Owenia collaris

A tube-dwelling polychaete worm

Phylum: Annelida
Class: Polychaeta
Order: Oweniida
Family: Oweniidae

Taxonomy: *O. collaris* was originally considered a subspecies of *O. fusiformis* (Hartman in 1955) and was later defined as a valid species by the same author v(1969) based on the presence of a thoracic collar. Based on morphological characters, Dauvin and Thiébaut (1994) designated *O. fusiformis* as a cosmopolitan species, considering most *Owenia* species (including *O. collaris*) junior synonyms of *O. fusiformis* while reducing the genus *Owenia* to two species. Character-based and molecular phylogenetics have revealed that *O. fusiformis* is a cryptic species complex (Blake 2000; Ford and Hutchings 2005; Capa et al. 2012) in which *O. collaris* is a distinct species (Blake 2000).

Description

Size: Individuals are moderate sized and up to 54 mm (Blake 2000) in length and 3 mm in width. Although specimens up to 100 mm in length (Berkeley and Berkeley 1952) and tubes up to 90 mm in length (Hartman 1969) have been reported. The specimen upon which the description is based was 27 mm in length and 1.0 mm in width with 18 segments (from Coos Bay).

Color: Buccal membrane (crown) is pale gray green, with white band. Body pale green flushed with pale reds. Preserved specimens are pale with large reddish brown shield pattern running length of first three setigers (Fig. 2a).

General Morphology: Slender and fragile but somewhat rigid with truncated anterior that tapers posteriorly. (Blake 2000).

Body: Body cylindrical with first four anterior segments short, middle segments long and posterior segments short (Fig. 1). Thorax and abdomen not morphologically distinct. 18-28 segments (Dales 1967).

Anterior: Prostomium reduced with no sensory appendages except frilly buccal membrane or tentacular crown. Prostomium fused with peristomium, forming a collar whose margin is complete except for a pair of ventral lateral notches (Hartman 1969) (Fig. 2b). Mouth is terminal (Blake 2000) and surrounded by three peristomial lips (one dorsal, two ventral) (Fig. 4), which can be used directly for feeding (Dales 1967).

Trunk: Body segments are inconspicuous and only marked by presence of setae. Abdominal groove present and dorsal glandular ridges absent (Blake 2000).

Posterior: Pygidium lobed (10 or more lobes) when expanded, but is usually contracted when collected (Berkeley and Berkeley 1952; Blake 2000) (Fig. 1).

Parapodia: Reduced and biramous both notosetae and neurosetae beginning on setiger four and continuing to posterior. “Neuropodia from setiger four form nearly encircling girdles of closely packed uncini at anterior end of segment" (Hartman 1969) (Figs. 2b, 3b). Each uncinus has a straight stem and 2 teeth (Fig. 3c).

Setae (chaetae): Notosetae consist of serrated capillaries (Blake 2000). First three thoracic setigers have capillary notosetae only (Fig. 2a) (genus *Owenia*). Setiger three is more dorsal and has shorter notosetae (Blake 2000). Abdominal notosetae are thin. Neurosetae are composed of dense small hooks with long shafts (Blake 2000).

Eyes/Eyespots: There is confusion about the presence or absence of peristomial eyes in this species. Two ventral eyes were reported (sp. *collaris,* Hobson and Banse 1981) and observed (Fig. 2b). However, Hartman (1969), Blake (2000) and Blake and Ruff (2007) indicate eyespots are absent.

Anterior Appendages: A buccal membrane at worm anterior forms a crown-like funnel (genus *Owenia*). The crown has 4–10 main

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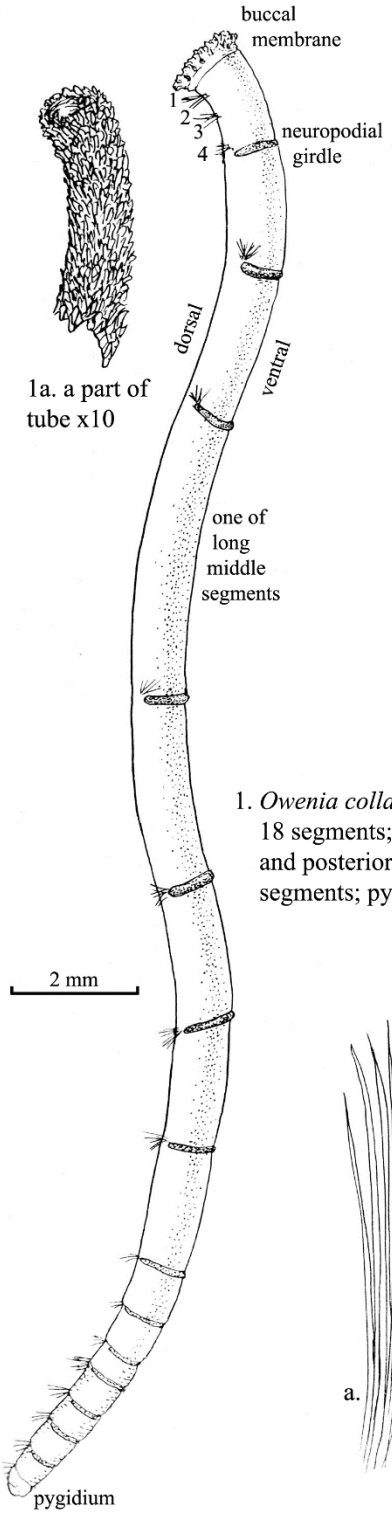
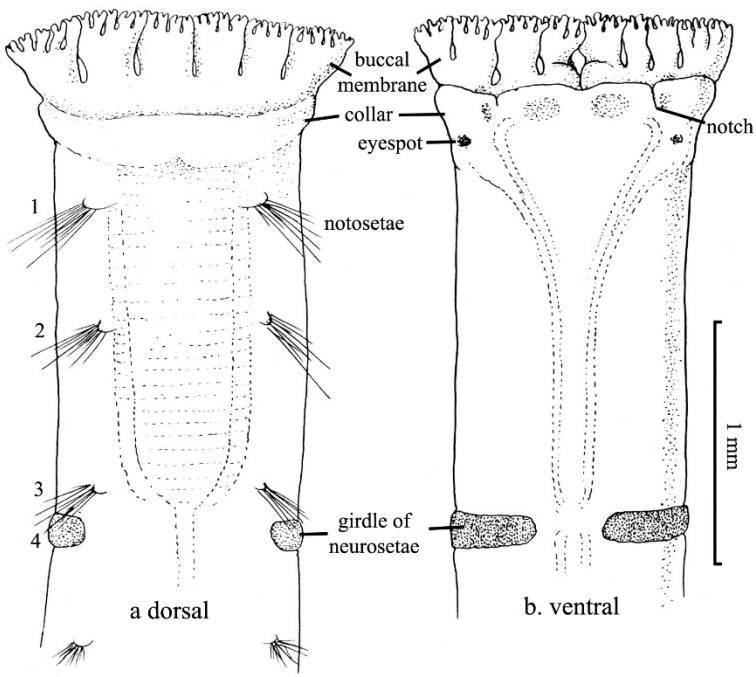
Owenia collaris

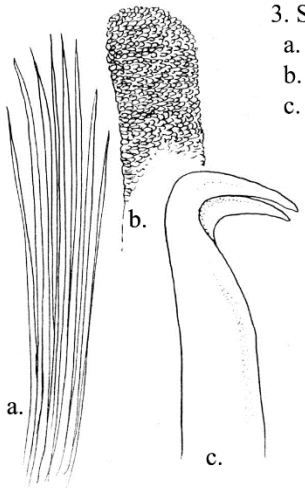


1a. a part of tube x10

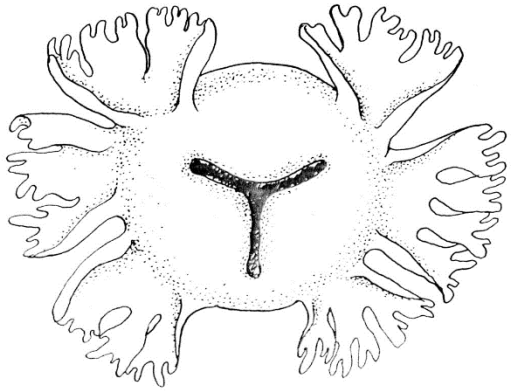


1. *Owenia collaris* (L:27mm) x10:
18 segments; cylindrical, short anterior and posterior segments, long middle segments; pygidium contracted.

2. Anterior segments x40:
prostomium reduced to a buccal membrane; two ventral eyespots; first three setigers with capillary notosetae only; neurosetal girdles from fourth setiger.



3. Setae:
a. notopodial capillaries (a posterior fascicle) x100
b. part of a neuropodial girdle; uncini closely packed x150
c. uncinus from b. x600



4. Lips, from above x40:
one dorsal, two ventral lobes (after Watson, 1901).

branches (eight, Blake 2000) divided into 100's of slender tips all of same length (Hartman 1969) (Fig. 2). The membrane functions in respiration and feeding (Dales 1967).

Branchiae:

Burrow/Tube: Cylindrical or spindle-shaped tube, up to 90 mm long, of overlapping shell fragments and/or sand grains. Each grain is attached at its one end, giving tube a tiled appearance (Fig. 1a). Tube lining is close-fitting, chitinous and tough (genus *Owenia)* and composed of fine filaments secreted by seven pairs of thread glands. Tube grains, usually light-colored, are cemented together by the buccal organ (Watson 1901), concealed by the crown. Tubes taper at both ends.

Pharynx: Bears a proboscis with muscular pad (Fauchald 1977) and pharynx is not eversible (Blake 2000).

Genitalia:

Nephridia:

Possible Misidentifications

Oweniida are all tube dwellers. The Oweniidae is a small family with its own order (Fauchald 1977). It is characterized by its lobed or membranous prostomium fused to the anterior segments. All the anterior segments are long (except the first four in this species) and the posterior segments are short. The neuropodial hooks occur in dense horizontal bands and notosetae are capillary. The prominent buccal membrane of Oweniidae is unique because it is not feathery, or composed of long branchiae, tentacles or of palps. It encircles the entire anterior end of the worm.

Other tube-dwelling polychaete families have buccal tentacles, a crown of radioles or palps, but none has the entire anterior end transformed into a tentacular membrane and thus a greatly reduced prostomium. In addition, oweniids have very short posterior segments with middle and anterior segments long. Other tube-dwelling polychaete families referenced in this guide include: Ampharetidae (see *Hobsonia florida),* Sabellidae (see *Eudistylia vancouveri),* Terebellidae (see *Pista pacifica* and *Thelepus crispus).*

There are 4 other genera in the family Oweniidae:

Galathowenia spp. have a prostomium with a midventral cleft surrounded by overlapping ventral membranes but lacks anterior appendages. The type species, *G. africana* was described from South Africa (Dales 1967; Blake 2000), but three undescribed species are reported offshore of California (Blake and Ruff 2007).

Myriowenia spp. are recognizable by having deeply bilobed prostomiuma, with paired palps and no tentacular crown. Their tubes are loose-fitting and easily torn. *M. californiensis* is reported from offshore central California to Oregon in mixed sediments (Blake and Ruff 2007).

Myriochele spp. have a rounded prostomium, no tentacular crown and no midventral cleft. Like *Owenia*, they have only notosetae in the first two or three setigers. Of the dozen or so species of *Myriochele* worldwide (Hobson and Banse 1981), three species are reported offshore in California. *Myriochele striolata* is the only species known in nearshore sediments (Blake and Ruff 2007). This species is distinct in its small size (7–8 mm in length, <1 mm in width and 16–17 setigers) (Blake 2000).

Myrioglobula sp. also have a rounded prostomium and no crown of tentacles, however the first setiger has only notosetae, but no species in this genus are currently reported locally (Blake and Ruff 2007)

The genus *Owenia,* is characterized by its tentacular crown, its lack of neurosetae on the first three setigers, and its close-fitting, firm tube (Fauchald 1977).

Owenia fusiformis differs from *O. collaris* as the latter species has a collar (=collaris), anteriorly (Hartman 1969). *Owenia johnsoni* has much less anterior pigment than *O. collaris*. Additionally, the tentacular crown of *O. collaris* is shorter and bears fewer main branches than *O. johnsoni.* The posterior end is grooved in *O. collaris*, unlike *O. johnsoni* (Blake 2000).

Ecological Information

Range: Type locality is Santa Catalina Island (Hartman 1969). Cosmopolitan distributions

previously reported (Berkeley and Berkeley 1952) are likely that of *O. fusiformis*. Blake (2000) suggests that *O. collaris* is found offshore in southern and central CA and this species is also reported in OR (Blake and Ruff 2007).
Local Distribution: In Coos Bay including South Slough and bay mouth. Also Yaquina Bay.
Habitat: Forms large, dense colonies in mud and silty estuarine habitats, but can also be found offshore in sandy sediments (Blake 2000). Found in clean sand and among eel grass roots in Coos Bay.
Salinity: Found at salinities of 30.
Temperature:
Tidal Level: Intertidal and subtidal (to 150 m, Blake 2000).
Associates:
Abundance:

Life-History Information

Reproduction: The reproduction and larval development have been described by Smart and von Dassow (2009). Dioecious and iteroparous, gametes are loose in the coelom (Smart and von Dassow 2009) in males and females which spawn March through September (Washington and Oregon) (Smart et al. 2012). Colorless eggs (70–80 µm) and sperm (4 µm) are released through paired pores in the worm posterior. Once fertilized, cleavage is spiral, gastrulation occurs at 8–9 hours, embryos are ciliated and swimming at 24 hr and develop through trochophores to mitraria larvae (12˚ C, Smart and von Dassow 2009).
Larva: Planktotrophic mitraria larvae are characterized by triangular bodies with undulating ciliated margins (Crumrine 2001; Pernet et al. 2002), have two red eyes and are recognizable by two extremely long bundles of chaete, which develop from individual chaetal sacs. These chaetae extend when the larva is disturbed (Fernald et al. 1987). A juvenile rudiment develops after four weeks (12˚ C). At metamorphosis, the larval body is resorbed into the collar of the juvenile worm (Smart and von Dassow 2009).
Juvenile: Post-metamorphosis juvenile *O. collaris* are approximately 800 µm in length and have a prostomium and peristomium. The juvenile has 7–8 segments bearing 1–2 sets of chaetae, a pygidium and begins assembling a tube rapidly. They grow anterior tentacles and reach 1300 µm in length after 24 days (Smart and von Dassow 2009).
Longevity:
Growth Rate:
Food: Both a filter and a surface deposit feeder, picking up particles directly with the lips and selecting particles for size and composition (Fauchald and Jumars 1979). Juveniles are surface deposit feeders at two weeks of age (Smart and von Dassow 2009).
Predators:
Behavior: Individuals can move freely within the tube (Fauchald 1977; Watson 1901).

Bibliography

1. BERKELEY, E., and C. BERKELEY. 1952. Annelid. Polychaeta Sedentaria. Canadian Pacific Fauna. 9b:1-139.
2. 2000b. Family Oweniidae, p. 97-127. *In:* Taxonomic atlas of the benthic fauna of the Santa Maria Basin and the Western Santa Barbara Channel. Vol. 7. J. A. Blake, B. Hilbig, and P. V. Scotts (eds.). Santa Babara Museum of Natural History, Santa Babara, California.
3. BLAKE, J. A., and E. R. RUFF. 2007. Polychaeta, p. 309-410. *In:* Light and Smith manual: intertidal invertebrates from central California to Oregon. J. Carlton (ed.). University of California Press, Berkeley, CA.
4. CAPA, M., J. PARAPAR, and P. HUTCHINGS. 2012. Phylogeny of Oweniidae (Polychaeta) based on morphological data and taxonomic revision of Australian fauna. Zoological Journal of the Linnean Society. 166:236-278.
5. CRUMRINE, L. 2001. Polychaeta, p. 39-77. *In:* Identification guide to larval marine invertebrates of the Pacific Northwest. A. Shanks (ed.). Oregon State University Press, Corvallis, OR.
6. DALES, R. P. 1967. Annelids. Hutchinson & Co., Ltd., London.
7. DAUVIN, J.-C., and E. THIÉBAUT. 1994. Is *Owenia fusiformis* Delle

Chiaje a cosmopolitan species? Mémoires du Muséum national d'histoire naturelle. 162:383-404.
8. FAUCHALD, K. 1977. The Polychaete worms: definitions and keys to the orders, families and genera. Natural History Museum of Los Angeles County, Los Angeles.
9. FAUCHALD, K., and P. A. JUMARS. 1979. Diet of worms: a study of polychaete feeding guilds. Oceanography and Marine Biology. 17:193-284.
10. FERNALD, R. L., C. O. HERMANS, T. C. LACALLI, W. H. WILSON, JR, and S. A. WOODIN. 1987. Phylum Annelida, Class Polychaeta, p. 138-195. *In:* Reproduction and development of marine invertebrates of the northern Pacific coast. M. F. Strathmann (ed.). University of Washington Press, Seattle, WA.
11. FORD, E., and P. HUTCHINGS. 2005. An analysis of morphological characters of *Owenia* useful to distinguish species: description of three new species of *Owenia* (Oweniidae: Polychaeta) from Australian waters. Marine Ecology. 26:181-196.
12. HARTMAN, O. 1969. Atlas of the sedentariate polychaetous annelids from California. Allan Hancock Foundation, University of Southern California, Los Angeles, CA.
13. HOBSON, K. D., and K. BANSE. 1981. Sedentariate and archiannelid polychaetes of British Columbia and Washington. Canadian Bulletin of Fisheries and Aquatic Sciences. 209:1-144.
14. PERNET, B., P. Y. QIAN, G. ROUSE, C. M. YOUNG, and K. J. ECKELBARGER. 2002. Phylum Annelida: Polychaeta. *In:* Atlas of marine invertebrate larvae. C. M. Young, M. A. Sewell, and M. E. Rice (eds.). Academic Press, San Diego, CA.
15. SMART, T. I., and G. VON DASSOW. 2009. Unusual development of the mitraria larva in the polychaete *Owenia collaris*. Biological Bulletin. 217:253-268.
16. SMART, T. I., C. M. YOUNG, and R. B. EMLET. 2012. Environmental cues and seasonal reproduction in a temperate estuary: a case study of *Owenia collaris* (Annelida: Polychaeta, Oweniidae). Marine Ecology. 33:290-301.
17. WATSON, A. T. 1901. On the structure and habits of the Polychaeta of the family Ammocharidae. Journal of the Linnean Society of London, Zoology. 28:230-260.