

Leitoscoloplos pugettensis

A burrowing polychaete worm

Phylum: Annelida
Class: Polychaeta
Order: Orbiniida
Family: Orbiniidae

Taxonomy

In 1957 Pettibone determined that *H. elongatus* was a homonym a different species named *H. elongatus* and was therefore renamed *H. pugettensis* (Blake 1980). *Haploscoloplos* became a junior synonym of *Scoloplos* (for nomenclature see Blake 1980) in 1977 and the genus *Leitoscoloplos* was erected which now includes all former *Haploscoloplos* species with pointed thoracic setae and without parapodial hooks, including *L. pugettensis*.

Description

Size: Individuals range in size from 100–200 mm in length and 3 mm in width (Hartman 1969) with up to 300 setigers (Blake 1996). The specimen examined from Coos Bay was 75 mm long with 136 segments.

Color: When sexually mature, males are pink and females grey (Blake 1980).

General Morphology: Orbiniids can be recognized by their body morphology: anterior region is firm while the abdominal region is fragile, ragged and easily lost and by the presence of camerated and crenulated setae (Blake and Ruff 2007).

Body: Long, slender with 200–300 short segments (Johnson 1901). Body most broad at segments 9–17, narrowing gradually after segment 200.

Anterior: Prostomium small, acutely pointed and conical (genus *Leitoscoloplos*, Day 1977) and with small palpode at apex (Fig. 2a). Peristomium bears one ring and width increases rapidly toward the second segment (Fig. 2a). First segment achaetous (Figs. 1, 2).

Trunk: Thorax composed of 14–21 setigers with transition from thoracic to abdominal region between setigers 15–21 (Hartman 1969). Thoracic dorsum flat and ventrum convex. No ventral papillae in posterior thorax

(genus *Leitoscoloplos*, Day 1977) (Fig. 1).

Posterior: Pygidium slightly expanded, hemispherical). Anus dorsal. Long, slender anal cirri (*Scoloplos acmeiceps*, Fig. 1, Johnson 1901).

Parapodia: Biramous and lateral anteriorly (family Ordiniidae, Fauchald 1977), dorsal posteriorly (Harman 1969) (Fig. 1). Anterior-most podia short. Thorax with small papillar postsetal lobes (Hartman 1969) (Fig. 3). Abdominal parapodia supported by acicula (Fig. 5) and lobes become long and leaf-like posteriorly (Johnson 1901) (Fig. 5).

Abdominal notopodia with subtriangular postsetal lobes (Blake 1996). Abdominal neuropodia with bifid lobes. Inflated neuropodial flange present (Blake 1996).

Setae (chaetae): Simple (not jointed) (family Orbiniidae Fauchald 1977). All slender and pointed: *leitos* = simple, *scoloplos* = thorn (Day 1977). Notosetae and neurosetae finely crenulate (Blake 1996) in thorax (Fig. 4a). Abdominal capillary noto- and neurosetae, as in thorax, have few furcate spines (Hartman 1969) (Fig. 4c).

Eyes/Eyespots: None.

Anterior Appendages: None (family Orbiniidae, Fauchald 1977).

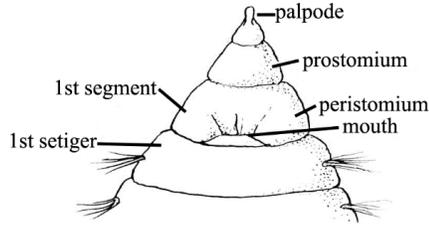
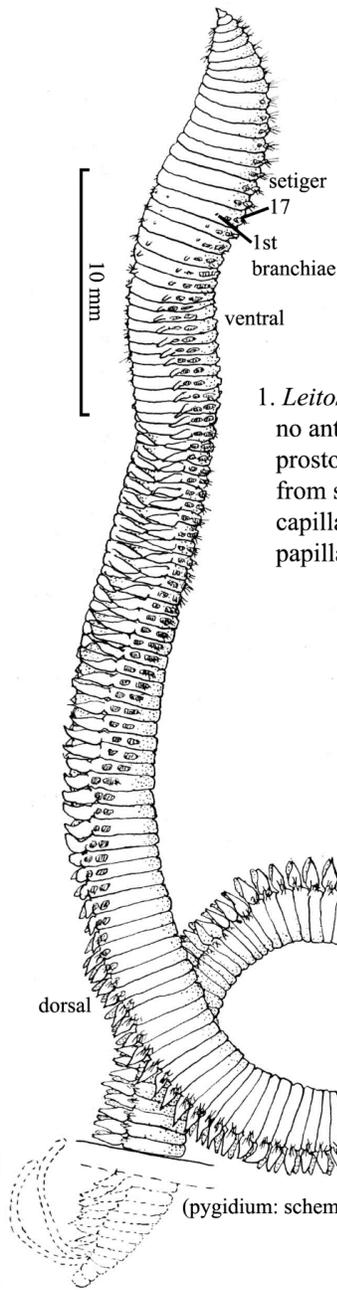
Branchiae: Begin on setigers 13–18 (Hartman 1969). Setiger 18 in present specimens (from Coos Bay). Branchiae small (i.e. short and narrow) anteriorly, becoming flat and subdistally inflated, laterally fringed (“fimbriated”) and larger posteriorly (Fig. 5) (Hartman 1969). Abdominal branchiae are twice as long as notopodial lobes (Blake 1996).

Burrow/Tube: These burrowing polychaetes do not inhabit permanent burrows or tubes (Blake and Ruff 2007).

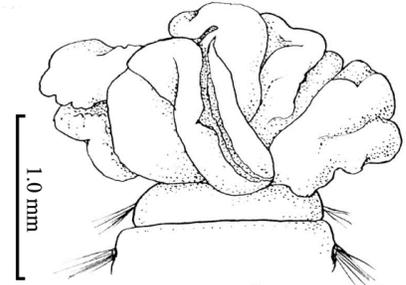
Pharynx: Bears eversible proboscis with leaf-shaped lobes (Fig. 2b).

Genitalia:

Leitoscoloplos pugettensis



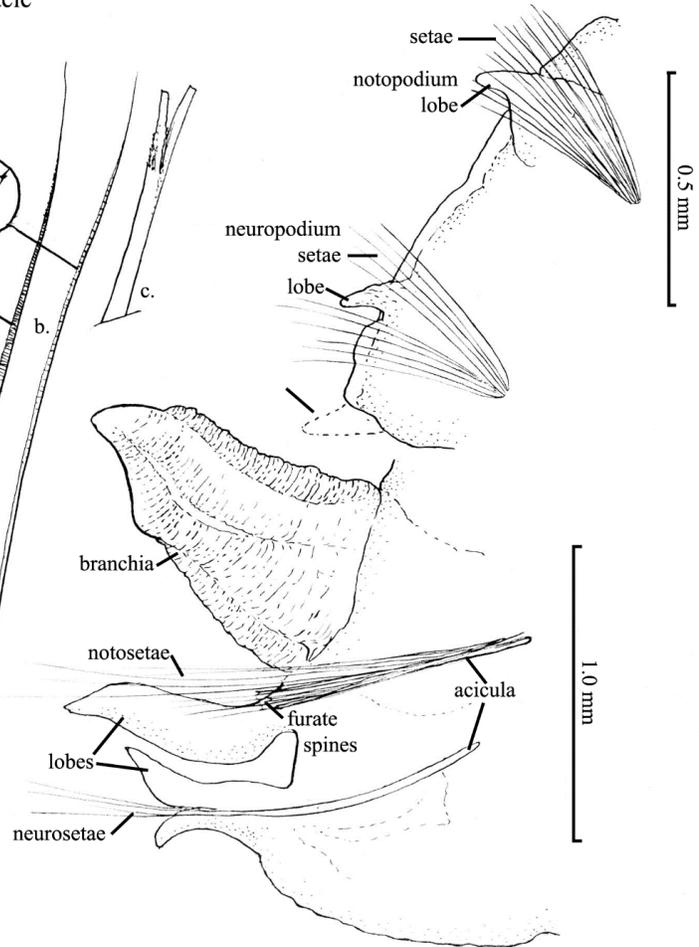
2a. Anterior (ventral view) x26.



2b. Proboscis, everted x26 (from Johnson 1901).

1. *Leitoscoloplos pugettensis* x25:
no anterior appendages; pointed prostomium; leaf-like branchiae from setiger 13-18; all setae simple capillary; no ventral thoracic papillae.

3. Thoracic parapodium (16) x75.



5. An abdominal branchia and parapodium x48.

4. Setae
a. thoracic notoseta x100.
b. abdominal neuroseta x100.
c. abdominal furcate spine x150.

Nephridia:

Possible Misidentifications

The order Orbiniida (Fauchald 1977) includes the families Orbiniidae and Paraonidae, the latter comprising smaller species (less than 20 mm in length) (Blake and Ruff 2007). The order is characterized by a lack of prostomial appendages, maximum of two asetigerous anterior segments, a lack of additional cephalized segments or palps, simple setae and an eversible pharynx that is either an axial sac or biramous (Fauchald 1977). Members of the family Orbiniidae have a prostomium and peristomium without appendages, one to two asetigerous anterior segments and lateral thoracic parapodia, becoming dorsal abdominally. Setae can be capillary or simple hooks and some species have brush-topped bifid or furcate setae. Orbiniidae and Paraonidae can be distinguished by peristomial rings, where orbiniids have one and paraonids have two (Blake 2000).

There are several similar families (not in the order Orbiniida): Ophelidae are short and stout and have a strong ventral groove. Goniadidae and Glyceridae have palps or some kind of buccal appendage. *Ampharetidae* have retractible tentacles and *Lumbrineridae* have hard jaw pieces and hooded hooks among the setae (uncini).

Among those families which are orbiniids, the Paraonidae are small and often overlooked, they have branchiae occurring only on maximum of 15–20 segments, beginning on setigers 4–10 (not on all posterior segments). The body in Paraonidae is not divided into distinct regions by setae and parapodial shapes, but changes gradually along the body (not distinctly as in Orbiniidae, Fauchald 1977). A Paraonidae prostomium can have a medial antenna, which are lacking in Orbiniidae. They have branchiae on some median setigers in most species. The parapodia are lateral. Local paraonid genera include: *Aricidea*, *Cirrophorus*, *Paraonella* and *Levinsenia* (= *Tauberia*) (Hobson and Banse 1981; Blake and Ruff 2007).

Orbiniidae genera in the subfamily Protoarciinae are small (less than 20 mm),

have rounded prostomium, 1–2 asetigerous anterior segments, two peristomial rings and can lack branchiae. Recent research suggests that many Protoarciinae species are simply juvenile orbiniids (Blake 1996; 2000b). Genera include:

Orbiniella, with two asetigerous anterior segments and no branchiae. Neuropodia have both hooks and capillary setae (Hobson and Banse 1981). *Orbiniella nuda* is found intertidally in Washington and British Columbia, amongst gravel and rock.

Paraorbiniella, a monotypic northeastern Pacific genus (Hobson and Banse 1981).

Protoarcia spp. have two asetigerous segments, are less than 6 mm in length and have been found in northern California (Blake 1975).

Protoarciella differs from *Protoarcia* by the presence of neuropodial hooks in the abdominal region (Hobson and Banse 1981). Most notosetae are forked. Its branchiae begin at setigers 4–5 and continue to setigers 28–47. *Protoarciella oligoranchia* is found in British Columbia (Hobson 1976).

Polychaetes in the subfamily Orbiniinae (including *L. pugettensis*) have only 1 asetigerous anterior segment and its members are usually over 20 mm in length. Local genera in the Orbiniinae include:

Naineris, which has a broadly rounded prostomium (unlike that of *Leitoscoloplos*). *Naineris dendritica*, often found in algae or in the marine grass (*Phyllospadix*), occurs inside Coos Bay (Hartman and Reish 1950) and offshore. *Naineris quadricuspida* and *N. uncinata* are found farther north (Hobson and Banse 1981).

Orbinia have pointed prostomium and one asetigerous anterior segment (as in *L. pugettensis*), but they also have very conspicuous ventral papillae on the posterior thoracic segments, which are lacking in *L. pugettensis*. *Orbinia johnsoni* is a rocky intertidal species.

Scoloplos is the genus most likely to be confused with *Leitoscoloplos*. *Scoloplos* spp. have a pointed prostomium, one asetigerous anterior segment and no ventral thoracic papillae. These two genera must be separated by their setae: *Scoloplos* have

blunt spines as well as slender pointed setae in the thoracic neuropodia. *Scoloplos acmeceps* has a few incomplete rows of curved and ridged uncini in its thoracic neuropodia. Some of these neuropodia also have a single post-setal lobe. This species is found in the Coos Bay and Umpqua estuaries, usually subtidally. In California, it is also intertidal, in mud and algae holdfasts and in *Zostera* roots (Blake 1975). *Scoloplos armiger*, found in southern California, is distinguished from the former species by the presence of two post-setal thoracic neuropodial lobes (not one).

In *Leitoscoloplos* the thorax is rounded and lacks parapodial hooks and ventral papillae. There is only one other known Pacific northeast species, *L. panamensis* which occurs from British Columbia to Panama. This species can have one or two subpodial lobes on its posterior thoracic parapodia (Fig. 3, dotted lines, arrow), which are lacking in *L. pugettensis*. Branchiae begin on setigers 11–13 in *L. panamensis* and on setigers 13–18 in *L. pugettensis*.

Ecological Information

Range: Alaska to southern California (Hartman 1969).

Local Distribution: In Coos Bay including South Slough, Shore Acres and offshore. Also Columbia River mouth and Yaquina Bay.

Habitat: Burrows in sandy shores (Johnson 1901) in gravelly, silty, fine sands (Parkinson 1978) or fine mud (Barnard and Reish 1959). Individuals found in most substrates except for black sulfide mud. Found occasionally with eelgrass or algae, but not as closely associated with plant growth as in Naineris (Blake 1975). In Bodega Bay, California, most common in sandy mud with a large grain size and with little algal (*Ulva*) cover (Parkinson 1978).

Salinity: Found in salinities of 30 in Coos Bay.

Temperature: Larvae successfully cultured at 14–15°C (Blake 1980).

Tidal Level: Near low-water mark (Johnson 1901). Also subtidal, but not as often as *Scoloplos* in Coos Bay, down to 380 m (Parkinson 1978).

Associates:

Quantitative Information

Abundance: One of the most common intertidal and subtidal benthic polychaetes of the Pacific Coast of North America (Blake 1980). A stable population (12 months, Tomales Bay, California) is most dense October through December and March through April. Size distribution also stable (Blake 1980). Most frequently found Orbiniid in Newport Bay, California (Barnard and Reish 1959) and in northern California (Day 1977).

Life History Information

Reproduction: Dioecious. Individuals may pair up during spawning where males and females release gametes with fertilize externally (Blake 1980). Ripe females are found June through December (Tomales Bay, California), with largest number found in July. Females form a 2 cm pear-shaped cocoon at sediment surface and secrete a jelly-like substance from ventrum. Eggs are extruded from medial segments through nephridial pores at notopodial bases where deposition takes 1–2 hrs. After spawning, the female stretches a portion of the jelly mass and anchors it to the sediment. Through this thin, hollow extension the larvae will eventually escape from the cocoon. Eggs are large and yolky with average egg diameter is 210 µm.

Larva: Development is described in Blake (1980) at 15° C where trochophore larvae develop at two days post fertilization. Larvae are barrel-shaped and have two red eyes. At four days, trochophore larvae are 290 µm in length. Larvae are metatrochophores between five and eight days. At 11 days they are three setiger nectochaetes and hatch from 3–12 setiger stage between 11 and 20 days. A few larvae escape at a seven segment state and swim, but most crawl, lacking swimming cilia at 12 segments (Blake 1980). A single achaetous peristomial ring (which defines members of the Orbiniinae) develops early (Blake 2000b).

Juvenile: Juveniles can be maintained to sexual maturity on a diet of homogenized *Enteromorpha*. Juvenile *L. pugettensis* have 10 setigers at 17 days (880 µm long) and 13 setigers at 22 days (1010 µm long) at which point they have a fully functional proboscis. The anterior epidermis is yellowish, has two

red eyes and one achaetous segment (the first segment). The body is granular in texture and branchiae begin on setigers 8–10. Notosetae are longer than neurosetae and there are two short anal cirri that elongate at 22 days (Blake 1980).

Longevity:

Growth Rate: At six days a three segment larva is approximately 5 mm, at 14 days a 10 segment larva is 9 mm, at 21 days a 14 segment larva is 12 mm (15° C and 33, Blake 1980).

Food: All Orbiniids are considered to be non-selective deposit feeders because they have a sac-like pharynx, but no work has been done to test for selectivity (Fauchald and Jumars 1979). Gut contents include diatoms, foraminifera and sand (Parkinson 1978).

Predators:

Behavior: A free burrower with pointed prostomium used as anchor to penetrate substrate and to enlarge burrow (Parkinson 1978). The muscular thorax is used for digging and the soft proboscis is not. Movement is by retrograde waves, back or forward much like in *Arenicola marina* (Parkinson 1978). Larva burrows with pharynx (Fauchald and Jumars 1979).

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