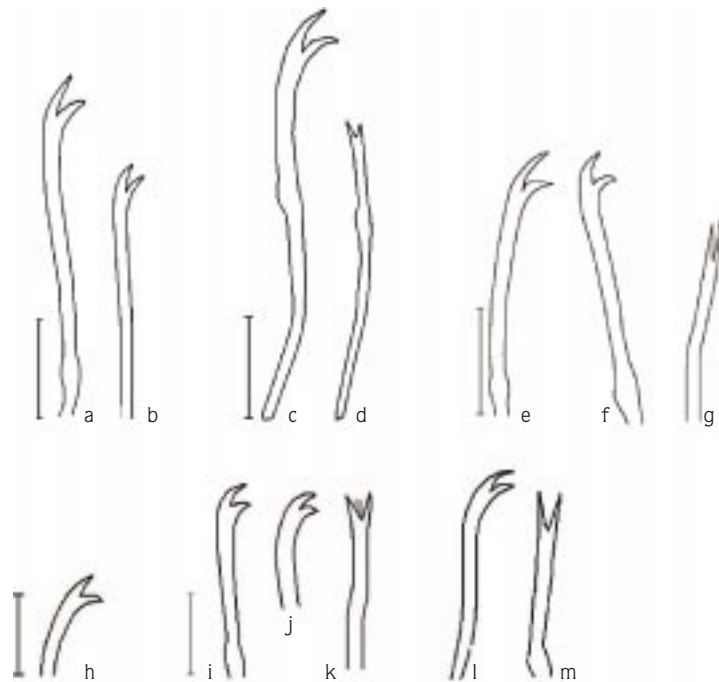


Figure 4. *Spericaria josinae* (a-b): a-distal end of anterior ventral setae, b-dorsal setae; *Pristinella amphibiotica* (c-d): c-ventral setae, d-needle setae; *P. rosea* (e-g): e-distal end of anterior ventral setae, f-distal end of posterior ventral setae, g-needle setae; *P. sima* (h): h-distal end of anterior ventral setae; *Allonais pectinata* (i-k): i-distal end of anterior ventral setae, j-distal end of posterior ventral setae, k-needle setae; *A. gwaliorensis* (l-m): l-distal end of anterior ventral setae, m-needle setae. Scales: 10 µm.

separate from *Pristina*, and both genera are reunited as *Pristina*.

Pristinella amphibiotica (Lastockin, 1927)

Material examined: Seven samples were found at only 2 stations (Table).

Description: l (p): 4-5 mm; d (p): 0.2-0.3 mm; s: 20-25.

No proboscis. Ventral bundles consist of 4-6 setae with distal nodulus (Figure 4c), 40-55 µm, in anterior segments upper tooth of ventral setae equal to lower one but in posterior segments shorter. Dorsal bundles composed of 1(2) non-serrated hair seta, up to 140 µm and 1(2) bifid needle setae, upper tooth shorter than lower, teeth not parallel with conspicuous distal nodulus, 35-45 µm long (Figure 4d).

Sperber (1948) indicated that the needle seta in IV (and V) was longer and thicker than in other segments but this characteristic was not observed in the present samples.

P. rosea (Piguet, 1906)

Material examined: Six samples were collected from 3 stations (Table).

Description: l (p): 4-4.5 mm; d (p): 0.2-0.3 mm; s: 20-22.

No proboscis and prostomium short. Ventral bundles composed of 3-5 setae, 40-50 µm, with distal nodulus and upper tooth longer than lower but in posterior segments equal or upper tooth slightly longer than the lower (Figures 4e-f). Dorsal bundles consisting of 1(2) hair setae, up to 220 µm long and 1(2) needle setae, 45-65 µm. The needles have distal nodulus, fine teeth, the proximal tooth being longer than the distal (Figure 4g).

The measurements in the present samples agreed with those given by Sperber (1948) and Timm (1999). However, the maximal lengths of needle and hair setae in our samples are shorter than those given by these authors.

P. sima (Marcus, 1944)

Material examined: Four samples were found at only 2 stations (Table).

Description: l (p): 2-2.5 mm; d (p): 0.1 mm; s: 18-22.

No proboscis and prostomium rounded. Dorsal bundles composed of non-serrated 1 hair setae (85-145 µm), its length decreases in posterior segment, the longest hair setae are in II-V, and 1 or 2 (generally 1) needles. Teeth of needles are diverging, upper tooth markedly shorter and thinner, usually 2 or 3 intermediate teeth and marked nodulus at distal end. Ventral setae 4-5 per bundles (up to 40 µm) but in posterior segments generally 4. In anterior segments (II-VII) upper tooth longer than lower (Figure 4h), and smaller in posterior segments.

Brinkhurst and Marchese (1989) suggested the synonymy of *P. sima* and *P. minuta* with *P. osborni*. However, Rodriguez (2002) indicated that *P. sima* can be clearly separated from these species by the characteristic bayonet-like form of the needles, with teeth longer and markedly unequal compared with those in *P. osborni* and *P. minuta*. Unequal teeth of needle setae were observed in the present samples. All measurements fall well within the published ranges.

Genus: *Allonais* Sperber, 1948

Allonais pectinata (Stephenson, 1910)

Material examined: Three samples were collected from 3 stations (Table).

Description: l (p): 2.5-3 mm; d (p): 0.3 mm; s: 21-28.

Ventral bundles composed of 4-5 setae in anterior segment, with upper tooth slightly longer and thinner than lower, in posterior segments thicker than anterior ventral setae and teeth about equal (Figures 4i-j). Dorsal bundles beginning in VI, 1-hair setae and 1 or 2 needle setae per bundle. Needle setae with fine intermediate teeth and distal nodulus (Figure 4k), up to 55 µm.

Allonais gwaliorensis (Stephenson, 1920)

Material examined: Two samples collected from 2 stations (Table).

Description: l (p): 2.1-2.5 mm; d (p): 0.3 mm; s: 26-30.

Ventral bundles composed of 4-6 setae, up to 60 µm (Figure 4l), setae in anterior segment thinner than those following, nodulus at median and upper tooth longer than lower; in posterior with distal nodulus and teeth about equal. Dorsal setae begin in VI with 1 smooth hair and 1(2) needle setae. Needle setae bifid, with distal nodulus and upper tooth slightly longer than lower (Figure 4m).

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