
Pentamera lissoplaca

Crescent Sea Cucumber

Phylum: Echinodermata
Class: Holothuroidea
Order: Dendrochirotida
Family: Phyllophoridae

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Taxonomy: Originally described as *Cucumaria lissoplaca* by Clark in 1924 and later moved into the genus *Pentamera*, described by Ayres in 1852 (WoRMS 2021).

Description

Size: Typically up to 3.5 centimeters, this sea cucumber is one of the smaller species of *Pentamera*. The body can be relatively straight or curved in a “U” shape (Fig. 1, Lambert 1997).

Color: *Pentamera lissoplaca* has a white-colored body with pastel yellow tube feet. The feeding tentacles are brown.

General Morphology: Body is the shape of a cylinder, containing the mouth at the anterior end and the anus at the posterior. The skin contains a skeleton made up of ossicles. Feeding tentacles surround the mouth, and the body is lined with five rows of tube feet, running from mouth to anus (Hendler et al. 1995).

Body: *Pentamera lissoplaca* contains five rows of tube feet running from mouth to anus. The tube feet in each of the five rows are separated into two distinct and sometimes crowded lines. The epidermis of the body can be either smooth or wrinkled (Lambert 1997).

Mouthparts: The mouth uses twelve tentacles; ten are relatively short while the remaining two are ventral and much smaller than the other ten. (Lambert 1997). The tentacles are used for feeding. They retain mucus that picks up particles from the seawater or the sediment and then retract back towards the mouth. (Binyon 1972). The lengths of the tentacles of the *P. lissoplaca* collected from offshore Cape Arago, OR were on average 2 cm. The small ventral tentacles were 0.3 cm.

Ossicles: The calcareous skeleton of the sea cucumber is placed within the dermis of the body. The skeleton is composed of small, geometric calcium carbonate structures called

ossicles (Hendler et al. 1995). The ossicles of *P. lissoplaca* are a particularly long, oblong shape. Some of them retain a more triangular shape, while others look more like diamonds (Fig. 2). Other *Pentamera* species tend to have round ossicles or ones with no distinct geometric shape.

Tube Feet: The tube feet are used for locomotion and burrowing, as they are connected to the water vascular system (Hendler et al. 1995). Tube feet of the *P. lissoplaca* collected from offshore Cape Arago, OR had an average length of 0.15-0.2 cm.

Sexual Dimorphism: *Pentamera lissoplaca* are either male or female. The only way to identify the gender is by observing the gonads internally (Hendler et al. 1995).

Possible Misidentifications:

It is difficult to distinguish between species in the *Pentamera* genus. Each species has white skin, yellowish tube feet, and occasionally a similar size range and shape. The main species to be concerned about misidentification are *P. populifera*, *P. pseudocalcigera*, and *P. trachyplaca*. The rest of the genus can be dismissed due to their habitats outside the North American Pacific North West coast. The best way to distinguish the Pacific North West species from each other is to look at their ossicles. For example, while *P. lissoplaca* has elongated diamond and triangle-shaped ossicles, *P. pseudocalcigera* has round and large triangular ossicles (Lambert 1997). Outside of the genus, *P. lissoplaca* is commonly misidentified with *Eupentacta pseudoquinquesemita*. At first glance, both species look similar in color and body morphology. However, *E. pseudoquinquesemita* is much longer and has ten tentacles, while *P. lissoplaca* has twelve. Additionally, the ossicles of *E.*

pseudoquinquesemita are small, oval, and cup-shaped (Lambert 1997).

Ecological Information

Range: The type locality is Alert Bay of Queen Charlotte Strait in BC, Canada. The species ranges from Southern Alaska to Monterey Bay, California, with an individual observation in Cedros Island, Baja California (Lambert 1997).

Local Distribution: Commonly found in the intertidal and up to 90 meters (Lambert 1997). The OIMB Deep-Sea Biology course has collected this species from ~100 m offshore of Cape Arago and ~130 m offshore the Heceta Valley.

Habitat: *Pentamera lissoplaca* is a benthic organism and lives in soft mud. The “U” shape of the body allows for the cucumber to stay hidden within the mud with the mouth and anus to be exposed to pick out food and expel waste (Lambert 1997).

Temperature: The temperature range for *P. lissoplaca* is unknown, though they have been collected from waters around 12.8°C.

Depth: 10-134 meters (Lambert 1997).

Associates: Unknown.

Abundance: Unknown.

Life-History Information

Reproduction: Gametes are free-spawned, and fertilization occurs externally for the *Pentamera* genus. The genus lacks species-specific chemoattraction between eggs and sperm. Peak spawning season occurs in the spring, between February and March. (Strathmann 1987).

Larva: The *Pentamera* genus is known to have lecithotrophic doliolaria larvae. After about 17 days, the larvae metamorphose to the juvenile stage and settle in the sediment (Strathmann 1987).

Juvenile: For the *Pentamera* genus, it has been found that juveniles can reach a density of $1.5 \times 10^5/m^2$ in the sediment (Strathmann 1987).

Longevity: Unknown.

Growth Rate: Unknown for this species. Growth rate is different for each species as it depends on habitat temperature, salinity, food resources, etc.

Food: Members of the *Pentamera* genus are both suspension and deposit feeders. Using their tentacles, they can obtain detrital organic matter and particulate organic matter from either the sediment around them or the water above them (Lambert 1997).

Predators: Predators are made up of mainly sea stars and benthic fish (Lambert 1997).

Behavior: Tube feet are used to burrow themselves into the sediment. It is unknown if they move or tend to be sessile (Hendler et al. 1995).

During spawning, females of the *Pentamera* genus will lift their eggs with their tentacles and wave them around in the current (Lambert 1997).

Bibliography

1. BINYON, J. 1972. Physiology of Echinoderms. International Series of Monographs in Pure and Applied Biology. 49:3-4.
2. HENDLER, G., J. E. MILLER, D. L. PAWSON, and P. M. KIER. 1995. Sea Stars, Sea Urchins, and Allies: Echinoderms of Florida and the Caribbean. Smithsonian Institution. 252-257.
3. LAMBERT, P. 1997. Royal British Columbia Museum. Sea Cucumbers of British Columbia, South East Alaska and Puget Sound. 18-21, 88-97.
4. STRATHMANN, M. F. 1987. Reproduction and Development of Marine Invertebrates of the Northern Pacific Coast. 574-589.
5. WoRMS (2021). *Pentamera lissoplaca* (Clark, 1924). Accessed at: <http://www.marinespecies.org/aphia.php?p=taxdetails&id=529598> on 2021-03-21



Fig. 1. *Pentamera lissoplaca* collected from offshore the Haceta Valley in Oregon. The posterior end is at the bottom of the picture, and the anterior at the top. Feeding tentacles are retracted. Photo by M. Hailey.

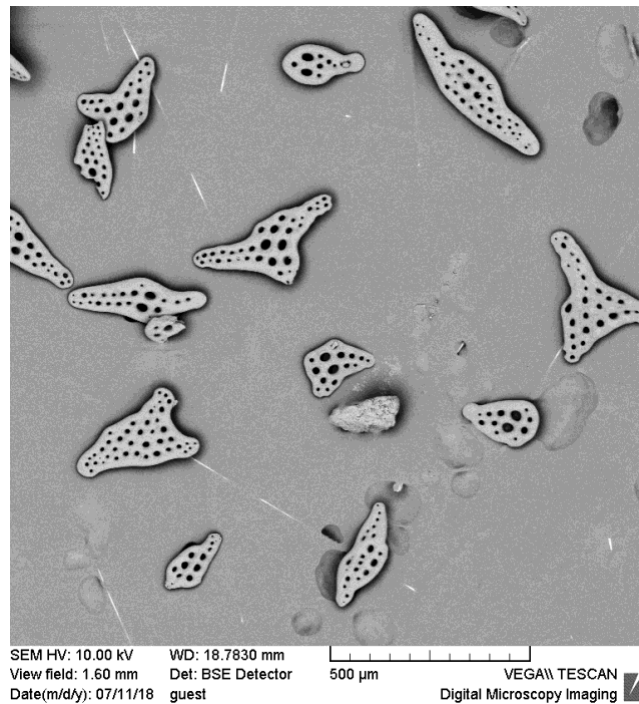


Fig. 2. Scanning electron micrograph of ossicles from *P. lissoplaca* collected from offshore of Cape Arago, OR.