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## Aquatic Oligochaeta (Naididae) of Washington

### Abstract

Ten species of Naididae are reported from Washington; of these, six have not been previously reported from the state (*Chaetogaster cristallinus*, *Nais behningi*, *Nais pseudobtusa*, *Nais variabilis*, *Stylaria fossularis*, *Stylaria lacustris*). Possible synonymy of *S. fossularis* with *S. lacustris* is suggested from identical or overlapping setal characteristics between the two species, and collection of both species from the same habitats. North American distributional records of Washington specimens are discussed in addition to morphological characteristics of each species. A key to naidids known to occur in the state is included.

### Introduction

Few records of naidid oligochaetes have been reported from Washington. Altman (1936) lists five genera and six species as being present in the state. Hiltunen and Klemm (1980) report an additional species bringing the total to seven. During May 1982, Naididae were collected from 11 freshwater localities in western Washington. Ten species were collected; of these, six have not been previously reported from the state.

### Methods

Samples were fixed in 10 percent formalin after collection. Worms were dehydrated in an ascending ethanol series, cleared in methyl salicylate, and mounted whole in Permount (Fisher Scientific Co.). Voucher specimens are in the possession of the author.

### Species Accounts

*Chaetogaster cristallinus* Vejdovsky, 1883

Kitsap County: Square Lake, 25 May 1982 (4 specimens).

No dorsal setae present. Prostomium inconspicuous, with a median incision, clearly seen in specimens collected. This incision, located in the middle of the frontal contour of the prostomium has been used by some researchers as a non-failing character for the species (Brinkhurst and Jamieson 1971, Sperber 1948). Other researchers (Elrick 1976, Poddubnaya 1966) have found the median incision to be an unreliable character; also, depending on the orientation of the mounted specimen, the incision can be difficult to see.

Ventral setae in II, 10-11 per bundle, 192-214  $\mu\text{m}$  in length. Posterior setae range from 108-138  $\mu\text{m}$  in length with 6-7 setae per bundle. The setal lengths of II seem to conform better to those given for *Chaetogaster diaphanus* in the literature, while the posterior setal lengths fall within ranges recorded for *C. cristallinus*, albeit at the upper end of the range (Elrick 1976, Sperber 1948).

Also, 7 setae per bundle for posterior setae has not previously been recorded for *C. crystallinus* (Elrick 1976). This poses a problem in assigning the specimens to *C. crystallinus*, although other worms collected and assigned to *C. diaphanus* show distinct differences in number of setae per bundle, have slightly larger maximum setal measurements in II, and show no signs of a median incision in the prostomium. Examination of gut contents in *C. crystallinus* revealed detritus and chydorid cladocerans.

*C. crystallinus* is known in the Yukon and Northwest Territories, the Great Lakes and eastward (Hiltunen and Klemm 1980), and Colorado (Elrick 1976). The occurrence of this species in Washington extends to the south its known western distribution.

*Chaetogaster diaphanus* (Gruithuisen 1828)

Kitsap County: Horseshoe Lake, 25 May 1982 (2 specimens); Square Lake, 25 May 1982 (4 specimens). Mason County: Haven Lake, 30 May 1982 (5 specimens).

No dorsal setae present. Prostomium inconspicuous, without a median incision. Setae in II, 8-9 per bundle, and range from 190-232  $\mu\text{m}$  in length. Posterior setae are 8-9 per bundle and are from 104-128  $\mu\text{m}$  in length. All setal measurements fall within previously reported values, as do number of setae (Elrick 1976, Sperber 1948). Gut contents consisted of detritus, diatoms, and chydorid cladocerans.

Distribution of this species is widespread (Brinkhurst 1964, Hiltunen and Klemm 1980) and has been reported from Washington by Altman (1936).

*Chaetogaster limnaei limnaei* Von Baer, 1827

Kitsap County: Square Lake, 25 May 1982 (2 specimens).

Worms were found epizoic on a physid snail. No dorsal setae present. Setae in II are 9-10 per bundle and are arranged in a semi-circle. Length of setae are from 80-128  $\mu\text{m}$ . Posterior setae are 4-7 per bundle and range from 104-124  $\mu\text{m}$  long. The teeth of the setae are strongly hooked (Gruffydd 1965, Sperber 1948). Setal measurements for Washington specimens are longer than those reported by Gruffydd (1965) in Britain, and by Elrick (1976) in Colorado. No contents were noticed in the gut of the specimens collected.

Distribution of *C. limnaei limnaei* is widespread (Brinkhurst 1964, Hiltunen and Klemm 1980) and this naidid has been reported from Washington by Altman (1936).

*Nais behningi* Michaelsen, 1923

Kitsap County: Blackjack Creek, 25 May 1982 (1 specimen). Mason County: Mission Creek, 30 May 1982 (3 specimens); Union River, 30 May 1982 (27 specimens).

Eyes present. Purple pigmentation present in the anterior segments. Dorsal setae hairs and needles 1-2 per bundle; needles are simple-pointed. Needles 38-54  $\mu\text{m}$  in length, hairs 180-220  $\mu\text{m}$  long. Hairs are within reported ranges; needles are shorter than reported by Sperber (1948). Ventral setae in II-V, 5-7 per bundle, strongly curved, longer, and thinner than posterior setae; the distal tooth is much longer than the proximal tooth. Ventral setae II-V from

132-148  $\mu\text{m}$  long; Sperber (1948) reports them to be about 120  $\mu\text{m}$  long. Posterior ventrals are 5 per bundle and range from 120-130  $\mu\text{m}$  in length which is again longer than reported by Sperber (1948). Gut contents consisted of detritus and diatoms.

Hundreds of *N. behningi* were collected in the Union River. Densities were extremely high in the top 1 cm of substrate, especially where algae was present. Distribution is widespread (Hiltunen and Klemm 1980) although this is the first report of this species from Washington.

*Nais communis* Piguët, 1906

Kitsap County: Square Lake, 25 May 1982 (2 specimens). Mason County: Mission Creek, 30 May 1982 (1 specimen); Tahuya River, 30 May 1982 (1 specimen); Haven Lake, 30 May 1982 (1 specimen); pond off Elfendahl Pass Road by Tahuya River land development, 30 May 1982 (1 specimen); Wooten Lake, 30 May 1982 (6 specimens).

Eyes present or absent (2 specimens). Dorsal setae; hairs 1 per bundle, 244-294  $\mu\text{m}$  in length. Needles with diverging teeth, 2 per bundle, and 50-88  $\mu\text{m}$  long. Hair length is longer than in most reported literature (Sperber 1948), although similar to what was found by Harman, *et al.* (1979) for Texas collections. Ventral setae, 4-6 per bundle; those in II-V are essentially the same size and shape as in VI. Length of distal tooth in VI, and posteriad, approximately equal to proximal tooth. Setae are from 76-110  $\mu\text{m}$  in length, which is longer than elsewhere reported. Gut contents were composed entirely of detritus.

Distribution of *N. communis* is widespread (Brinkhurst 1964, Hiltunen and Klemm 1980) and has been reported from Washington by Altman (1936).

*Nais pseudobtusa* Piguët, 1906

Kitsap County: Square Lake, 25 May 1982 (4 specimens); Wye Lake, 25 May 1982 (2 specimens). Mason County: pond off Elfendahl Pass Road by Tahuya River land development, 30 May 1982 (3 specimens).

Eyes present. Dorsal setae consist of needles and hairs, 1 per bundle. Needles are simple pointed and 46-54  $\mu\text{m}$  in length; hairs are from 150-190  $\mu\text{m}$  long. Both needle and hair lengths are somewhat shorter than previously reported (Sperber 1948). Ventral setae, 3 per bundle; anterior ventrals are from 52-56  $\mu\text{m}$  long; posterior ventrals measure 48-52  $\mu\text{m}$  in length. Ventral setal measurements are also somewhat shorter than reported in the past; those of II-V are straighter and more slender than setae posteriad. Detritus and diatoms were present in the digestive tract.

Distribution of *N. pseudobtusa* is given by Hiltunen and Klemm (1980) to be: Richmond, Virginia; Lincoln Parrish, Louisiana; St. Mary's River, Chippewa County, Michigan; British Columbia, and northwest Canada. This is a new record for Washington and extends the known range of the species to the south of its present western distribution.

*Nais variabilis* Piguët, 1906

Kitsap County: Long Lake, 25 May 1982 (3 specimens); Square Lake, 25 May 1982 (2 specimens). Mason County: Haven Lake, 30 May 1982 (5 specimens); Wooten Lake, 30 May 1982 (4 specimens).

Eyes present. Dorsal setae consist of 1 needle and hair per bundle. Needles with essentially parallel teeth; length is from 54-60  $\mu\text{m}$ . Hairs are from 150-280  $\mu\text{m}$  long. Ventral setae are 4 per bundle, those of II-V are longer and thinner than setae posteriad. Setae of II-V measure 104-122  $\mu\text{m}$  in length; VI-posteriad measure 88-110  $\mu\text{m}$  long. Distal tooth of ventral setae VI-posteriad are equal to or slightly shorter than proximal tooth. All setal measurements and numbers are within known ranges. Detritus and diatoms were present within the digestive tract.

Distribution of *N. variabilis* is widespread (Hiltunen and Klemm 1980). No previous record of this species exists from Washington, although it is perhaps the most common of all naidid oligochaetes.

*Pristina leidy* Smith, 1896

Kitsap County: Square Lake, 25 May 1982 (2 specimens). Mason County: Wooten Lake, 30 May 1982 (1 specimen).

No eyes. Prostomium elongated into a proboscis. Dorsal setae beginning in II. Serrations are present on all hair setae except those in II and III; hairs of III greatly elongated. Hairs, 2-3 per bundle; measurements of II are approximately 500  $\mu\text{m}$ , those posteriad range from 262-390  $\mu\text{m}$ . Needles are finely bifid, 2-3 per bundle and range from 38-48  $\mu\text{m}$ . Ventral setae are 5-6 per bundle in II, and 38-48  $\mu\text{m}$  long. Ventrals of posterior are 6-7 per bundle and approximately 50  $\mu\text{m}$  in length. All numbers and measurements of setae are within ranges of North American records (Harman and McMahan 1975). Detritus and diatoms were present in the digestive tract.

Distribution of *P. leidy* is widespread (Hiltunen and Klemm 1980), and Altman (1936) has reported this species as occurring in Washington.

*Stylaria fossularis* Leidy, 1852

Kitsap County: Long Lake, 25 May 1982 (8 specimens). Mason County: Haven Lake, 30 May 1982 (6 specimens).

Eyes present. Proboscis projecting from the tip of the pointed prostomium. Dorsal setae begin on VI; consist of 1 hair and 1-2 needles per bundle. Needles are from 60-92  $\mu\text{m}$  in length; hairs are serrated and range from 278-440  $\mu\text{m}$  long. Needles are longer and hairs are shorter than has been reported by Sperber (1948). The digestive tract contained detritus and diatoms.

*S. fossularis* has been considered a *species inquirenda* by Brinkhurst (Brinkhurst 1964, Brinkhurst and Jamieson 1971), who considers it a synonym of *Stylaria lacustris* (Linnaeus 1767). Distribution of *S. fossularis* includes the Great Lakes and Wisconsin to Louisiana, Alabama, South Carolina, West Virginia, and Maine (Hiltunen and Klemm 1980). This species has also been reported from Pennsylvania, Michigan, Tennessee, and (?) Ohio (Brinkhurst 1964). The presence of *S. fossularis* in Washington greatly extends its range to the west; it was heretofore unreported from the state.

*Stylaria lacustris* Linnaeus, 1767

Kitsap County: Long Lake, 25 May 1982 (2 specimens).

Eyes present. Prostomium elongated into a proboscis which projects from a notch between two lateral lobes. Dorsal setae begin in VI, and consist of 1 hair

and 1-2 needles per bundle. Hairs are 377-560  $\mu\text{m}$  long, finely serrated. Needles are 60-68  $\mu\text{m}$  in length. Ventral setae are 4-6 per bundle, and from 127-158  $\mu\text{m}$  long. Lengths of all setae are somewhat shorter than have been reported in past literature. Gut contents consisted of detritus and diatoms.

Distribution is widespread for *S. lacustris* (Brinkhurst 1964, Hiltunen and Klemm 1980), although it has not been previously reported from Washington.

Numbers of setae are identical between collected specimens of *S. fossularis* and *S. Lacustris*; ranges for setal measurements overlap. *S. Lacustris* does seem to have longer hairs than *S. fossularis*, this being the only noticeable difference. Both species were collected in the same lake and from the same habitats. These factors seem to provide further support for the possible merging of the two species, although evidence provided by collections in this study are certainly not conclusive. Further investigations must be carried out to resolve this question.

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Received October 4, 1982

Accepted for publication January 7, 1983

#### Key to the Naididae of Washington

1	Dorsal setae present	4
	Dorsal setae absent	<i>Chaetogaster</i> 2
2(1)	Teeth of setae strongly hooked. Epizoic on molluscs	<i>Chaetogaster limnaei limnaei</i>
	Teeth of setae not strongly hooked	3
3(2)	Median incision in prostomium	<i>Chaetogaster cristallinus</i>
	Without median incision in prostomium	<i>Chaetogaster diaphanus</i>
4(1)	Segment II with hair setae	<i>Pristina</i> 5
	Segment II without hair setae	6
5(4)	Proboscis present	<i>Pristina leidyi</i>
	No proboscis	<i>Pristina idrensis</i> <sup>a</sup>
6(4)	Proboscis present	<i>Stylaria</i> 7
	No proboscis	8
7(6)	Proboscis arises from a notch in the prostomium between two lateral lobes	<i>Stylaria lacustris</i>
	Proboscis arises from the tip of a pointed prostomium	<i>Stylaria fossularis</i>
8(6)	Posterior end modified to form caudal gills	<i>Dero obtusa</i> <sup>b</sup>
	Posterior end without gills	9

9(8)	More than 3 hair setae per bundle .....	<i>Vejdovskyella</i> sp. <sup>b,c</sup>	
	Less than 3 hair setae per bundle .....	<i>Nais</i>	10
10(9)	Needle setae simple-pointed .....		11
	Needle setae bifid .....		12
11(10)	Ventral setae of II-V extremely reduced in thickness with long thin teeth, the distal tooth very long, the proximal tooth half as long or less .....	<i>Nais behningi</i>	
	Ventral setae of II-V not extremely reduced in thickness with shorter teeth, at a greater angle to each other .....	<i>Nais pseudobtusa</i>	
12(10)	Size and shape of ventral setae in VI are essentially the same as in II-V; teeth of needle setae divergent .....	<i>Nais communis</i>	
	Size and shape of ventral setae in VI are dissimilar to those in II-V; teeth of needle setae not divergent .....	<i>Nais variabilis</i>	

<sup>a</sup>Reported as being collected from King County, Cedar River by Hiltunen and Klemm (1980)—not collected in this study.

<sup>b</sup>Reported by Altman (1936) as present in Washington—not collected in this study.

<sup>c</sup>No species identification was made by Altman (1936).