Alderia modesta

A sacoglossan sea slug

Phylum: Mollusca

Class: Gastropoda, Heterobranchia, Euthyneura, Tectipleura

Order: Sacoglossa

Family: Plakobranchoidea, Limapontiidae

Description

Size: To 8 mm long; Coos Bay specimens to 5 mm.

Color: Greenish to yellowish-tan, black markings, base ivory.

Body: Metamorphic, adult is an oblong, flat-bottomed form without tentacles or tail (Figs. 1, 2) (Evans 1953).

Rhinophores: Reduced, rolled and not solid (Fig. 1); (Kozloff calls these cephalic projections 'dorsolateral tentacles,' not rhinophores) (Kozloff 1974).

Foot: No parapodia (lateral flaps that could fold over dorsum); foot extends laterally beyond body (Kozloff 1974).

Cerata: Dorsal projections, about 18 (Fig. 1), in two loose branches on both anterior and posterior halves of dorsum (Kozloff 1974).

Gills: Rather than a circlet of gills, like those present in some other gastropods, they have branchial processes set in six or seven diagonal rows on the sides of the back, increasing in size towards the posterior (Jeffreys 1869).

Eyes: Small, black (Figs. 1, 2).

Anus: A long tube originating on a medial line, resembling posterior ceratum (McDonald 2007).

Renal Pore:

Eggs: Light yellow, in clear cuticle (Fig. 3). Dark yellow when first deposited. The slugs deposit egg masses on the steep sides of little slopes. Thought to produce both planktotrophic and lecithotrophic larva (Krug 1998), but later studies suggest *A. modesta* is planktotrophic while its congener, *A. willowi*, is truly poecilogonous (Krug et al. 2007).

Possible Misidentifications

Sacoglossans are a little known group, and of small size, but can occur in large numbers. *Alderia modesta*, like others of the order, feeds on a specific alga (Williams and Walker 1999), has a wide distribution, and is not likely to be confused with other Opisthobranchs.

While sacoglossans superficially resemble the more well-known nudibranchs, they lack a circlet of gills, solid rhinophores, and oral tentacles. One exception, *Stiliger fuscovittatus*, has solid rhinophores; it is tiny (3 mm), transparent white with reddish brown patterns, and lives in *Polysiphonia*, a red alga.

In the family Limapontiidae there are two additional species:

Olea hansineensis has only about 10 elongate cerata on its posterior dorsum; it is gray, and found commonly in *Zostera* beds.

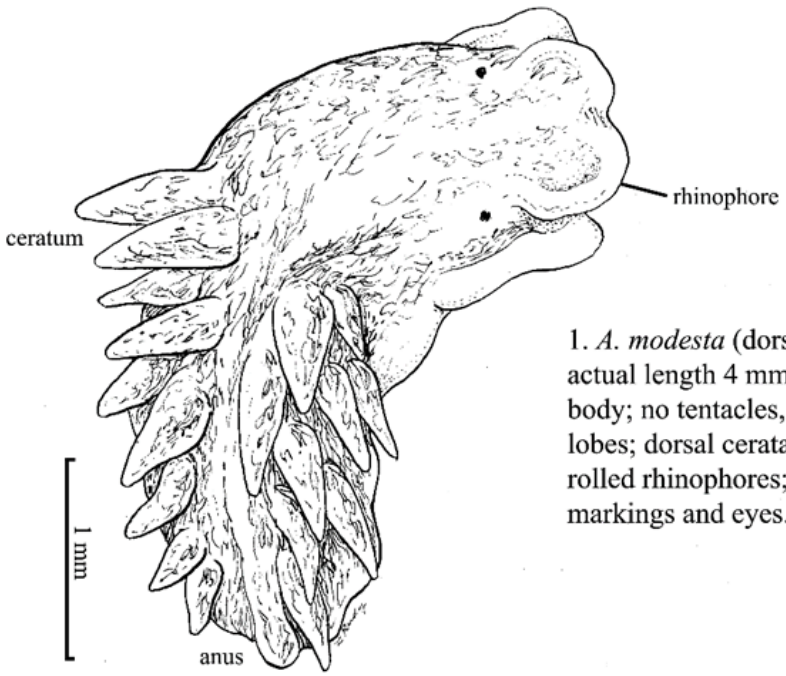
Placida dendritica has a long, obvious tail, long cerata, and is pale yellow with dark green lines. It is usually on algae *Bryopsis* or *Codium* in the rocky intertidal, and found in California and Puget Sound (Williams and Gosliner 1973).

None of the above are yellowish tan, have small black markings, a tubular anus, and live on *Vaucheria*.

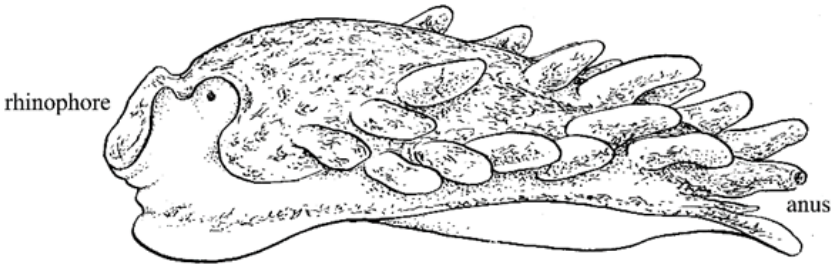
Other Sacoglossans with dorsal cerata and rolled rhinophores, in the family Hermaeidae, include:

Aplysiopsis enteromorphae, greenish to brownish black with white edges, bulbous cerata, and up to 22 mm long. It lives in *Chaetomorpha, Rhizoclonium* (its preferred

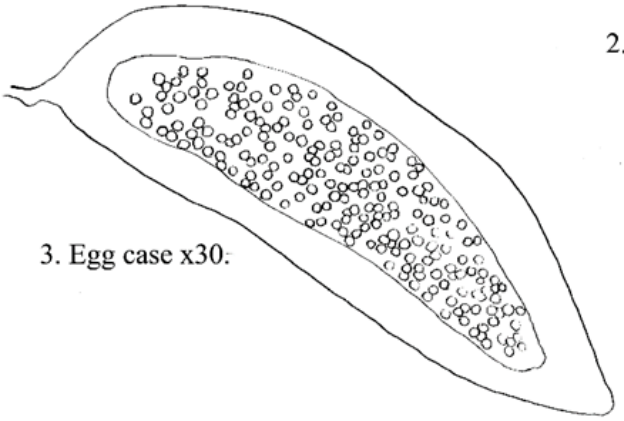
Alderia modesta



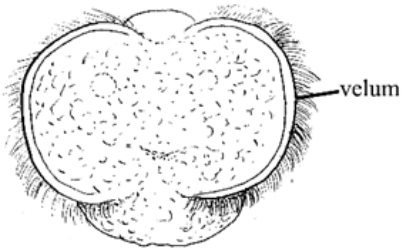
1. *A. modesta* (dorsal view) x30: actual length 4 mm; oblong, changeable body; no tentacles, tail, or parapodial lobes; dorsal cerata; anal tube; small rolled rhinophores; light tan, black markings and eyes.



2. *A. modesta* (lateral view).



3. Egg case x30.



4. 2-day veliger.

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food), or *Enteromorpha* (Gonor 1961). It has prominent rhinophores and a tail.

Hermaea oliviae has a Y-shaped mahogany line from the rhinophores to the head midline; pale yellow with a pink spot behind the eyes.

Hermaea vancouverensis is small (to 5 mm), brown and white, and more common in Puget Sound than in the south; its habitat is eelgrass (*Zostera*); feeds on the diatom *Isthmia* (Williams and Gosliner 1973).

Ecological Information

Range: San Juan Island to Elkhorn Slough, CA; Europe (Steinberg 1963).
Local Distribution: Coos Bay: South Slough, and for a more thorough treatment of local distribution see Trowbridge (1993).
Habitat: Found only in mats of alga *Vaucheria* in *Salicornia* marshes. For a review of sacoglossan natural history in the Pacific Northwest see Trowbridge (2002).
Salinity: Prefers 16-17; cannot survive in normal seawater or fresh water (Hyman 1967), although eggs develop in either seawater or brackish water. Cerata pulsation rate varies with salinity (Hyman 1967).
Temperature: Adults inhabit a wide variety of temperature ranges. "If the salinity is suitable, the larvae hatch after 3 1/2 days at 20° C; this takes 5 days at 14°C and 4 weeks at an average temperature of 2° C" (Seelemann 1967).
Tidal Level: At higher levels in the marsh, about 4.0' (Coos Bay).
Associates: Insects; alga *Vaucheria*.
Weight: Individuals sampled in Coos Bay ranged from 5.5 to 23.1 mg, with an overall mean weight of 11.2 +/- 0.5mg (Krug et al. 2007).
Abundance: Common in its particular microhabitat, *Vaucheria* (McDonald 2007).

Life-History Information

Reproduction: Mating occurs via hypodermic insemination and they have a spine on the tip of their penis (Bleakney, J.S. 1988); eggs laid in September, Coos Bay (this specimen). Once adults reach about 3 mm they start producing eggs. During the warm season one animal can produce about 1000 eggs a day. Initially thought to be poecilogonous (Ellingson and Krug 2006), but later studies suggest that reproduction in *A. modesta* is planktotrophic and *A. willowii*, a congener of *A. modesta,* is truly poecilogonous (Krug et al. 2007). Seasonal influences, nutritional status and a number of other factors can come into play and for a further review of seasonal polyphenism in the genus *Alderia* see Krug (2001) and Krug et al. (2012).
Larva:
Juvenile:
Longevity: 1-2 years (IUCN 2013)
Growth Rate: After 4 to 5 days, the larvae hatch and begin their planktonic life. They are planktotrophic and require at least 30 days until they are ready for metamorphosis. To early veliger two days in lab (this specimen).
Food: Alga *Vaucheria*, exclusively (Williams and Walker 1999).
Predators: *Alderia modesta* produces a strong, pungent odor to repel fish and crabs (Hand and Steinberg 1955).
Behavior: Newly hatched planktotrophic larvae swim in meandering paths with equal rates of upward and downward movement. As larvae approach metamorphosis their swimming become straighter, faster, and increasingly directed towards the bottom (Krug and Zimmer 2004).

Competent larvae swim downwards, rather than passively sinking, even though sinking rates are faster than swimming speeds, and larvae settle in response to waterborne and surface carbohydrates (Krug and Manzi 1999). Active swimming may allow larvae to keep the velum extended, permitting rapid response to chemical settlement cues and promoting successful colonization (Krug and Zimmer 2004).

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