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# *Carinoma mutabilis*

A ribbon worm

Phylum: Nemertea  
Class: Anopla  
Order: Paleonemertea  
Family: Carinomidae

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**Taxonomy:** Originally described as *Carinoma griffini* by Griffin (1898), this species was re-described by Coe (1904) as *Carinoma mutabilis*. Initially, two varieties were described (*C. mutabilis argillina* and *C. mutabilis vasculosa*) based on size and degree of muscle development but these differences were determined to be intraspecific variation (Gibson 1995).

## Description

**Size:** Great size variation is reported for this species, from 2.5 to 50 cm, although few are over 20 cm on the California coast. The largest width is 3–5 mm with average sizes much less (Coe 1901, 1905; Kozloff 1974). Specimens are approximately 14 cm in length and 1 mm in width when preserved (Griffin 1898).

**Color:** Homogeneous (no variation dorso-ventrally). Anterior and head milk white, not translucent, sometimes with brownish mottling (Coe 1901). Intestinal region cream or brownish where internal organs show as transverse dark lines. Males dark yellow or orange, females reddish (Griffin 1898; Kozloff 1974) (Fig. 1). Posterior-most region white (Griffin 1898).

**General Morphology:** Soft, elongate (but not stretchy) non-segmented (phylum Nemertea).

**Body:** Thickened and rounded anteriorly, slightly compressed dorso-ventrally from behind head and very flattened posteriorly (Fig. 1). Individuals tend to coil from the sides posteriorly (Coe 1905).

**Anterior:** Anterior shape changes constantly and can be rounded or elongate. Head is wider than neck and not distinctly marked from the body (Coe 1901). When crawling, head is narrower than body with slight narrowing at neck (Griffin 1898). No

cephalic grooves (order Paleonemertea).

**Trunk:**

**Posterior:** No caudal cirrus.

**Eyes/Eyespots:** No ocelli.

**Mouth:** Just behind brain (class Anopla).  
**Proboscis:** Eversible (phylum Nemertea) and, when not everted, coiled inside rhynchocoel (cavity). No stylets and proboscis pore (opening to rhynchocoel) almost terminal.

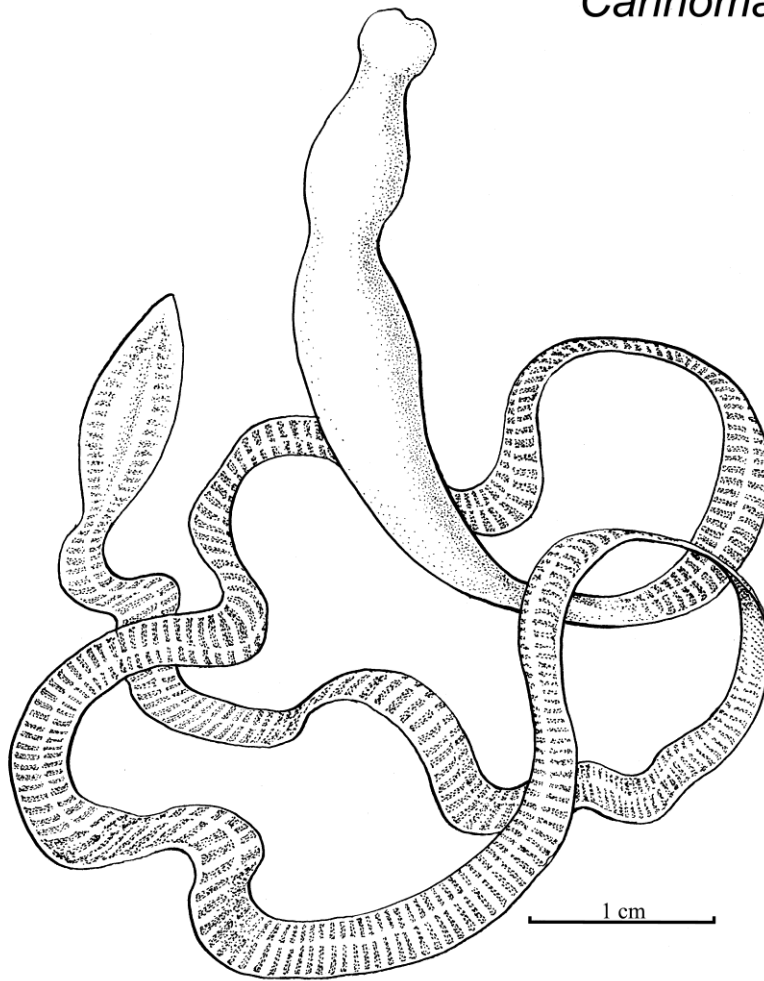
**Tube/Burrow:** Individuals are commonly surrounded by thin sandy mucous tube and worms are happiest in the lab if allowed to burrow in sand.

## Possible Misidentifications

The Genus *Carinoma* is small and comprises seven described species worldwide including (Gibson 1995): *C. patagonia*, intertidal from southern Chile (Magellan Straits); *C. patriciae*, an Australian species found in silty sand, mud and shell mix; *C. tremaphoros*, intertidal and sublittoral in sand and mud from the Atlantic and Gulf coasts; *C. hamanako* occurs in sand and mudflats near Honshu, Japan (Kajihara et al. 2011); *C. armandi* occurs in the low intertidal and is found among polychaete tubes in the British Isles; *C. crabica* from the Venezuelan coast in Curaçao (Gibson 1995).

*C. mutabilis* is believed to be the only carinomid species on the Pacific coast, but research suggests that there are likely at least four other species in the genus *Carinoma* in Coos Bay, alone (2008-2014, T. Hiebert and S. Maslakova, unpublished). Differentiating these five species based on morphology alone is currently very challenging. One local heteronemertean, which might cause confusion is *Baseodiscus punnetti* which has many very

*Carinoma mutabilis*



1. *Carinoma mutabilis* (L:27cm) x3:  
head changes shape constantly; no ocelli or cephalic grooves;  
internal organs show as transverse lines; body thickened anteriorly,  
flattened posteriorly, coiled (Coe, 1940).

minute eyespots, and slight, oblique cephalic grooves. Although both species flatten posteriorly, they can be differentiated from one another by the fact that *B. punnetti* can retract its head and *Carinoma* cannot. Other palaeonemerteans that are superficially similar to *C. mutabilis* are *Carinomella lactea* and *Tubulanus pellucidus*. They by possess lateral or cerebral sensory organs (Roe et al. 2007).

It is sometimes very difficult to distinguish among nemerteans without dissecting them because many identifying characteristics are internal and not visible. Ways in which the worms flatten, contract, and coil are useful as aids to identification of live specimens.

### Ecological Information

**Range:** Described by Griffin from specimens collected in Puget Sound, Washington (Griffin 1898). Known range includes the Pacific coast of North America, from British Columbia to Gulf of California (Gibson 1995).

**Local Distribution:** Coos Bay sites include South Slough, Pony Slough and North Spit.

**Habitat:** Most commonly encountered in sand and sandy mud. Also found in clay (Haderlie 1975) and amongst wharf pilings (Griffin 1898).

**Salinity:** Estuarine.

**Temperature:** Latitudinal range would indicate a wide temperature tolerance.

**Tidal Level:** Intertidal and below (to 40 m) (Corrêa 1964).

**Associates:**

**Abundance:** Regularly encountered in South Slough, common in San Pedro Harbor, California but less abundant in San Diego, California (Coe 1905).

### Life-History Information

**Reproduction:** Sexually mature in August (California and Puget Sound, Coe 1901, 1905). Dioecious (separate sexes), with many gametes released at once. Fertilization occurs in the water column. Development has been described for *C. tremaphorus* where eggs are 90–110 µm and surrounded by a chorion (Maslakova et al. 2004a, 2004b). *Carinoma*

*mutabilis* larvae from ripe adults collected in January and February (Friday Harbor, WA) have been reared in the lab and the development of their protonephridia documented (Bartolomaeus et al. 2014).

**Larva:** Planktonic larvae of *C. tremaphorus* are uniformly ciliated, possess both apical tuft and posterior cirrus and are 150 µm in length (Coe 1943; Maslakova et al. 2004a, 2004b). Larvae of the genus *Carinoma* are distinct in having a single, mid-ventral eye that is anterior to the mouth (Norenburg and Stricker 2002; Maslakova et al. 2004a, 2004b; Bartolomaeus et al. 2014).

**Juvenile:**

**Longevity:**

**Growth Rate:**

**Food:** A predator, *C. mutabilis* captures prey with its sticky, eversible proboscis.

**Predators:**

**Behavior:**

### Bibliography

1. BARTOLOMAEUS, T., S. MASLAKOVA, and J. VON DOHREN. 2014. Protonephridia in the larvae of the paleonemertean species *Carinoma mutabilis* (Carinomidae, Nemertea) and *Cephalothrix (Procephalothrix) filiformis* (Cephalothricidae, Nemertea). *Zoomorphology*. 133:43-57.
2. COE, W. R. 1901. Papers from the Harriman Alaska Expedition xx. The Nemerteans. *Proceedings of the Washington Academy*. iii:pp. 1-110.
3. COE, W. R. 1905. Nemerteans of the west and northwest coasts of America. *Museum of Comparative Zoology*, Cambridge, MA.
4. —. 1943. Biology of the nemerteans of the Atlantic coast of North America. *Transactions of the Connecticut Academy of Arts and Sciences*. 35:129-328.
5. CORRÊA, D. D. 1964. Nemerteans from California and Oregon. *Proceedings of the California Academy of Sciences (series 4)*. 31:515-558.

6. GIBSON, R. 1995. Nemertean genera and species of the world: an annotated checklist of original names and description citation, synonyms, current taxonomic status, habitats and recorded zoogeographic distribution. *Journal of Natural History*. 29:271-562.
7. GRIFFIN, B. B. 1898. Description of some marine nemerteans of Puget Sound and Alaska. *Annals of the New York Academy of Sciences*. xi:pp. 193-218.
8. HADERLIE, E. C. 1975. Phylum Nemertea (Rhynchocoela), p. 112-120. *In: Light's manual; intertidal invertebrates of the central California coast*. S. F. Light, R. I. Smith, and J. T. Carlton (eds.). University of California Press, Berkeley.
9. KAJIHARA, H., H. YAMASAKI, and S. ANDRADE. 2011. *Carinoma hamanako* sp. nov. (Nemertea: Palaeonemertea), the first representative of the genus from the northwest Pacific. *Species Diversity*. 16:149-165.
10. KOZLOFF, E. N. 1974. Keys to the marine invertebrates of Puget Sound, the San Juan Archipelago, and adjacent Regions. University of Washington Press, Seattle.
11. MASLAKOVA, S., and J. NORENBURG. 2001. Trochophore larva is plesiomorphic for nemerteans: evidence for prototroch in a basal nemertean *Carinoma tremaphoros* (Phylum Nemertea, Palaeonemertea). *American Zoologist*. 41: 1515-1516.
12. MASLAKOVA, S. A., M. Q. MARTINDALE, and J. L. NORENBURG. 2004. Vestigial prototroch in a basal nemertean, *Carinoma tremaphoros* (Nemertea; Palaeonemertea). *Evolution & Development*. 6:219-226.
13. ROE, P., J. L. NORENBURG, and S. MASLAKOVA. 2007. Nemertea, p. 221-233. *In: Light and Smith manual: intertidal invertebrates from central California to Oregon*. J. Carlton (ed.). University of California Press, Berkeley, CA.