
Hesperonoe complanata

Commensal scale worm

Phylum: Annelida
Class: Polychaeta
Order: Phyllodocida
Family: Polynoidae

Taxonomy: Eastern Pacific polynoids are often reported with wide distributions resulting in numerous synonymies. Subjective synonyms for *Hesperonoe complanata* include *H. senilis*, determined to be the same species by Hartman (1938). *H. complanata* was also previously considered a member of the closely related genus *Harmothoe* by some authors (e.g., *Harmothoe complanata*, *H. johnsoni*), but is now recognized as *Hesperonoe complanata* based on noto- and neuropodia setal morphology (Ruff 1993; Blake and Ruff 2007).

Description

Size: Individuals up to 21 mm in length and 6 mm in width (including setae) (Johnson 1901; Hartman 1968). The illustrate specimen was approximately 12 mm in length (Fig. 1). Most scale worms are less than a few centimeters long, however, commensal specimens can be larger than free-living (Haderlie 1980; Ruff 1993).

Color: Body color bright orange-yellow with reddish color around head, elytra pale or translucent and setae clear (Hartman 1968; Blake and Ruff 2007).

General Morphology: Short worms are dorso-ventrally flattened and have scale-like plates (see **Elytra**) dorsally (Polynoidae, Ruff 1993).

Body: 36–38 total body segments.

Anterior: Prostomium six-sided, as long as wide, and deeply incised (Fig. 2). Prostomium bears many appendages (see **Anterior Appendages**).

Trunk:

Posterior:

Parapodia: Biramous with distinct noto- and neuropodia. Notopodia short, with two kinds of simple setae and a long dorsal cirrus, that is easily detached (Fig. 1, 5), and alternate

with elytra (Fig. 1). Neuropodia long, with one kind of long setae (although lower ones can be thicker than upper ones) (Fauchald 1977). Ventral cirrus present (Fig. 5).

Setae (chaetae): Notosetae consists of two kinds: 1) upper are thick, stout, blunt, minutely serrated, both short and long (Fig. 5, 6a); 2) a few (4–5) slender, pointed and serrate (*Hesperonoe*, Fig. 5, 6b) (Fauchald 1977; Ruff 1993). Neurosetae (one kind) are curved, simple, and with lateral serrations (Fig. 5, 7), although upper neurosetae can be more slender, lower ones stouter (Ruff 1993).

Eyes/Eyespots: Four eyes, where each pair is arranged anterior to posterior and the anteriormost pair extends into the bilobed prostomium (Fig. 2).

Anterior Appendages: Large medial antenna and two small prostomial biarticulate antennae (inserted below lateral lobes of prostomium) (Fig. 3). Additional anterior appendages include one pair of lateral palps, which are longer than the medial antenna and red in color, and two pairs of tentacular cirri (Fig. 2, 3).

Branchiae:

Burrow/Tube:

Pharynx:

Genitalia:

Nephridia:

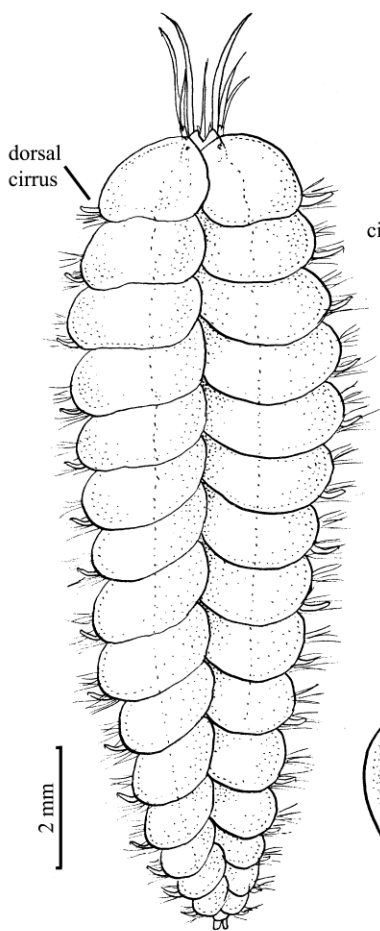
Polynoidae-specific character

Elytra: 15 pairs, reniform (kidney-shaped) (Hartman 1968), covering most of body on segments 2, 4, 5, 7, ...23, 26, 29, and 32 (Ruff 1993). Thin, delicate easily detached; with widely spaced low papillae (Fig. 4). Species with relatively smooth elytra, like this one, are often commensal (Fauchald 1977).

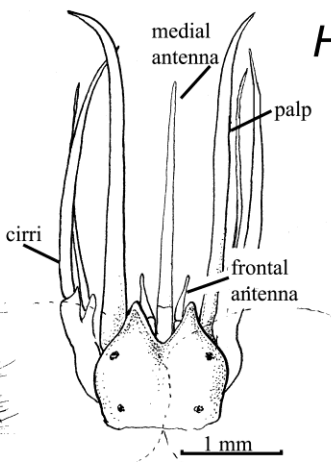
Possible Misidentifications

The number of pairs of elytra make identification easy among polynoids. The

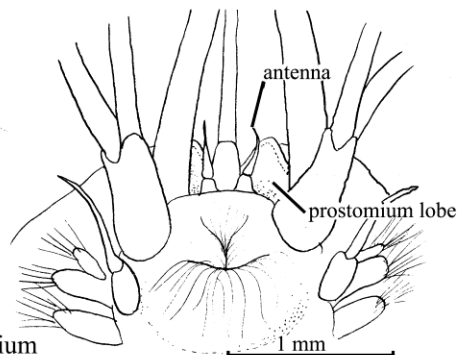
Hesperonoe complanata



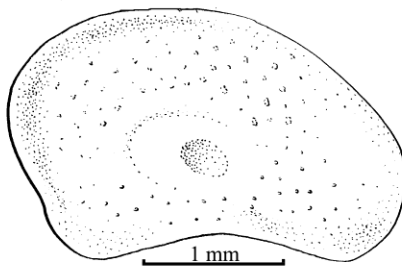
1. *Hesperonoe complanata* x11:
15 pairs smooth elytra; body flattened;
dorsal cirri alternate with elytra.



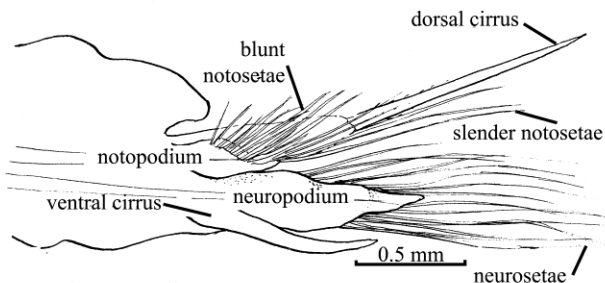
2. Head (dorsal view) x18:
two pairs of eyes; prostomium
deeply incised; short frontal
antennae, long medial one; one
pair palps, two pairs tentacular
cirri.



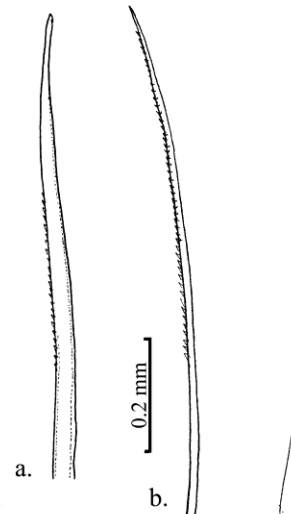
3. Head (ventral view) x30:
antennae inserted ventral to
prostomium, not terminal.



4. Elytron x25



5. 17th parapodia x40:
notopodia short, notosetae of two kinds- many stout, blunt
serrate; a few slender, pointed; serrate. Neuropodia long,
neurosetae long, slender, serrate; dorsal and ventral cirrus.



6. Ends of notosetae x100:
a. stout, blunt, minutely serrate
(both short and long)
b. long, slender, serrate.

7. Neuroseta, tip x100:
curved, simple; lateral
serrations.

genus *Hesperonoe* can be distinguished from other polynoids by its 15 pairs of smooth elytra covering almost the entire body as well as by its prostomial antennae that are inserted ventrally, not terminally (Fig. 3), and by the possession of two kinds of simple notosetae.

Hesperonoe complanata is the only scale worm known to be commensal with the ghost shrimp *Neotrypea californiensis* and *Urechis caupo* (Blake and Ruff 2007). Another species, *H. adventor*, also lives with the echiuran, *Urechis caupo*, as well as *Upogebia pugettensis*. *H. adventor* is larger (to 40 mm), has short, ciliated palps, antennae, and dorsal cirri. Furthermore, its roundish elytra have dark crescents on their posterior thirds. The third Pacific species, *H. laevis*, is found in deep water off Santa Barbara, California, in burrows of the same echiuran listed above (Ruff 1993).

Other local polynoid genera include, *Arctonoe* and *Lepidasthenia*, each with 20 or more elytra pairs and *Halosydna* with 18 pairs of elytra. Members of the genera *Arctonoe* and *Lepidasthenia* are free-living and commensal, but individuals continue to grow segments with age, usually having more than 50 segments, not 36–38. *Hesperonoe* is similar to the local polynoid genus *Harmothoe*, as members of both genera have 15 pairs of elytra (Barnich and Feige 2009) however members of the former genus have two different kinds of setae on the noto- and neuropodia (Ruff 1993).

Ecological Information

Range: Type locality is Puget Sound, Washington. Known range includes western Canada to southern California (Hartman and Reish 1950; Hartman 1968).

Local Distribution: Local collection sites include Coos Bay estuaries. Also occurs in many *Neotrypea* burrows in larger Oregon estuaries, including Alsea, Nestucca, Netarts, Umpqua, Tillamook, and Yaquina.

Habitat: The permanent burrows and side tunnels of the ghost shrimp *Neotrypea*. They occur in the sandy mud of low intertidal mudflats in extensive beds and also among oyster beds. Juvenile *Hesperonoe* are found

lying on the abdomens of *Neotrypea*, but the adults are free-living in the burrow (MacGinitie and MacGinitie 1949).

Salinity: Collected at salinities of 30 in Coos Bay and 27 in southern Puget Sound (R. Boomer pers. com.).

Temperature: Range indicates high temperature tolerance from cold temperate to warm temperate.

Tidal Level: Intertidal to upper mid-intertidal where *Neotrypea* occurs (Ricketts and Calvin 1971).

Associates: Commensal associates of *H. complanata* include those of *Neotrypea*, such as the pea crabs *Scleroplax* and *Pinnixa*, copepods *Hemicyclops* and *Clausidium*, the goby *Clevelandia*, the shrimp *Betaus* (in southern distribution), and the clam *Cryptomya* with mud shrimp *Upogebia* in California.

Abundance: MacGinitie found them in one fifth of *Neotrypea* burrows, but thought some might have escaped detection. Usually, only one adult occurs in a burrow with no other resident polychaete (MacGinitie and MacGinitie 1949).

Life-History Information

Reproduction: The reproduction and development of *H. complanata* is not known. Most polynoids have free-spawn gametes, although some brood embryos beneath their elytra (Wilson 1991; Fernald et al. 1987). Of those free-spawners, egg sizes range from 60–100 μm (Fernald et al. 1987)

Larva: The larvae of five other local polynoid species are known but not that of *H. complanata* (Crumrine 2001). Larval development most likely proceeds as planktotrophic cone-shaped trochophores and metatrochophores. In many larvae, distinct characters include a flattened episphere, distinct prototroch, up to three pairs of eyes, a conspicuous mouth posterior to the prototroch and a bundle of long cilia on the left side of the mouth (see *Halosydna brevisetosa*). These larvae can have long pelagic duration, ultimately elongating into nectochaete larvae before settlement (Lacalli 1980; Fernald et al. 1987).

Juvenile:

Longevity:**Growth Rate:**

Food: Eats particles brought in by the current or trapped in *Neotrypea* burrow.

Occasionally, it nibbles on the mucus lining of the burrow as well, making it parasitic, not just commensal (MacGinitie and MacGinitie 1949).

Predators:**Behavior:****Bibliography**

1. BARNICH, R., and D. FIEGE. 2009. Revision of the genus *Harmothoe* Kinberg, 1856 (Polychaeta: Polynoidae) in the Northeast Atlantic. *Zootaxa*:1-76.
2. BLAKE, J. A., and R. E. RUFF. 2007. Polychaeta, p. 309-410. *In: The Light and Smith manual: intertidal invertebrates from central California to Oregon*. J. T. Carlton (ed.). University of California Press, Berkeley, CA.
3. 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.
4. FAUCHALD, K. 1977. The polychaete worms: definitions and keys to the orders, families, and genera. *Natural History Museum of Los Angeles County Science Series*. 28:1-190.
5. 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.
6. HADERLIE, E. C. 1980. Polychaeta: The Marine annelid worms, p. 448-489. *In: Intertidal invertebrates of California*. R. H. Morris, D. P. Abbott, and E. C. Haderlie (eds.). Stanford University Press, Stanford, CA.
7. HARTMAN, O. 1938. The types of the polychaete worms of the families Polynoidae and Polyodontidae in the United States National Museum and the description of a new genus. *Proceedings of the United States National Museum*. 86:107-134.
8. —. 1968. Atlas of the errantiate polychaetous annelids from California. Allan Hancock Foundation, University of Southern California, Los Angeles.
9. HARTMAN, O., and D. J. REISH. 1950. The Marine annelids of Oregon. Oregon State College, Corvallis, Oregon.
10. JOHNSON, H. P. 1901. The Polychaeta of the Puget Sound region. *Boston Society of Natural History*. 29:381-437.
11. LACALLI, T. C. 1980. A guide to the marine flora and fauna of the Bay of Fundy: polychaete larvae from Passamaquoddy Bay. *Canadian Technical Report of Fisheries and Aquatic Sciences*. 940:1-27.
12. MACGINITIE, G. E., and N. MACGINITIE. 1949. *Natural history of marine animals*. McGraw-Hill Book Co., New York.
13. RICKETTS, E. F., and J. CALVIN. 1971. *Between Pacific tides*. Stanford University Press, Stanford, California.
14. RUFF, R. E. 1995. Family Polynoidae Malmgren, 1867, p. 105-166. *In: Taxonomic atlas of the benthic fauna of the Santa Maria Basin and Western Santa Barbara Channel*. Vol. 5. J. A. Blake, B. Hilbig, and P. H. Scott (eds.). Santa Barbara Museum of of Natural History, Santa Barbara, CA.
15. WILSON, W. H. 1991. Sexual reproductive modes in polychaetes: classification and diversity. *Bulletin of Marine Science*. 48:500-516.

Hiebert, T.C. 2015. *Hesperonoe complanata*. In: Oregon Estuarine Invertebrates: Rudys' Illustrated Guide to Common Species, 3rd ed. T.C. Hiebert, B.A. Butler and A.L. Shanks (eds.). University of Oregon Libraries and Oregon Institute of Marine Biology, Charleston, OR.