
Obelia longissima

A floating dock hydroid

Phylum: Cnidaria
Class: Hydrozoa, Hydroidolina
Order: Leptothecata
Family: Campanularidae

Taxonomy: *Obelia longissima* was first described by Pallas in 1766. Synonymous include *Campanularia flabellata*, *Gonothyraea longissima*, *Laomeda flabellata*, *L. longissima*, *O. flabellata*, *Sertularia longissima* (WoRMS 2015). *O. lucifera* may also be a synonym (especially of the medusa form), but further research is necessary to be sure. There has been much debate over the species identities within the genus *Obelia* (Cornelius 1975; Arai and Brinckmann-Voss 1980). The taxonomy above was taken from the World Register of Marine Species (WoRMS 2015). In addition to confusion in the lower taxonomy, the higher taxonomy has undergone revision. The order Hydroida was determined to be synonymous with subclass Hydroidolina in 2004 (Schuchert 2015).

Description

General Morphology: *Obelia longissima* has two forms. The sexual form is a gelatinous hydromedusa. It has radial canals that run from the top of the peduncle to the bell margin, where they are connected by a ring canal. Suspended from the inside of the bell by a peduncle is the manubrium, or mouth. A velum rings the inside of the bell margin (Fig. 3). Its asexual morphology is a large polyp. Each polyp has a stem (hydrocaulus), and most have a sheathed (thecate) hydranth with a mouth (manubrium), stomach, and tentacles. Rather than having hydranths, some polyps have gonothecae (Fig. 2).

Medusa:

Size: Newly-released medusae are about 0.5 mm in diameter; as they mature, they grow to 5 mm in diameter (Cornelius 1975; Kozloff 1983).

Color: Medusae are primarily clear. Their tentacle bases, mouths, gonads, and stomachs are sometimes yellow to brown, while their gonads and mouths can be bright

green (Puget Sound) (Arai and Brinckmann-Voss 1980).

Body:

Bell: The bell is very thin and flat, with a small stomach, no peduncle, and a rudimentary velum (Fig. 3). It is eversible (Arai and Brinckmann-Voss 1980).

Radial Canals: There are four straight radial canals, each containing a globular gonad (Fig. 3).

Ring Canal: The ring canal is narrow, with eight statocysts (balance structures) (Arai and Brinckmann-Voss 1980) and no ocelli (Fig. 3).

Mouth: The mouth has 4 small, simple lips (Arai and Brinckmann-Voss 1980); in mature specimens these contain nematocysts (Boero et al. 2007).

Tentacles: Tentacles are numerous, solid (as opposed to hollow), and short. There are usually 16-26 in young medusae (Ricketts et al. 1985; Mills and Strathmann 1987), and more develop as they mature.

Velum: Reduced (Arai and Brinckmann-Voss 1980)

Gonads: There are 4 round gonads on the middle of each radial canal (Arai and Brinckmann-Voss 1980).

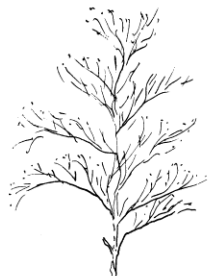
Polyp:

Size: Each colony can be up to 60 cm long (Mills et al. 2007) (Fig. 1). Older side branches are all about the same length (towards the base), but younger branches gradually get shorter near the growing tip (Mills et al. 2007).

Color: The polyp is transparent white when young, while old, mature colonies look dirty. Stems are brown to black (Mills et al. 2007).

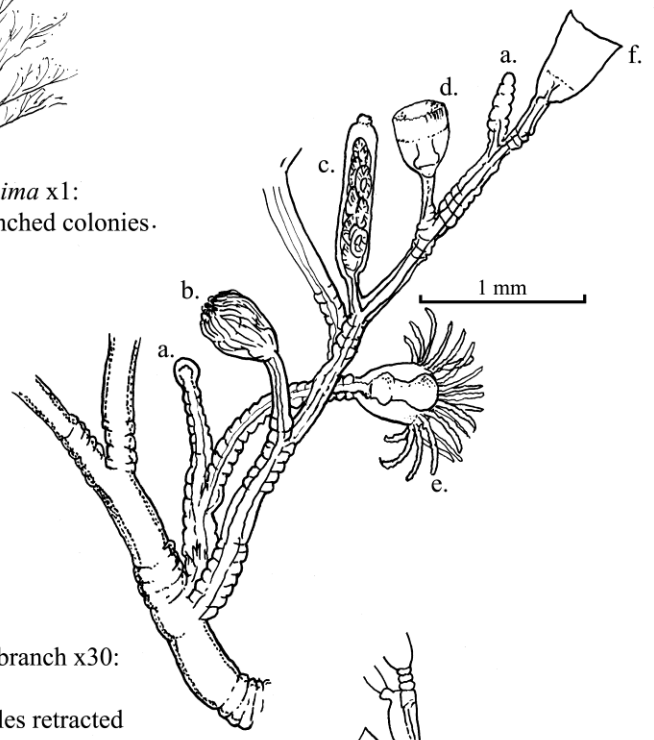
Body: Lacks nematophores (non-feeding defensive polyps) (Mills et al. 2007)

Pedical: Stems are thread-like and often monosiphonic (consist of a single



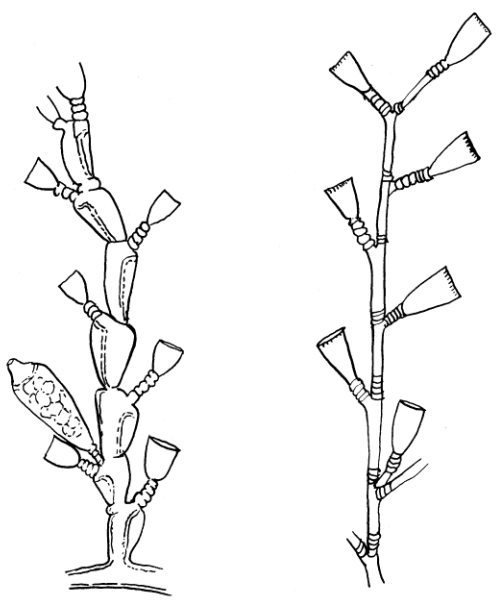
Obelia longissima

1. *Obelia longissima* x1:
white, many-branched colonies.

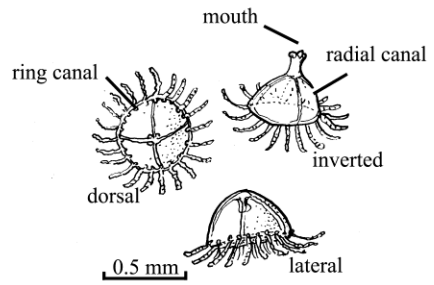


2. Closeup, single branch x30:

- a. buds
- b. hydranth, tentacles retracted
- c. gonotheca, showing medusae buds
- d. hydrotheca (covering young polyp)
- e. hydranth, tentacles extended
- f. empty hydrotheca



a. *O. geniculata* b. *O. dichotoma*



3. Medusae x30:
actual diameter 0.5 mm.

4. Other species
(from Russell 1953, after Hincks 1868).

tube or row of cells) except sometimes near the base. Internodes of the stem are straight or curve very slightly (Mills et al. 2007). Each stem has many branches, which are ringed at the joints, alternate, and have short stalks (Fig. 2). Stems hold many hydranths rather than just one (Mills et al. 2007).

Hydranth: The hydranth is covered by a theca (hydrothecae), which is campanulate (bell-shaped, hence family name) and deep enough to contain the hydranth when contracted. The margin is crenulate rather than cusped, and lacks an operculum (Mills et al. 2007). Each hydranth is on the end of a long, ringed pedicels (Fig. 2d, f).

Gonangium: The reproductive buds (gonotheca, gonangia) asexually produce medusae (Fig. 2c) (Ricketts et al. 1985). These buds are axillary (i.e., grow out of the angle between the stem and the hydrotheca). They are oval-shaped and smooth, with a raised central aperture (Parker et al. 1951) and a terminal collar (Mills et al. 2007).

Cnidae:

Possible Misidentifications

The family Campanulariidae includes leptomedusae possessing four radial canals, and lacking excretory pores and marginal or lateral cirri. The polyps in the family have a club or trumpet-shaped manubrium, and lack operculum. The genus *Obelia* includes species that have a nearly flat and eversible bell, a reduced velum, eight statocysts, and solid (rather than hollow) tentacles (Arai and Brinckmann-Voss 1980). Within the genus, the species look so similar (especially in the hydromedusa stage) that it is common for researchers to identify only to the genus level (Arai and Brinckmann-Voss 1980).

There are two very closely related species of *Obelia*: (Fig. 4)

Obelia geniculata has a central zig zag stem, thickened at the joints, while *O. longissima* has a much straighter and narrower stem. *Obelia geniculata* has a rather conical hydrothecae (as opposed to bell-shaped) that is only slightly longer than wide, and has plain margins rather than cusped

(Fig. 4a). Colony size is also a difference; the maximum size of an *O. geniculata* colony is 2 cm (Cornelius 1975), much smaller than the 60 cm maximum of *O. longissima*. This size also gives *O. geniculata* a delicate white and fuzzy appearance (Kozloff 1983). The species are similar in that they both have ringed branches and axillary gonothecae that are urn-shaped, with a raised center and a short ringed stalk. Their hydromedusae are also similar enough that they are often not identified past the genus level (Arai and Brinckmann-Voss 1980).

Obelia dichotoma is very similar to *O. longissima*. Both have slender and annulated stems, though *O. dichotoma* has curved internodes and is irregularly branched while *O. longissima* has a straight stem and is alternately branched. These are essentially the only differences. Both have hydrothecae that are broad, bell-shaped, with slightly sinuated margins; their gonothecae are axillar, slender, and smooth. They widen from the base, and end in a “raised, somewhat conical aperture” (Russell 1953) (Fig. 4b). No one has yet been able to definitively identify differences in the hydromedusae forms.

Other hydroids, which have stalks, and thecae within which their hydranths can be retracted (Fig. 2b) include those of the families Campanulinidae and Phialellidae (Rees and Hand 1975), which are very small and have tubular thecae with a pointed operculum. Other Campanularidae (bell-shaped hydrothecae) include *Phialidium sp.* and *Campanularia sp.* both of which have colonies of less than 2 cm in height, and are rarely branched.

The genus most closely related to *Obelia* is *Gonothyraea*, which does not release free medusae, but retains them within the gonotheca (Kozloff 1983).

Ecological Information

Range: The type locality is Belgium (Ralph 1957). The genus *Obelia* is found worldwide. *Obelia longissima* is found from Alaska to San Pedro, California (Ricketts et al. 1985).

Local Distribution: All three closely related species (*O. longissima*, *O. geniculata*, *O. dictotoma*) are found from northern California

to Puget Sound, Washington; other species may be present as well, some of them introduced (Rees and Hand 1975).

Habitat: This is a frequent fouling organism, common in harbors (Mills et al. 2007), on docks, kelp, and floats in bays, and in eelgrass beds (Elkhorn Slough, CA) (Ricketts et al. 1985). Healthy colonies are found on exposed pilings, particularly where water is clean and fast-moving. Medusae are found floating, probably not far from their hydroid parents. They probably are not light-dependent for vertical distribution (Parker and Haswell 1951). Polyps usually do not grow in pollution or direct sunlight (Ricketts et al. 1985).

Salinity: Collected at 30, though it can tolerate some fresh water (Ricketts et al. 1985). An Atlantic species, *O. bidentata* was found to have a wide distribution across the estuarine gradient, down to 0.5. *O. dichotoma* was found down to 12 (Cornelius 1975).

Temperature: Specimens have been found in cold and temperate waters; settling may occur in cooler temperatures during the year (Standing 1976).

Tidal Level: They are most abundant in mid-intertidal and just below, and have been found from low tide to 128 m (Mills et al. 2007).

Associates: The hydroid colonies serve as a good habitat for many epibionts. Some of these include caprellid and garnmarid amphipods; asellote isopods; copepods; diatoms; the sea slug *Eubranchus*; nudibranchs *Dendronotus frondosus* and *Phidiana crassicornis* (Bodega Bay); and pycnogonid *Halosoma veridintestinale*. The medusa form plays host to pycnogonid larvae of *Anaphia* (England). Despite both species' prevalence as fouling organisms, barnacle larvae cannot settle where *O. longissima* growth is heavy (Standing 1976).

Abundance: *Obelia longissima* is particularly common in harbors in northern California (Rees and Hand 1975), British Columbia, and Puget Sound (Arai and Brinckmann-Voss 1980; Ricketts et al. 1985). In the Strait of Georgia, it is collected from March to Sept., and common from April to June (Arai and Brinckmann-Voss 1980). Medusae are released primarily during summer, but also in smaller quantities throughout year (Ricketts et

al. 1985). Medusa blooms and subsequent massive shoreline settlement are not common but do occasionally occur (Genzano et al. 2008).

Life-History Information

Reproduction: Like other hydroids, *O. longissima* has both a sexual reproductive cycle and an asexual one. In sexual reproduction, the medusae produce either eggs or sperm (dioecious). After the egg is fertilized, it develops into a planula larva, which settles and becomes the polyp stage. In asexual reproduction, the gonangia of the polyp bud to form juvenile medusae. The production of medusae by the polyp may be tied to lunar periodicity: specifically, to the third week of the moon (Elmhirst 1925, in Russell 1953). The complete life cycle (swimming larvae to hydroid colony discharging medusae) takes one month (MacGinitie and MacGinitie 1968). Lab reared medusae are sexually mature six days after emergence (Russell 1953). *O. longissima* are present all year, but are most numerous in spring to late summer. Settling may correspond to low water temperatures (Standing 1976). Budding and release of medusae only occurs below 12° C (lab) (Haderlie et al. 1980).

Larva: The hydromedusae form produces planula larvae (Kozloff 1983). Planulae are usually oval or club-shaped and ciliated evenly all over their bodies. These larvae are non-feeding and free-swimming. They are armed with nematocytes, but lack an apical ciliary tuft and septa (see Fig. 3, Sadro 2001).

Juvenile: The juvenile medusa is about 0.5 mm in diameter and has 16-26 tentacles (Ricketts et al. 1985; Mills and Strathmann 1987). It lacks nematocysts on its lips (Boero et al. 2007).

Longevity: One generation (from newly-released larva to medusae-releasing hydroid) takes about one month (Ricketts et al. 1985).

Growth Rate: Because of the quick generation time and rapid hydroid growth, several generations are possible in a year (Ricketts et al. 1985). *Obelia dichotoma* grows to 2.5 mm in 19 days (from 1 mm) (Browne in Russell 1953). Growth is directly correlated

with temperatures of 8-20° C (Haderlie et al. 1980).

Food: The medusa stage is considered a microphagous filter-feeder, especially as a juvenile (*O. dichotoma*) (Boero et al. 2007). Older individuals can sometimes consume crustaceans and their larvae, arrowworms, and small fish. The polyp stage primarily eats phytoplankton (diatoms and dinoflagellates), and secondarily eats detritus from macroalgae (De Rosa et al. 1999).

Predators: Opisthobranch *Eubranchus* and several nudibranch species eat hydroid buds (Ricketts et al. 1985; Mills et al. 2007). Other hydrodmedusae prey upon the medusa stage (Arai and Jacobs 1980).

Behavior: The medusa is noted for its quick movements, and it is often found inverted (Fig. 3). Because of its flat bell, it uses bell-flapping rather than jet-propulsion to move through the water (see Fig. 2, Boero et al. 2007). This undulation is also how medusae maintain waterflow to their manubrium in order to continue filter-feeding. Juvenile medusae must flap their bells continuously (and thus feed continuously); they will undulate their bell while at the surface of the water to create waterflow while maintaining a single position (Boero et al. 2007). Medusae are bioluminescent, and are the source of the protein obelin (Ohmiya and Hirano 1996).

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