Neanthes brandti

A clam bed worm

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

Taxonomy: *Neanthes brandti* has been placed in the genera *Nereis* and, most recently, *Alitta*. Depending on the author, *Neanthes* is currently considered a separate or subspecies to the genus *Nereis* (Hilbig 1997). The genus *Alitta* was originally designated for the species, *A. virens*, based on parapodial morphology. Later, *A. brandti* was added to this genus. Although, most authors regard *Neanthes* and *Alitta* as synonyms, there is evidence to suggest that *Alitta* is a monophyletic and a separate taxon to *Neanthes* (Bakken and Wilson 2005). Currently, *Neanthes brandti* is the name seen in local intertidal guides (e.g., Blake and Ruff 2007), but this name could change to *Alitta brandti* in the near future. Furthermore, *N. brandti* is one of three species in a closely related cryptic species complex which has been suggested to be not three, but the single, widely distributed species – *N. virens* (Breton et al. 2004).

Description

Size: Atokous or sexually immature individuals up to 185 mm in length, having 166 segments. Epitokous (heteronereids) are 300- 600 mm in length, 18 mm in width, having 230 segments (Hartman 1968; Fernald et al. 1987).

Color: Usually a dark iridescent green-brownish or blueish, with a ventrum more pale than dorsum (Hartman 1968).

General Morphology: Thick worms that are rather wide for their length (Fig. 1).

Body: Individuals are flattened dorso-ventrally and extremely active. Nereids are recognizable by their anterior appendages including two prostomial palps and four peristomial tentacular cirri (see **Anterior appendages**) (Blake and Ruff 2007).

Anterior: Prostomium short, broad and not as long as peristomium (Fig. 2). The peristomium is apodous and asetigerous.

Trunk: Thick segments that are wider than they are long, gently tapers to posterior (Fig. 1).

Posterior: Pygidium bears two slender ventrolateral anal cirri (Fig. 1) (Blake and Ruff 2007).

Parapodia: The first two setigers are uniramous. All other parapodia are biramous (Nereididae, Blake and Ruff 2007) where both notopodia and neuropodia have acicular lobes and each lobe bears 1–3 additional lobes (above and below) called ligules (Blake and Ruff 2007). The posterior notopodial lobes broadly expanded and leaf-like. All other lobes are small (Fig. 6). Dorsal cirri are short and inserted halfway along dorsal (notopodial) lobe, while ventral cirri are inserted at the base of the neuropodial lobe (Fig. 6). The parapodia of epitokous individuals are modified for swimming and are wide and plate-like (Hilbig 1997).

Setae (chaetae): Setae are compound and can be blunt (falcigerous) or hair-like (spinigerous) (Nereididae, Blake and Ruff 2007). Compound setae can be described as heterogomph, meaning that the two basal prongs are of unequal length, or homogomph, where basal prongs are of equal length (Fig. 5). Notosetae are composite spinigers only (Fig. 5) (*Neanthes*, Pettibone 1963; Fauchald 1977; Hilbig 1997). Neurosetae are both composite spinigers and short shafted falcigers (Fig. 5).

Eyes/Eyespots: Two pairs of eyes in trapezoidal arrangement on prostomium (Fig. 2) (Nereididae, Hartman 1968; Blake and Ruff 2007). The eyes of epitokous individuals are enlarged (Hilbig 1997).

Anterior Appendages: Palps at sides of prostomium are thick at bases and each have a small style (Fig. 2). The palps of epitokous individuals are larger than sexually immature

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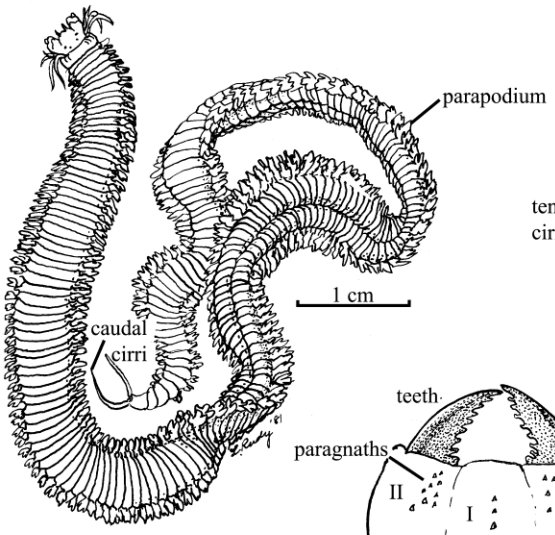
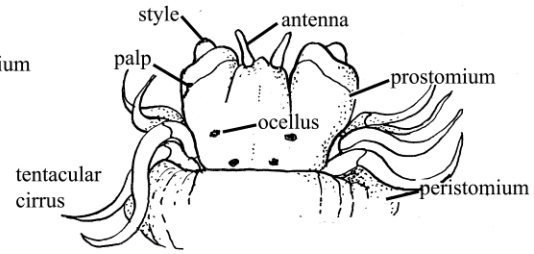
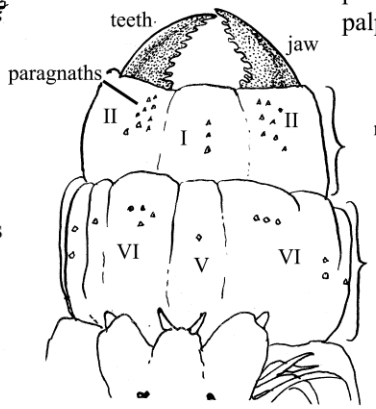
Neanthes brandti



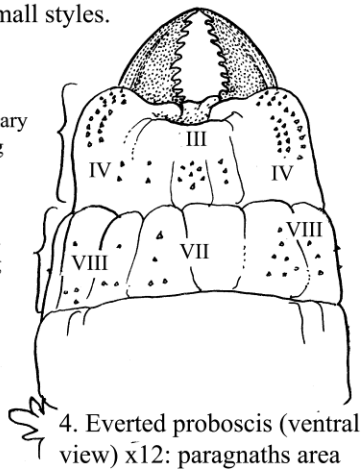
1. *Neanthes brandti* x2: dark green color; biramous parapodia; caudal cirri.



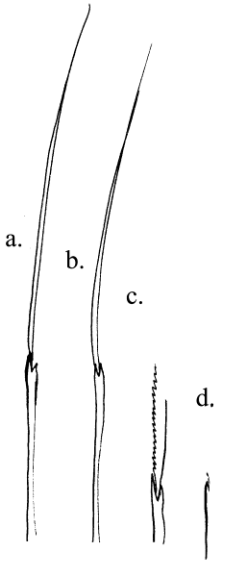
2. Prostomium (dorsal view) x12: four small ocelli; antennae-one small pair; tentacular cirri-four pairs; large palps; small styles.



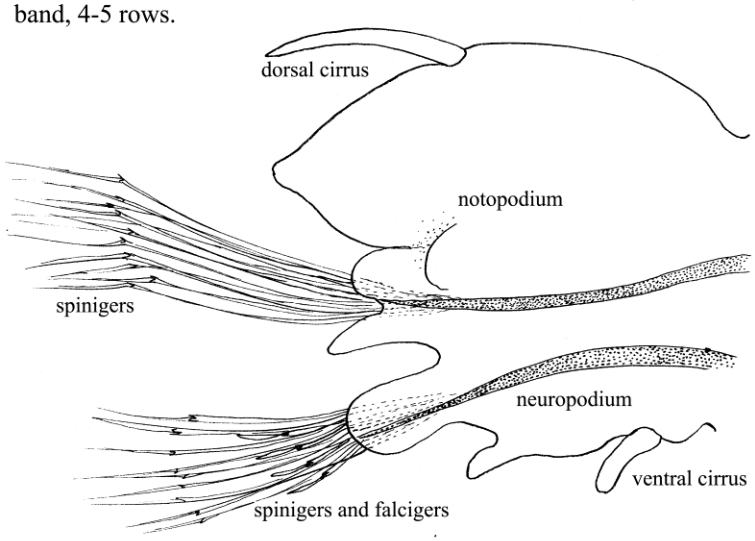
3. Everted proboscis (dorsal view) x12 conical paragnaths on oral and maxillary rings; jaws 6-8 teeth; paragnaths area I:3 in tandem, II:7-8^{+} in patch,V:0-1,VI:median band, 4-5 rows.



4. Everted proboscis (ventral view) x12: paragnaths area III: dense patch,IV: several rows (patch), VII: broad band4-5 rows, VIII: broad band, 4-5 rows.



5. Setae x300:
a. heterogomph spiniger
b. homogomph spiniger
c. heterogomph falciger
d. homogomph falciger



6a. Posterior parapodium: biramous, dorsal notopodium and ventral neuropodial lobes ; notopodial lobe leaf-like; dorsal cirrus medial.

individuals (Hilbig 1997). The prostomium also bears two short and conical antennae (Fig. 2). Four pairs of smooth tentacular cirri are found on the peristomium and second dorsal pair is the longest.
Branchiae: Absent (Blake and Ruff 2007).
Burrow/Tube: Nereids secrete and live in mucous-lined tubes (Hilbig 1997).
Pharynx: The pharynx bears a distinct eversible proboscis. The everted proboscis has two rings, oral (or proximal) and distal (or maxillary) and terminates with two fang-shaped jaws (Figs. 3, 4). The oral ring is used largely in burrowing, while the distal ring is used in feeding (Barnes and Head 1977). Each ring is equipped with many papillae and conical paragnaths and their patterns are taxonomically relevant. Area I is composed of three cones in tandem; Area II, Ill, IV are each with many cones in dense patches; Area V has zero to one cone (Banse and Hobson 1974); Area VI has a median row of four to five large cones; Areas VII and VIII are each with a broad band of many cones (Hartman 1968) (*N. brandti* has at least four to five rows) (Figs. 3, 4) (Banse and Hobson 1974).
Genitalia:
Nephridia:

Possible Misidentifications

The prostomia of nereid worms are quite alike, with four eyes, a pair of frontal antennae and biarticulate palps, and 3–4 pairs of tentacular cirri. The genus *Neanthes* currently, includes 3–4 local species (Blake and Ruff 2007). *Neanthes* species have only homogomph spinigerous setae in the posterior notopodia, a trait it shares with *Hediste* but without the fused falcigers. The genus *Neanthes* is further distinguished by having only conical paragnaths on both proboscis rings, and biramous parapodia with composite setae (Hartman and Reish 1950).

Neanthes brandti has been at times considered a subspecies or a synonym of *N. virens*, the large, coldwater form (Breton et al. 2004). This latter species, however, has only a few paragnaths on its proboscis rings, (i.e. 2–3 rows in AreasmVII, VIII), not many as in *N. brandti* (4–5 rows in Areas VII, VIII). The prostomium of *N. virens* is small and triangular, its eyes are small and on the posterior half of the prostomium. It has short antennae, and massive palps. These species exhibit overlapping geographic distributions and it is possible that they are the same species (Breton et al. 2004).

Neanthes succinea is one of the most common nereids in the NE Pacific, but is recognizable from *N. brandti* by its very enlarged posterior notopodial lobes, with a small distal dorsal cirrus attached at the end of the lobe (Blake and Ruff 2007). Furthermore, it has a heteronereid form and *N. limnicola* does not. *N. succinea* is thought to be a more southern form (although it has been reported from Netarts Bay).

Neanthes limnicola is usually pale and translucent, not dark green and its posterior parapodial lobes are not expanded like those of *N. brandti*.

Neanthes have spinigerous notosetae only (Hilbig 1997). The morphologically similar genus, *Nereis sensu stricto*, is characterized by species with spinigerous notosetae in the anterior half of the body and falcigerous notosetae posteriorly (Pettibone 1963; Smith 1959). Common *Nereis* species include the very abundant *Nereis vexillosa*, an olive green to brown worm found in many diverse marine environments, especially in mussel beds. It has greatly elongated, strap-like notopodial lobes in the posterior parapodia. *Nereis eakini*, from rocky habitats, has a long prostomium and proboscis rings covered with small round paragnaths. The bright green *Nereis grubei* has greatly expanded posterior notopodial parapodial lobes and no paragnaths in Area V of the proboscis. *Nereis procera* is subtidal in sand, has tiny eyes, a very long body, and unusually inconspicuous paragnaths on its proboscis (Hartman 1968). The genus *Nereis* differs from *Hediste* because members of the latter genus has 1–3 fused falcigers on the supra-acicular bunch of posterior neuropodial setae (no local species are known, Blake and Ruff 2007).

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Ecological Information

Range: Type locality is coastal Siberia. Known range includes northeast Pacific to southern California (Hartman 1968).
Local Distribution: Coos Bay distribution includes sites along the South Slough in Charleston (Hartman and Reish 1950).
Habitat: Known habitats are highly variable with individuals found in sand bars, thick mud (Kozloff 1974), and *Enteromorpha* beds (MacGinitie and MacGinitie 1949). Largest specimens occur in fine mud and eelgrass beds rather than in pure sand. *N. brandti* is very rare in sulfite-polluted areas (Porch 1970).
Salinity:
Temperature:
Tidal Level: Low intertidal (Hartman 1968) where individuals burrow deeply in sand.
Associates:
Abundance: A common nereid in Coos Bay and also abundant in eelgrass beds (Pettibone 1963).

Life-History Information

Reproduction: Epitokous stages begin swarming and are attracted to night-lights in June–August (Washington, Fernald et al. 1987). These epitokes provide observers with one of the most spectacular displays of nereid swarming (Porch 1970). The sexually mature (epitokous) animals swim wildly at night on the water's surface, their medial parapodial lobes swollen for swimming. After expelling sperm and eggs, the distended worms will die.
Larva: The larval development of *N. brandti* is not known, and development varies in the Nereididae. Some species have embryos that are fertilized and develop in the plankton, while others develop in benthic egg masses. Their trochophore larval stage is usually reduced and most nereids hatch as nectochaetes (Fernald et al. 1987; Crumrine 2001). Many larvae are lecithotrophic until their pharynx is fully developed. Finally, nereid larvae tend not to acquire many segments in the plankton, and instead do so once they have settled into the benthos (Fernald et al. 1987).
Juvenile:
Longevity:
Growth Rate:
Food: Fecal castings, which are similar to the lug worm (see *Abarenicola pacifica*), are small and contain seaweed. Although some nereids are carnivorous (Blake and Ruff 2007), many are herbivorous and use their jaws to tear apart and eat pieces of algae (Fernald et al. 1987; Kozloff 1993). Immature worms appear to eat *Ulva, Enteromorpha* (MacGinitie and MacGinitie 1949).
Predators:
Behavior: *Neanthes brandti* are fast swimmers with swimming speed between 50–80 mm/sec (Haderlie 1980).

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