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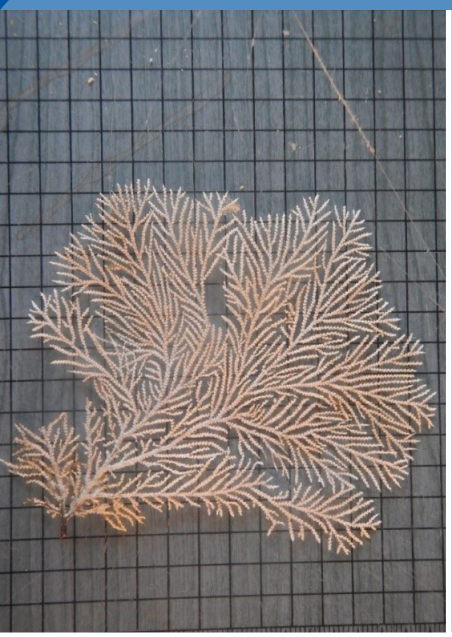

Northeast Pacific Invertebrates, 5th Edition

August 2023

U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
National Marine Fisheries Service
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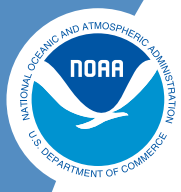

NOAA FISHERIES

Northeast Pacific Invertebrates, 5th Edition

Daniel J. Kamikawa and John Buchanan

https://doi.org/10.25923/8cew-zs83

August 2023

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Northwest Fisheries Science Center
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U.S. DEPARTMENT OF COMMERCE

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Introduction

This document was originally developed for internal use by the Northwest Fisheries Science Center (NWFSC) Fisheries Resource, Analysis and Monitoring Division (FRAM) field staff. Designed as a pictorial list to aide identification of the invertebrate taxa captured during the various FRAM West Coast surveys one does not need an advanced degree to use it. Therefore scientific and technical terms have been kept to a minimum and, when used, are defined within the text. Descriptions and distribution are confined to those species within the geographic (U.S.–Canada to U.S.–Mexico borders) and depth (30–1,680 m) parameters of the FRAM West Coast surveys. Many of the invertebrates described have geographic and/or depth ranges that extend outside of the survey parameters. Distributions include these areas and are described by political boundaries (e.g., state and/or country borders), bodies of water (i.e., the northeastern Pacific, the Strait of Juan de Fuca, the Columbia River, etc.), islands and/or major geographical features (i.e., the Hawaiian, Farallon, and Channel Islands, Cape Flattery, Point Conception, etc.). Conducted aboard small commercial vessels with limited personnel and space, the majority of the FRAM West Coast surveys do not have access to wet/dry lab facilities for detailed observations. Due to a variety of factors such as body size and specimen damage, meristic counts (i.e., spine shape, size, number and location), and others that cannot be made with the naked eye, identification of some groups of invertebrates included in this text are treated only to the family or generic level. Because identification of many invertebrates to the species and/or generic level require examination beyond what is possible during the surveys no keys to the species in this guide are included. The list of common and scientific names are in the List of Species, and photographs are provided when available.

Acknowledgments

We would like to thank Research Associates with the Santa Barbara Museum of Natural History Roger N. Clark and Kayla D. Clark and former FRAM field staffer Keri J. York for their contributions to the previous versions of this document.

We would also like to thank Roger N. Clark for his continuing assistance with invertebrate taxonomy, systematics and for confirming the identification of species listed in this guide.

The following organizations and individuals graciously allowed the use of their photographs, drawings and diagrams.

The FRAM Division Fisheries Research Survey (FRS) team (West Coast Groundfish Bottom Trawl Survey and Southern California Shelf Rockfish Hook and Line Survey)
The West Coast Groundfish Observer Program (WCGOP)
The At-Sea Hake Observer Program (ASHOP)
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We would like to acknowledge all the Captains and Crew members of the participating vessels the members of the NWFSC Groundfish Trawl Survey Team and Volunteers, past and present who have helped in the collection and identification of invertebrates.

Table of Contents

Table of Contents

Sponges Porifera

Sponges are individual organisms composed of differentiated cells connected by an epidermis. Flagellated cells (choanocytes) that line the inside cavity (spongocoel) create water currents and capture food particles and sperm. Water flows from the porocytes (incurrent pores) through the spongocoel and out through the osculua (excurrent pores). Sponges retain shape by structurally supportive fibers (spicules). Skeletal materials are specific to the class of porifera, and are composed of silica, calcium carbonate, or protein (spongin). These fibers may also aid in defense and are used in species identification. Sponge identification is difficult without examination of spicules or spongin, as many have similar morphologies.

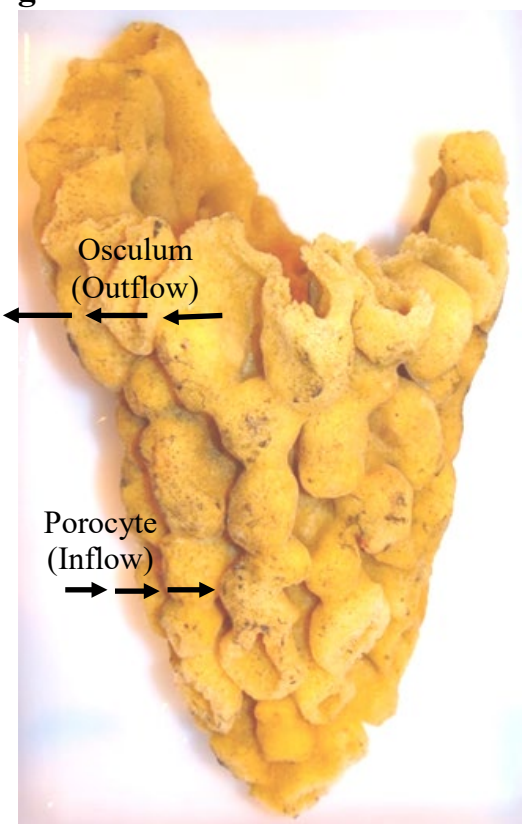
Class Demospongiae (spicules may be enhanced or replaced by proteinaceous spongin)

- Order Hadromerida
  - Family Cladorhizidae - *Asbestopluma*
  - Family Suberitidae – *Suberites*

Class Hexactinellida (glass sponges – spicules siliceous and six-rayed, outer layer is syncytial – having many nuclei in one membrane rather than connected, individual cells)

- Order Amphidiscosida
  - Family Hyalonematidae – *Hyalonema*
- Order Lyssacinosida
  - Family Rossellidae – *Staurocalyptus, Rhabdocalyptus, Acanthascus*
- Order Hexasterophora
  - Family Farreidae – *Farrea*
  - Family Aphrocallistidae – *Aphrocallistes*
  - Family Euretidae – *Chonelasma*

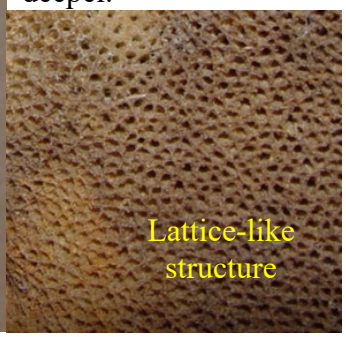
Sponge Characteristics and Terminology



Sponges

Aphrocallistes vastus (Clay Pipe Sponge)

Description
The spicules of this rigid yellow, brown, or white sponge are fused into a lattice-like structure. Height to 1 m.
Similar species
Chonelasma calyx has larger spicules fused into a coarse reticulation.
Distribution
Bering Sea to Mexico, 20-800 m possibly deeper.



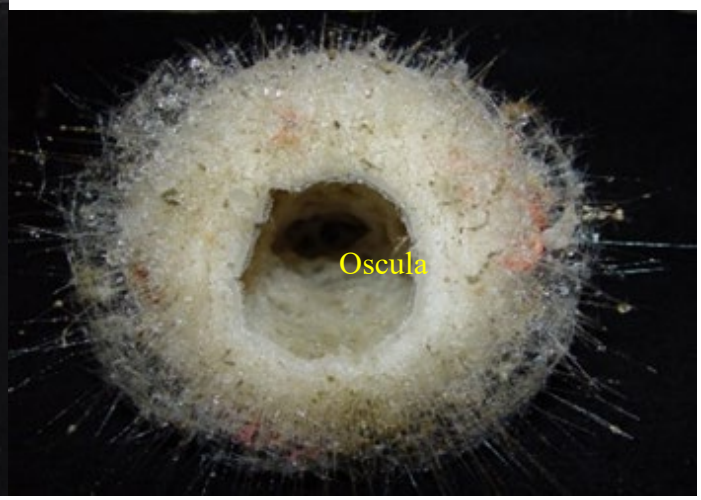
Chonelasma calyx (Goblet sponge)

Description
This is a thick, rigid, polymorphic sponge with numerous large drip-like projections on the exterior surface. Live colonies are yellow or white.
Height to 2 m, diameter to 80 cm.
Similar species
Aphrocallistes vastus spicules form lattice-like structure, are smaller, and more distinctive.
Distribution
Aleutian Islands to southern California, 20-2000 m possibly deeper.

Sponges

***Staurocalyptus* spp.** (Spiny Vase Sponge)

Description
This white vase-like sponge has long needle-like spicules. Especially those around the perimeter of the oscula called 'guard spicules'. Height to 75 cm, diameter to 50 cm.
Similar species
Rhabdocalyptus spp. are brown with shorter, less numerous spicules and have only a few 'guard spicules.'
Distribution
Aleutian Islands to southern California, 40-2000 m.

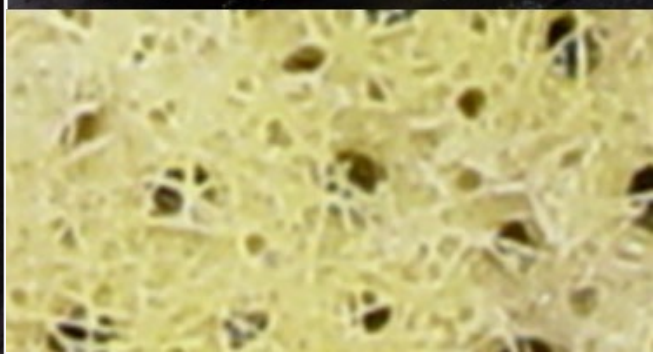


***Rhabdocalyptus* spp.** (Cloud Sponge)

Description
This white, brown or gray tube-like sponge has glassy exterior surface spicules that trap sediment, giving a "dirty" appearance and few, long 'guard' spicules surrounding the osculum. Height to 60 cm.
Similar species
Staurocalyptus spp. has longer spicules and more 'guard spicules.'
Distribution
Bering Sea to southern California, 20-800 m possibly deeper.

Sponges

Acanthascus spp. (Chimney Sponge)



Description
This large yellow or brown, soft, vase-like sponge can have long, curved spicules. Height to 60 cm.

Similar species
Rhabdocalyptus spp. and *Staurocalyptus* spp. have long 'guard spicules' surrounding the osculum.

Distribution
Bering Sea to southern California, 200-1000 m.

Farrea convolulus (Crusty Tube Sponge)

Description
This white and brown sponge has many connecting, thin, rigid tubes. Colonies to 20 cm with individual tube diameter to 1 cm.

Similar species
The tube shaped colonies distinguish this species

Distribution
Alaska to southern California, 400 m and below.

Sponges

***Hyalonema* spp.** (Fiber Optic Sponge)

Description
This yellow, orange or pink deep sea sponge has an inverted bell-shaped sponge atop long, twisted, silica spicules resembling fiber optic cable. The spicules can exceed 1 m in length.

Similar species
Not likely to be confused with other species

Distribution
Alaska to Mexico, 1000 m and below.

***Suberites* spp. cf.** (Deep Sea Free Living Sponge)

Description
This yellow, green or brown, small, foam-like sponge has only a few small, scattered oscula. Without a base or attachment site it is not sessile. Length to about 15 cm, oscula to about 1 cm in diameter.

Similar species
Not likely to be confused with other species

Distribution
Southern California, 600 m and below.

Sponges

Asbestopluma spp.

Description
This light yellow or white fan shaped sponge consists of numerous slender branches diverging from a single point and arranged in one plane. The mainstem and branches have a twisted rope-like appearance and are covered with fine hairs. Some species can reach 75 cm.

Similar Species
Often mistaken for a Gorgonian coral the fine hairs and the twisted rope-like appearance of the branches should distinguish this genera.

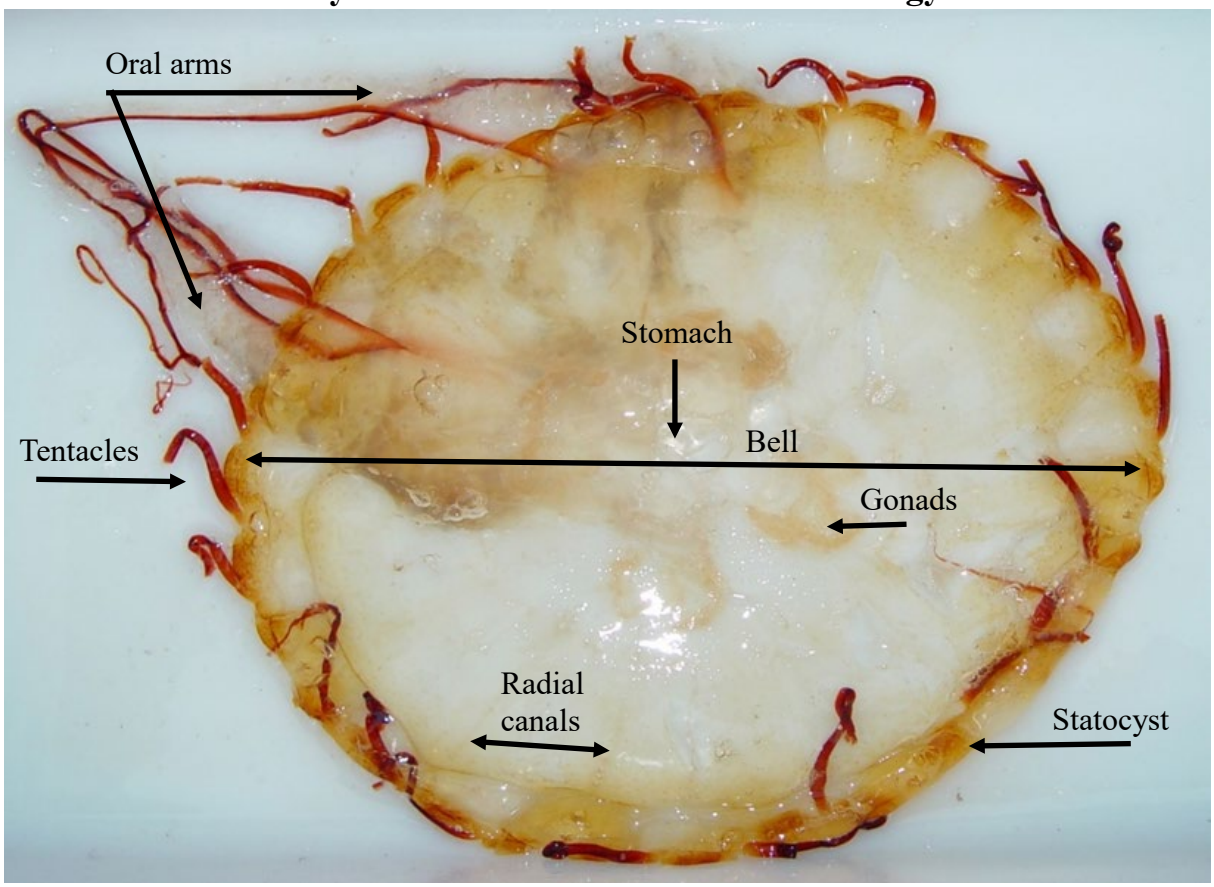
Distribution
Widespread at depths 400-1800 m possibly deeper.

Jellyfish Cnidaria

Cnidaria is a phylum containing over 11,000 species found mostly in marine environments with a few in freshwater. Their distinguishing feature are the cnidocytes or nematocytes, specialized cells used mainly for capturing prey and a layer of mesoglea (a non-living jelly-like substance that gives the body some level of hydrostatic rigidity) between two epithelial layers that are mostly one cell thick. Cnidarians have two basic body forms free swimming medusa and sessile polyps both are radially symmetrical with mouths surrounded by nematocyst bearing tentacles. Both forms have a single orifice and body cavity used for both digestion and respiration. Many cnidarians form colonies that are single organisms composed of medusae, or sessile polyps or both (trimorphic). Cnidarians can be broken down into 4 different groups. The nearly always sessile Anthozoa (anemones, corals, and sea pens). The swimming Scyphozoa (jellyfish), the Cubozoa (box jellies) and the diverse Hydrozoa that includes all freshwater and many marine species and has both sessile and mobile forms.

Jellyfish

Jellyfish Characteristics and Terminology



Chrysaora colorata (Purple-striped Jelly)

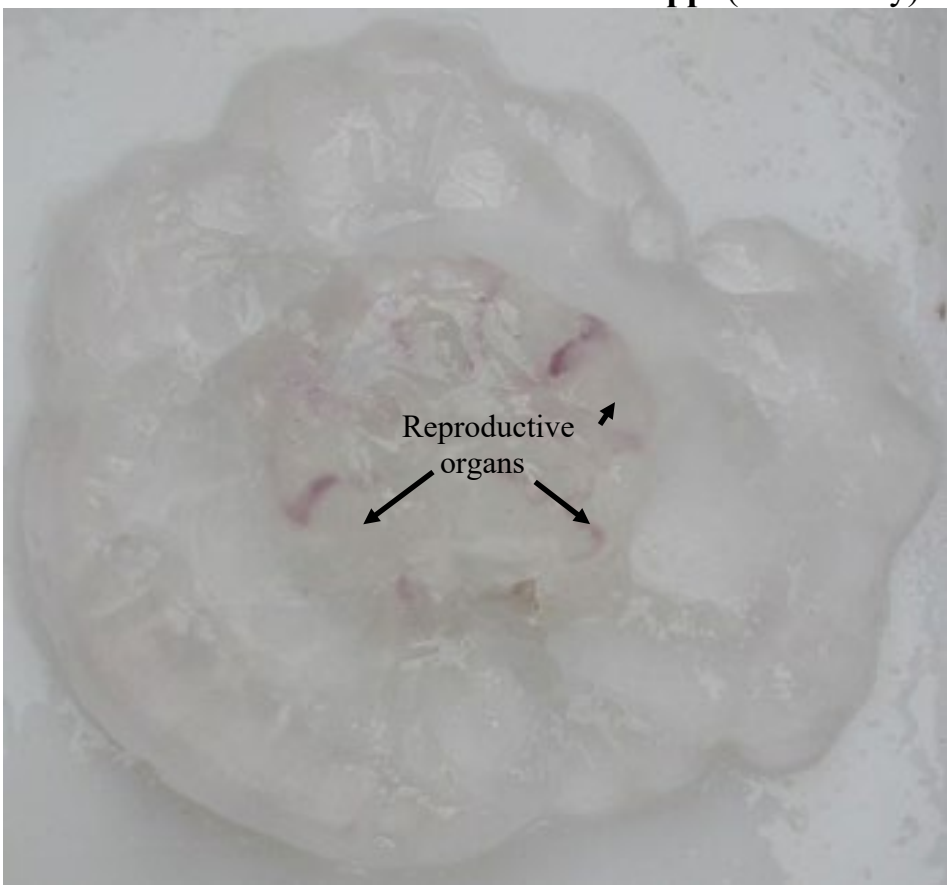
Description
This pale purple-gray or white jellyfish has a purple ring on the top of the bell from which several stripes radiate. This pattern can fade upon death. Diameter to 70 cm.

Similar species
The distinct color and color pattern of the jelly formerly known as *Pelagia colorata* is (now considered a synonym of *Chrysaora colorata*) distinguishes it from other similar species.

Distribution

Jellyfish

Aurelia spp. (Moon Jelly)

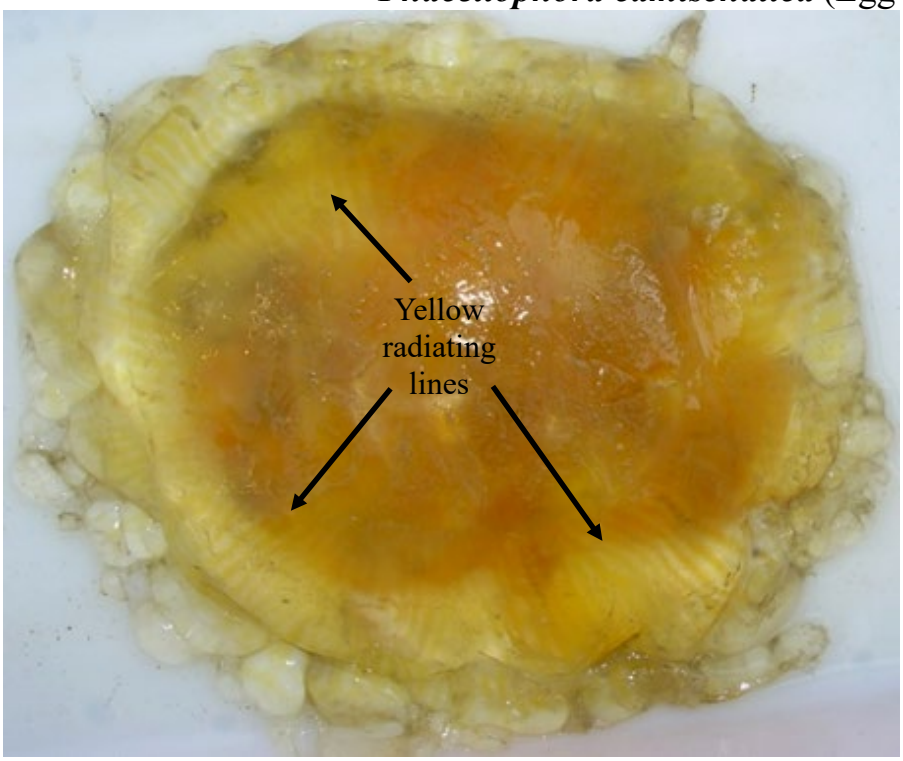


Description
This translucent white, pale blue or grey jellyfish has four pink, blue, yellow or purple bioluminescent reproductive organs in the center of the bell. The edge has V-shaped indentations and small often unnoticeable tentacles.
Bell to 50 cm in diameter.

Similar species
Both *Aurelia aurita* and *Aurelia labiata* occur in the survey area. The differences between the species are very subtle making identification beyond the generic level in the field problematic.

Distribution
Alaska to Mexico, inshore (including bays, harbors, estuaries) and offshore at depths 0-1000 m.

Phacellophora camtschatica (Egg-yolk Jelly)



Description
This transparent jellyfish has a large yellow mass at the center, along with numerous, often branching radiating yellow lines. The oral arms and tentacles are as friable as they are massive and long. Diameter to 60 cm.

Similar species
This jellyfish can be distinguished by the radiating yellow lines.

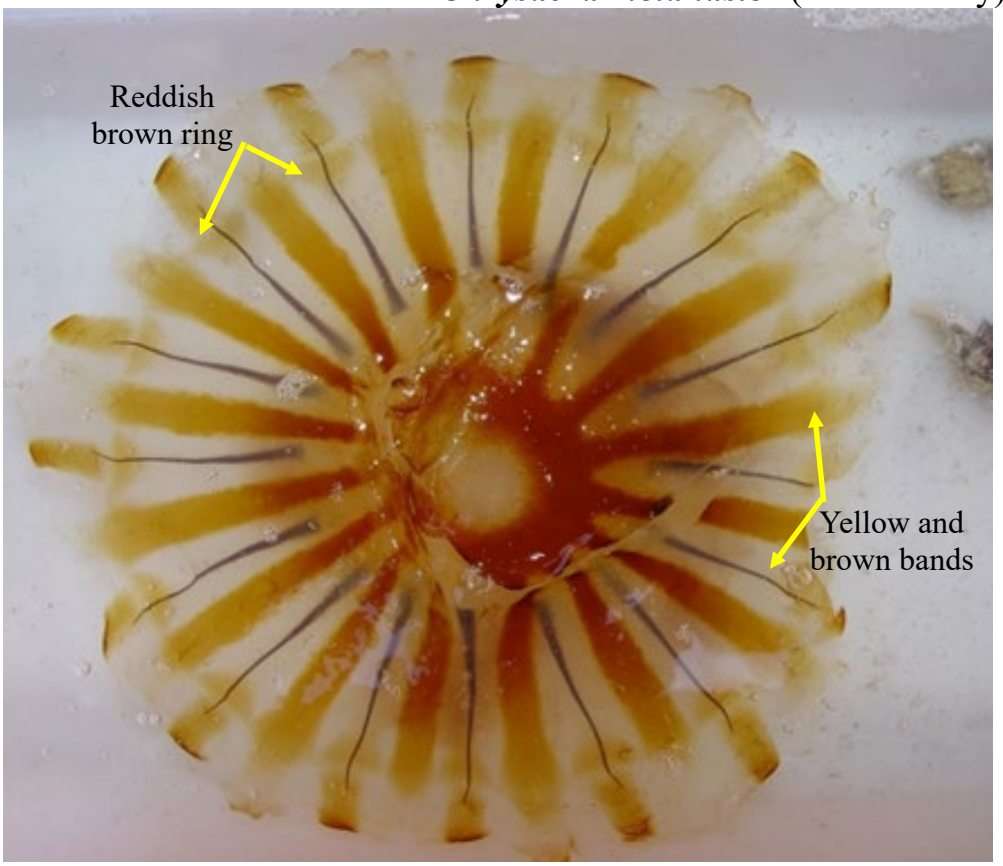
Distribution
Alaska to Oregon, 0-200 m.

Jellyfish

Cyanea capillata (Lion's Mane Jelly)

Description
This large yellow to yellow brown jellyfish has a transparent bell with dark brown markings and large but highly friable tentacles. The edge of the disc has eight deep, V or U shaped indentations. Diameter of bell to 60 cm.
Similar species
Phacellophora camtchatica is lighter and has yellow lines radiating from the center.
Distribution
Alaska to Oregon, 0-200 m.

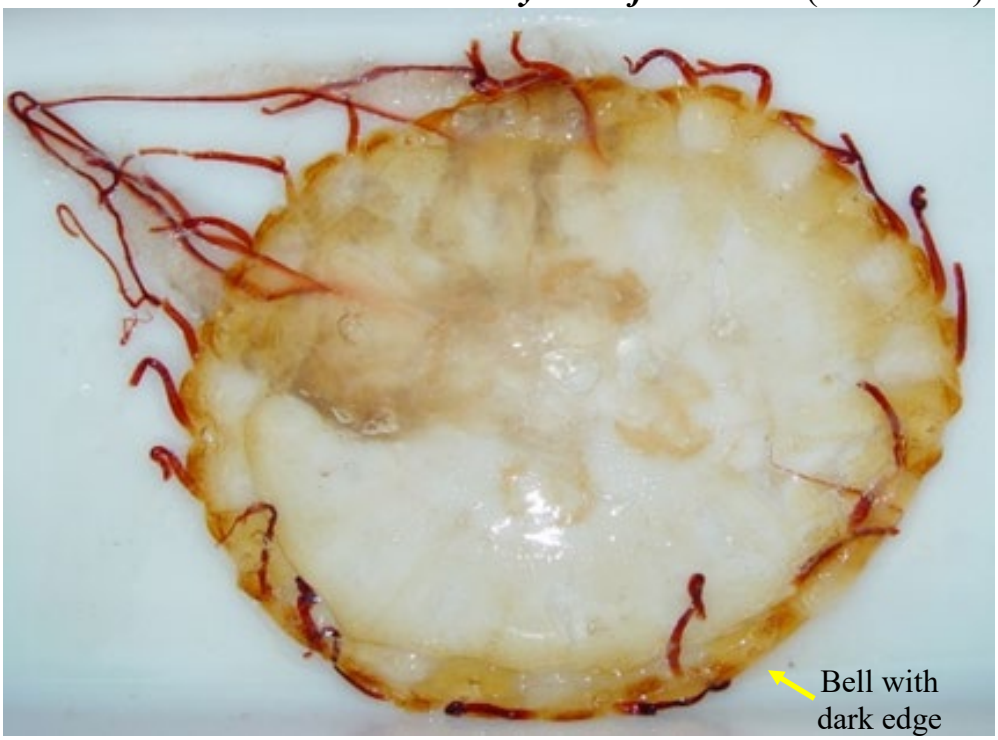
Chrysaora melanaster (Sunrise Jelly)



Description
This large, hemispherical jellyfish has very friable massive oral arms and long tentacles. The transparent bell has a reddish-brown ring and distinctive radiating bands of brown and yellow. Diameter of bell to 60 cm. Tentacles 3-6 m.
Similar species
The distinct radiating bands distinguish *Chrysaora melanaster* from other similar species.
Distribution
Alaska to California, 0-200 m.

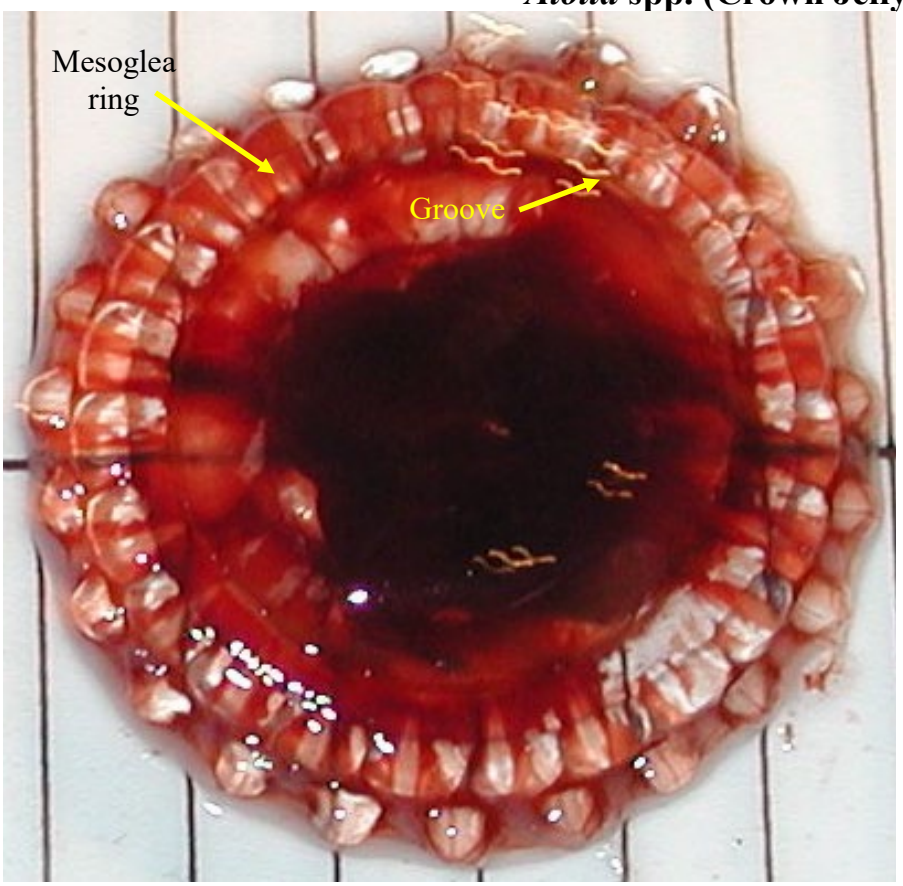
Jellyfish

Chrysaora fuscescens (Sea Nettle)



Description
This large jelly has massive but friable oral arms and tentacles. The bell is yellow, or brown and when undamaged has a dark edge. The tentacles are dark brown, reddish brown to purple. Diameter of bell to 60 cm.
Similar species
Chrysaora melanaster has distinctive, radiating bands.
Distribution
Alaska to California, 0-200 m.

Atolla spp. (Crown Jelly)



Description
The color varies from a deep red to purplish red or maroon. A ring of mesoglea (a layer of tissue that gives hydrostatic rigidity to the bell) and 20 short tentacles encircles the central disc. The deep groove running through the bell gives the impression of a transparent crown. Diameter to approximately 20 cm.
Similar species
The genus *Atolla* consists of 6 species the differences between them are subtle making identification in the field beyond the generic level problematic.
Distribution
Deep waters worldwide from the Arctic to the Antarctic, 500-4000 m.

Jellyfish

Periphylla periphylla (Helmet Jellyfish)

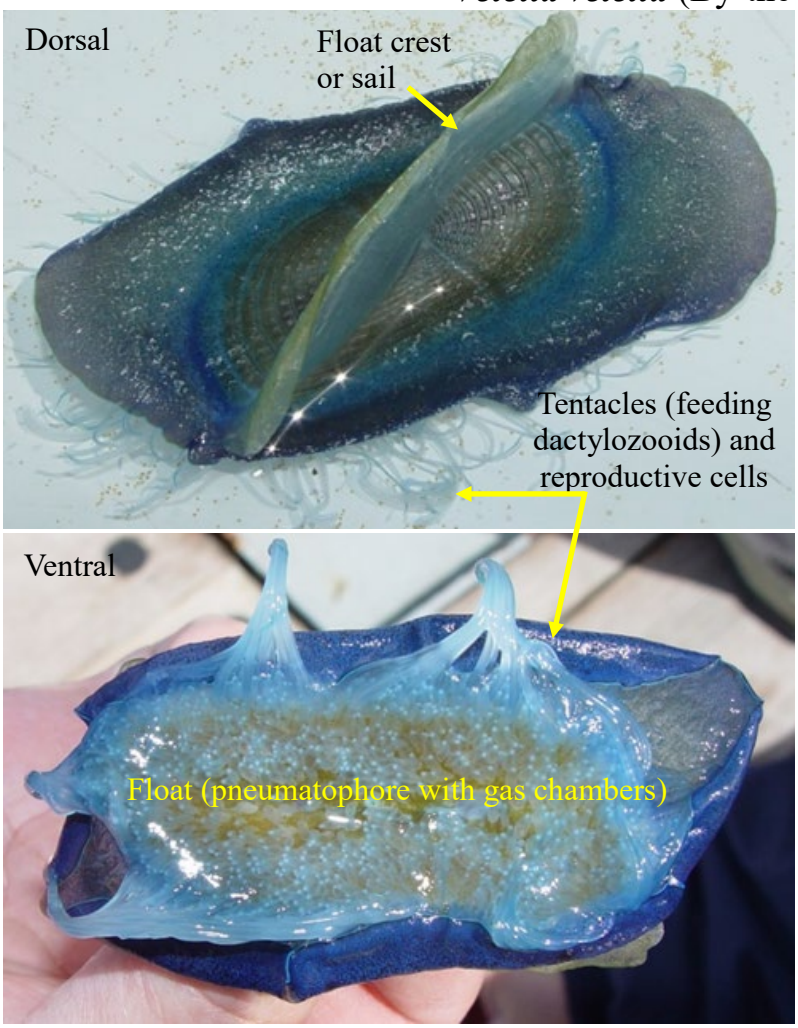
Description
Although 90% water it's the remaining 10% of gelatinous tissue that gives the animal its shape. The color varies from a deep red to purplish red or maroon. The animal has 12 arms, a bell diameter to 30 cm and a bell height to 10 cm.

Similar species
Atolla spp. are not cone shaped.

Distribution
The only major body of water where they have not been found is the Arctic Ocean. Depth distribution is highly influenced by latitude, light penetration, temperature, salinity, food availability and ocean conditions 0-2700 m.

Hydrozoans

Velella velella (By-the-wind Sailor)



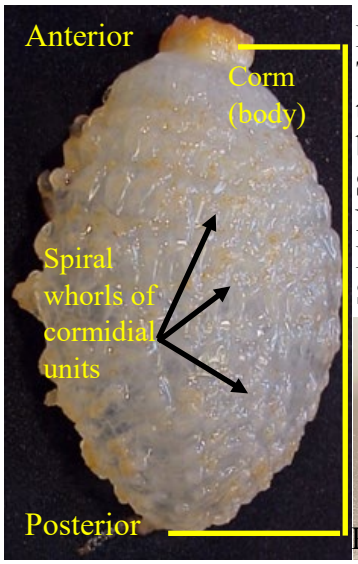
Description
This upside down hydroid colony, unlike traditional medusa that have a benthic stage attached to a hard substrate. Adult *Velella* use the surface as its substrate. The colony consists of a flat, oval disc (pneumatophore or float) with concentric rings that hold air and floats. The dorsal side of the disc has a stiff blade-like sail. The sails are dimorphic. While most Velella are "left handed" the sail aligned from the upper left to lower right of the long axis, some are "right handed" upper right to lower left. The ventral side is ringed with multiple small tentacles for capturing prey, feeding and reproduction. The deep blue color fades upon death, making dead individuals appear transparent. Disc to 10 cm.

Similar Species
The only known species of this monospecific genus it is not likely to be confused with other hydrozoans.

Distribution
A free floating hydrozoan inhabiting the surface of warm and temperate seas worldwide.

Hydrozoans

Dromalia alexandri (Benthic Siphonophore, Sea Pineapple)



Description

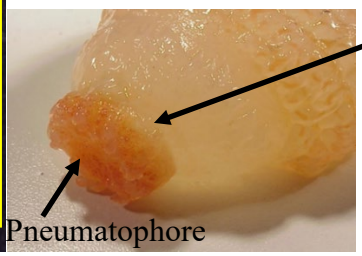
This firm gelatinous pineapple-shaped colonial hydrozoan is sometimes anchored to the sediment by thread-like tentacles. The pneumatophore is orange or pink the body is translucent pale orange or yellow. Height to 7 cm, diameter to 5 cm.

Similar Species

Not likely to be confused with other species.

Distribution

Southern California to Mexico, 200-600 m.



Nectosome single band (corona) of Nectophores at base of pneumatophore

Anemones

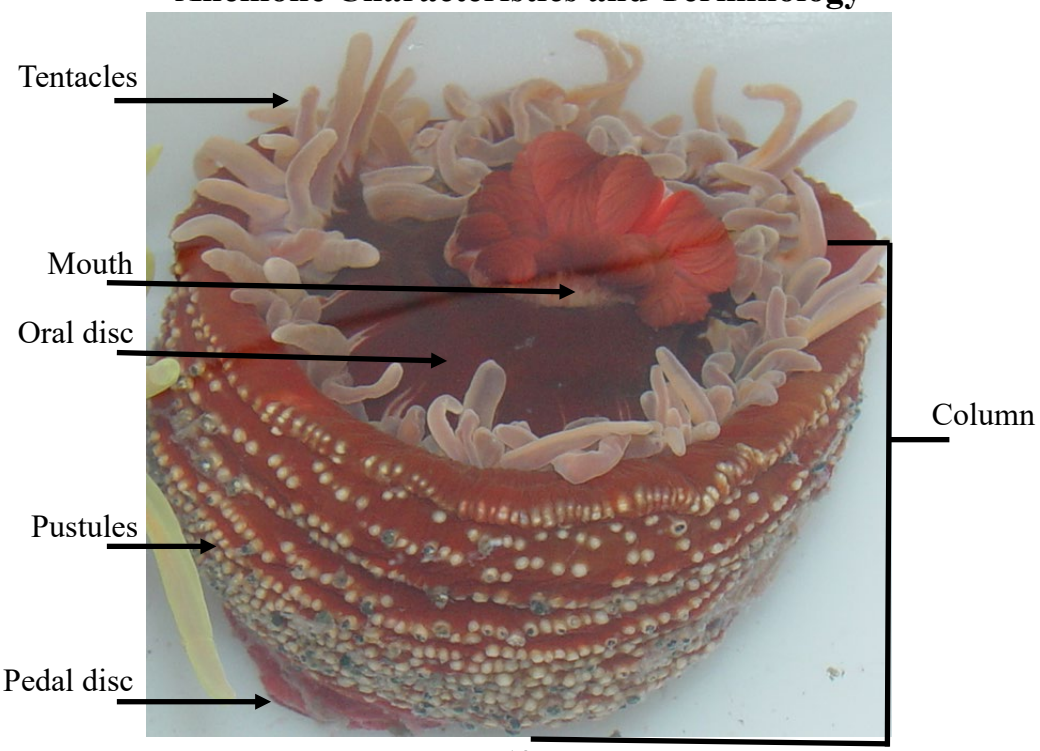
Anemones are radially symmetrical and are solitary or colonial. Most incorporate zooxanthellae and lack the calcareous skeleton secreted by stony corals. Tentacles occur in multiples of six or eight and are found in either one or two rings around the oral disc. The column holds the internal organs and the exterior surface may be textured with the following: Nodules: small, rounded bumps

Tubercles: small, pointed or rounded elevations

Pustules: blister-like bumps

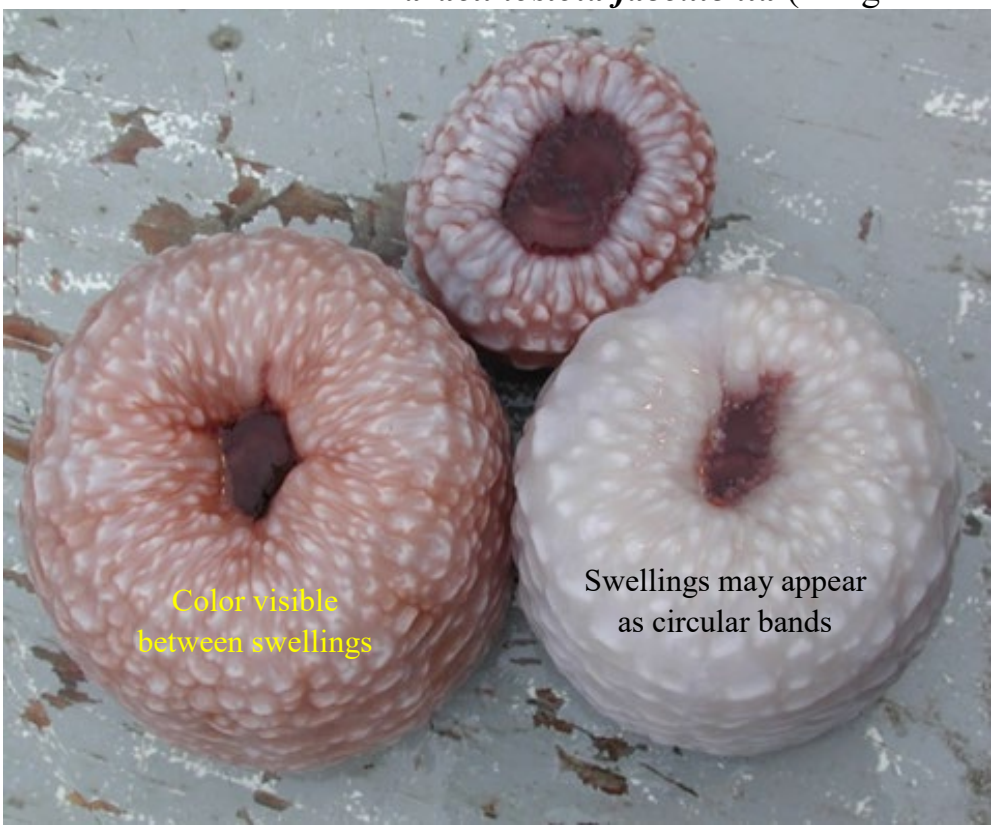
Reticulations: rough surface, rows of tiny bumps

Anemone Characteristics and Terminology



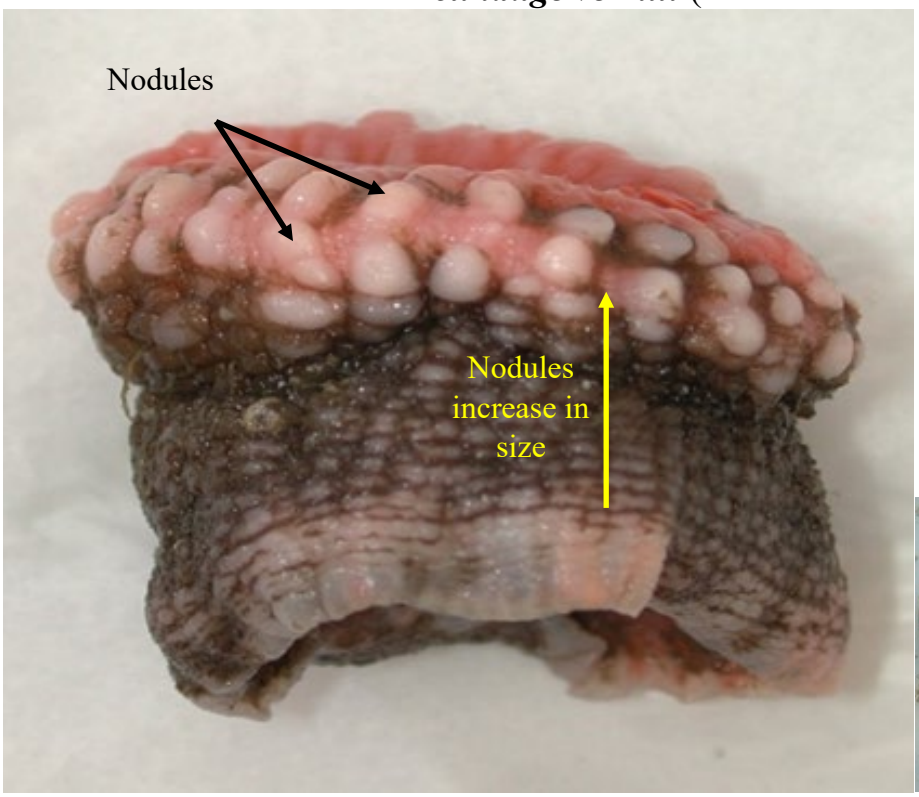
Anemones

Paractinostola faeculenta (Rough Anemone)

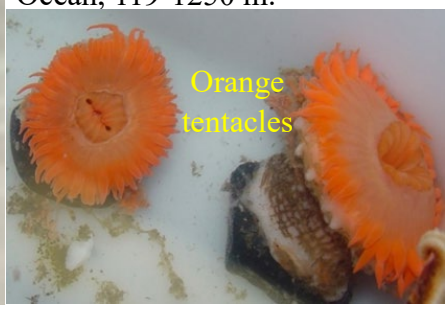


Description
The large cylindrical (vasiform) column has scattered swellings along the entire surface that can appear as circular bands on smaller specimens. Slightly translucent a variety of colors from white to pale gray, pale purple or light brown to burgundy persists in the spaces between the nodules. Diameter to 20 cm height to 15 cm possibly more.
Similar species
Actinauge verrillii has nodules on margin of oral disc.
Paraphelliactis pabista has tubercles in rows.
Hormathiidae are pink and usually laterally flattened
Distribution
Alaska to Mexico, 82-2265 m

Actinauge verrilli (Reticulated Anemone)

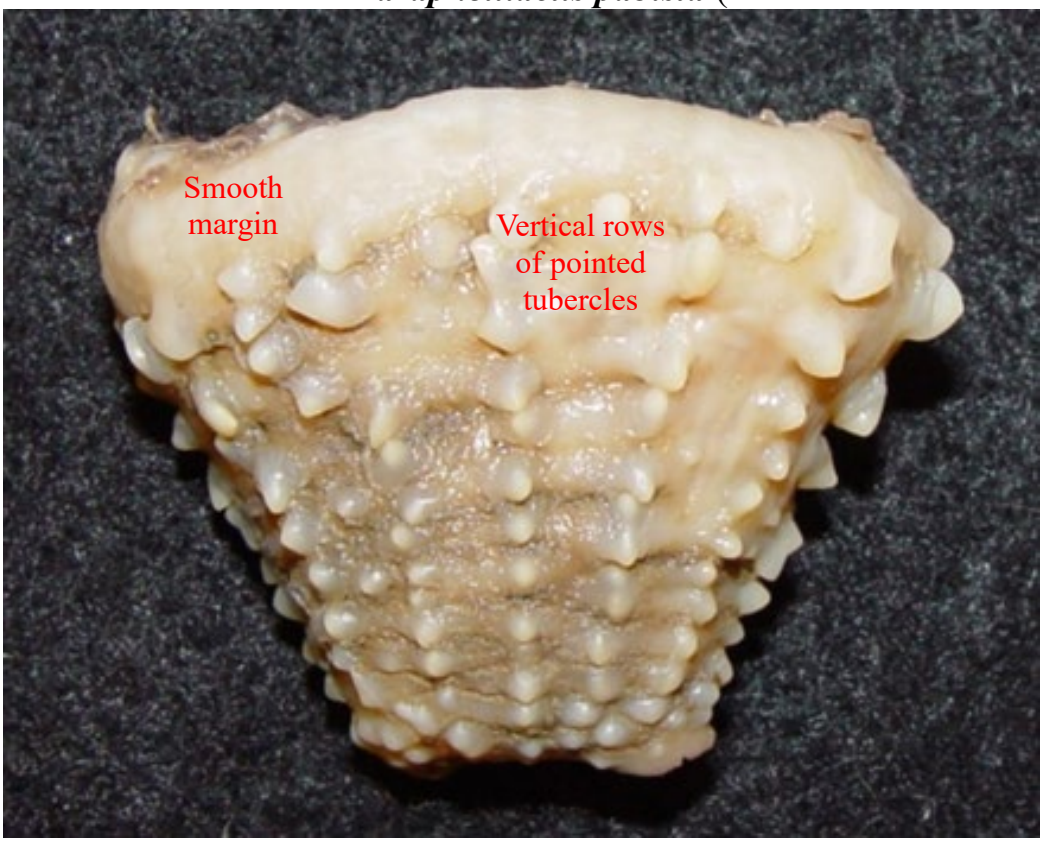


Description
The nodules on the column increase in size from base to margin. The gray to pink cuticle shows through between the nodules. When visible the tentacles are orange. Diameter to 6 cm.
Similar species
The increasing nodule size from base to margin distinguish it from similar species.
Distribution
Aleutian Islands to the Southern Ocean, 119-1250 m.



Anemones

Paraphelliactis pabista (Tuberculose Anemone)

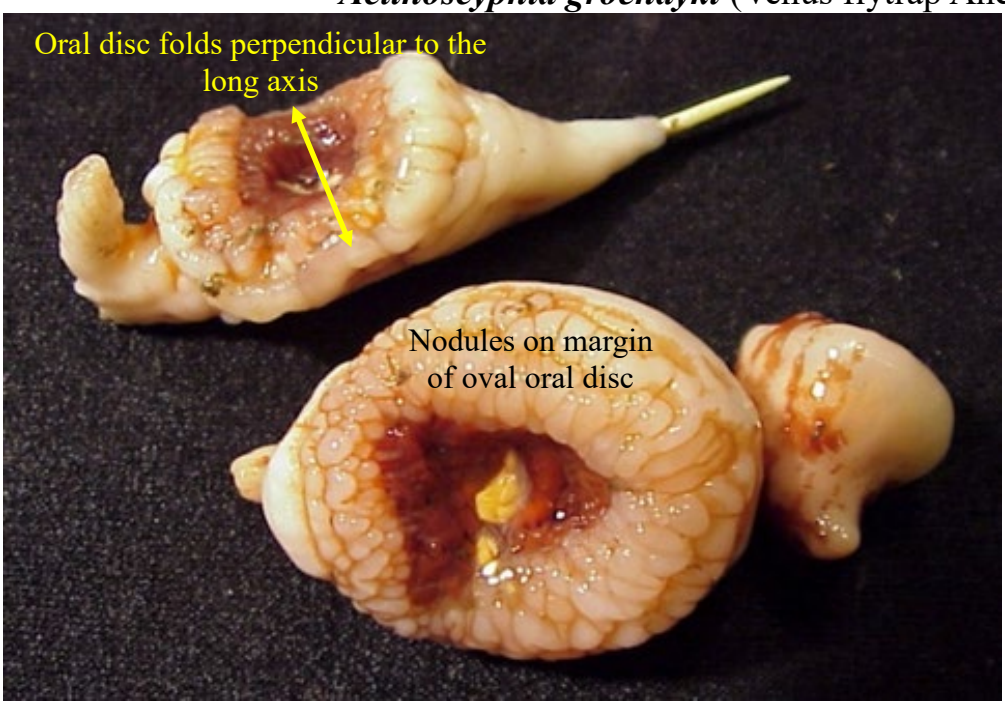


Description
The light tan, brown or gray tapered column has numerous vertical rows of pointed tubercles. The margin of the oral disc is smooth. The numerous tentacles (150 or more) are pale orange. Diameter to 12 cm height to 8 cm possibly more.

Similar species
The vertical rows of pointed tubercles distinguish this anemone from similar species.

Distribution
Alaska to Mexico, 1200-4100 m.

Actinoscyphia groendyki (Venus flytrap Anemone)



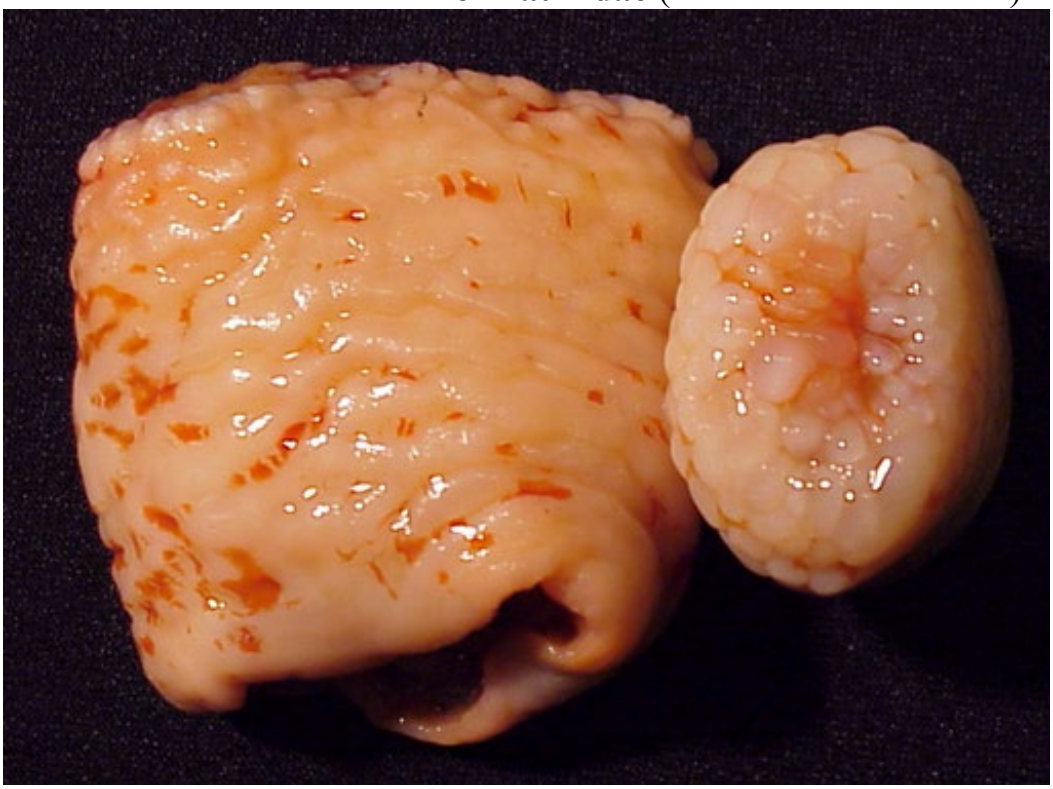
Description
The tan to light brown, tapered column is smooth and stiff. The tan to salmon oval oral disc folds along the long axis. The nodules along margin of the oral disc and the numerous, (90-149 tan or salmon, 1-12 mm long) tentacles gives the animal its Venus flytrap appearance.

Similar species
The elongate pedal disc, oval oral disc and 150 aborally thickened tentacles distinguish this anemone from other *Actinoscyphia* spp.

Distribution
NE Pacific to the Southern Ocean, 636-3819 m.

Anemones

Hormathiidae (Hormathiid Anemones)



Description
These pink or orange laterally flattened anemones have a rough textured column. Diameter 1-13 cm.
Similar species
Paractinostola faeculenta are cylindrical and with more reticulations. *Actinauge verrillii* are brown with a rough column and large nodules. Pink hormathiidae become increasingly smooth towards the base.
Distribution
Alaska to Mexico, 200 m and below.

Hormathiidae sp. A (Pink Hormathiid Anemone)

Description
The column of these pink or orange anemones tapers towards the oral disc, and has vertical rows of pustules that fade towards the base.
Similar species
Other Hormathiidae are rough on the entire column.
Distribution
Gulf of Alaska to Mexico, 200 m and below.

Anemones

Red Striated Anemone

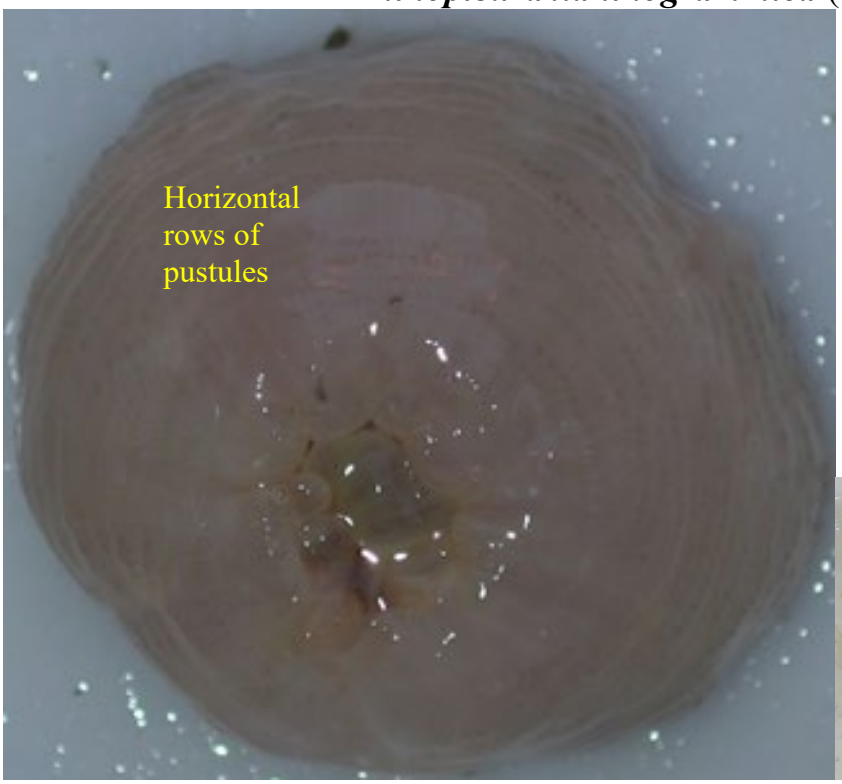
Description
These small, smooth, cherry-like anemones are red with dark tentacles. The internal organs appear as pale vertical lines. Diameter to about 4 cm.
Similar species
Actinernus spp. are firm and rubbery to touch.
Distribution
The range has not been clearly defined generally 400 m and below.

Purple Striated Anemone

Description
These small, flattened, light purple anemones with dark red tentacles have a broad base and narrow oral disc. The internal organs appear as vertical striations. Diameter to about 5 cm.
Similar Species
Not likely to be confused with other anemones.
Distribution
Alaska to Mexico, 200 m and below.

Anemones

Anthopleura xanthogrammica (Green Anemone)



Description
This green, white or light tan, fleshy, soft anemone has horizontal rows of clear or pale pustules and blunt tentacles. Diameter to 13 cm.
Similar species
Urticina grebelnyi is orange and white/yellow mottling; when dead, body is not as fleshy and tentacles have pink horizontal stripes
Distribution
Alaska to Oregon, 10-200 m.

Urticina columbiana (Columbian Anemone, Fish-eating Anemone)

Description
This red, green or brown anemone has horizontal rows of white pustules on the column. The long, thick tentacles are green or pale tan. Diameter to 12 cm.
Similar species
The color pattern distinguishes this anemone from similar species. A common name for species in the Genus *Urticina* is Fish-eating Anemone.
Distribution
SE Alaska to Mexico, 1-100 m.

Anemones

Urticina grebelnyi (Painted Anemone, Christmas Anemone, Fish-eating Anemone)

Description
The column of this mottled red, green and yellow anemone is covered by numerous un-adhesive verrucae that may be inconspicuous when fully inflated. The oral disc is pale yellow, pale lilac green, or brownish. There is a thin red radial band at the base of the tentacles. Diameter to 15 cm.

Similar species
Misidentified for years as *Urticina crassicornis* (Mottled Anemone). *Urticina crassicornis* has an absolutely smooth body and does not occur in the North Pacific.

Distribution
The depth and geographic range has not been totally defined.

***Stomphia* spp.** (Swimming Anemone)

Description
These mottled orange and white spherical anemones have banded tentacles. Diameter to 12 cm.

Similar species
Stomphia coccinea and *Stomphia didemon* are nearly identical, but *Stomphia didemon* lacks a white spot at the base of the tentacles.

Distribution
Both species occur from Alaska to Oregon, 10-200 m.

Anemones

Metridium farcimen (Gigantic Anemone)

Description
This white, tan or light brown, soft anemone has numerous very small "fluffy" tentacles. Diameter to 15 cm.
Similar species
Metridium senile is uncommon, much smaller, with longer tentacles on fewer, large broad lobes, and occurs in shallower water usually less than 30 m.
Distribution
Bering Sea to Mexico, 2-300 m possibly deeper.

Metridium senile (Frilled Anemone)

Description
This white, brick red/orange, tan or light brown, soft anemone grows to about 10 cm tall and has up to 100 slender tentacles. The edges of the oral disc which is wider than the smooth column are not prominently lobed.
Similar species
Metridium farcimen is much larger has over 200 tentacles on a deeply lobed oral disc.
Distribution
Circumpolar. In the eastern Pacific from Alaska to southern California, intertidal to 100 m but most common at depths less than 30 m.

Anemones

Liponema brevicornis (Pom Pom Anemone)

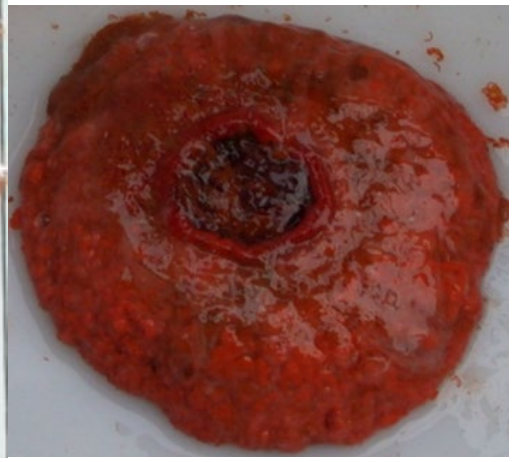
Description: This red, brown or orange, soft, flat, hemispherical anemone has numerous extremely friable tentacles. Diameter to 16 cm.

Similar species

Actinernus spp. are white, firm, rubbery, and lack tentacles.

Distribution

Bering Sea, Alaska to Mexico, 100 m and below.



Actinernus spp. (Lava Anemone)

Description

This smooth, waxy appearing anemone is white or pale purple with a red base and bright red oral disc. The column is firm and rubbery. The tentacles around the large oral disc, when present, are small and inconspicuous. Diameter to 7 cm.

Similar species

Not likely to be confused with other species.

Distribution

California, 1000 m and below.

Anemones

Oractis diomedeae (Grape Anemone)

Description
These small, pale yellow, orange, or cream anemones have no apparent pedal disc, and internal organs visible as white lines. Diameter to 3 cm.
Similar species
May be confused with tunicates (Ascidiacea), but these small anemones have no incurrent or excurrent pores, and are not attached to substrate.
Distribution
Central California to Mexico, 400 m and below.

Corallimorphus denhartogi

Description
The yellowish, smooth disc shaped column has mesenterial insertions (folds) visible as dark lines. There may also be shallow longitudinal furrows but they do not correspond with the mesenterial insertions. Remnants of the ectoderm (outermost layer of tissue) vary in color from yellow to violet or brown. The circular, flat to slightly domed, yellowish oral disc is slightly raised and has shallow furrows radiating from around the slit-like to oval shaped mouth. The short, sparse, tapered tentacles end in a distinct compact head. Marginal tentacles are alternately long and short. The limbus (margin) of the flat to slightly concave pedal disc extends below it in most individuals, but can also be folded under. Oral disc diameter 0.5-7 cm column height to 0.3-3 cm and the circular pedal disc diameter 0.5-3 cm.
Similar species
Although considered an order of hexacorallian anthozoans and often referred to as sea anemones, the skeletonless Corallimorpharia are more morphologically similar to the Scleractinia (hard or stony corals). *Corallimorphus pilatus* has more numerous and regularly spaced longitudinal furrows, twice the tentacles on the oral disc margin, and numerous tentacles obscuring the oral disc.
Distribution
The range has not been completely defined, currently Oregon to Baja California, 2550-4300 m.

Anemones

Corallimorphus pilatus (Club-tipped Anemone)

Description

The color of the column varies from translucent, to nearly transparent while others are purplish or maroon. The distal end of the smooth column can be flared in some individuals. The numerous, regularly spaced, shallow longitudinal furrows give a scalloped appearance in cross section. The furrows do not correspond to the mesenterial insertions (folds) which may be visible through the column as light lines. The numerous, whitish, tapered tentacles end in a distinct compact head and obscure the oral disc. Marginal tentacles about 1/3rd the length of the longer disc tentacles. The brownish to maroon oral disc is usually raised around the slit like mouth, and is about the same size as the flat to concave pedal disc. Diameter to about 6 cm, height to 4 cm.

Similar species

Although considered an order of hexacorallian anthozoans and often referred to as sea anemones the skeletonless Corallimorpharia are more morphologically similar to the Scleractinia (hard or stony corals). *Corallimorphus denhartogi* are shorter, and have an expansive oral disc and shorter tentacles that do not obscure the oral disc.

Distribution

The range has not been completely defined, currently British Columbia to Baja California, 198-900 m.

Anemones

Corynactis californica (Strawberry Anemone)

Description: These small, pink or red aggregating anemones have translucent tentacles with blunt white tips. Height to 7.5 cm, diameter to 2.5 cm.

Similar species

Although considered an order of hexacorallian anthozoans and often referred to as sea anemones the skeletonless Corallimorpharia are more morphologically similar to the Scleractinia (hard or stony corals). *Corallimorphus* spp. are dark.

Distribution

British Columbia to Baja California, 0-50 m.

***Sicyonis* spp.**

Description

These small, smooth anemones are orange, pink or light brown with red or brown tentacles. Diameter to 5 cm. Often found attached to various snails particularly *Bathybembix bairdii*.

Similar species

The genus *Sicyonis* contains 16 species (5 are endemic to the Pacific Ocean) that have rather different morphologies making field identification problematic.

Distribution

Bering Sea to Mexico 200 m and below.

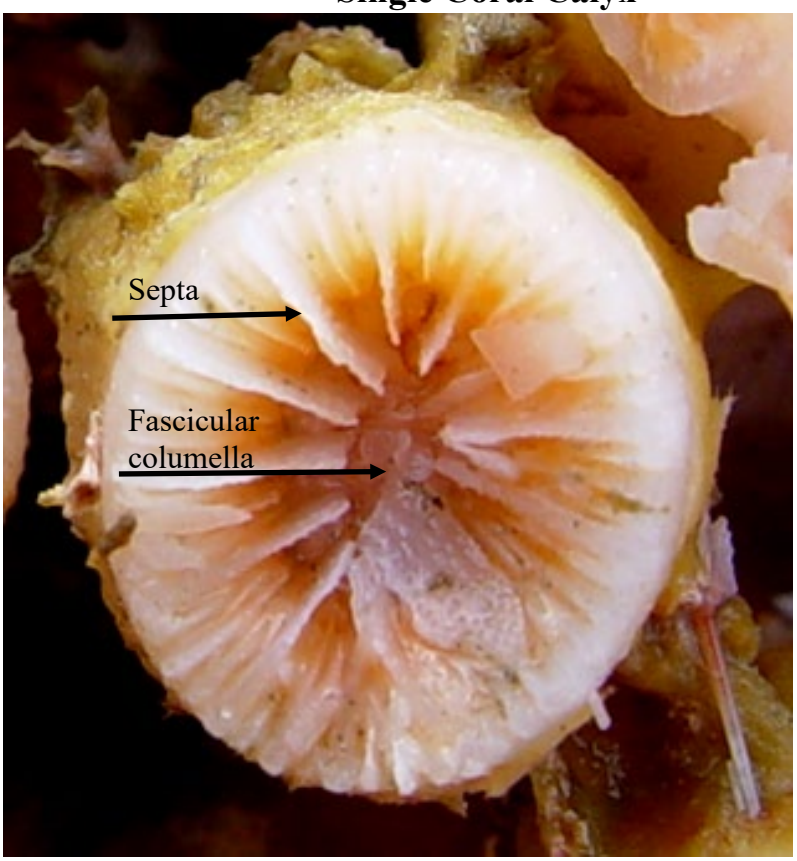
Corals Alcyonacea

The Alcyonacea are a highly diverse group. However, many Alcyonacea across and/or within family, across and/or within genera and/or at the species level are very similar in appearance making field identification difficult. Many specimens taken during the WCGFBTS are awaiting species identification/confirmation via DNA analysis. Visual similarities also reach across the Phylum level. *Asbestopluma sp.* often mistaken for a gorgonian is actually a sponge. And can be differentiated from the corals by the twisted appearance of and the many fine hairs on the main stem and branches.

Corals have representatives in the classes Anthozoa and Hyrdozoa. They are marine, have nematocysts, and some incorporate zooxanthellae. Anthozoans lack a medusoid life stage. All have polyps which capture food particles and some retract into a calcareous cup (calyx) or the basal area, as in soft corals. The tiny polyps of hydrocorals are difficult to see and form an encrusting skeleton that is covered in an epidermal layer.

For the purposes of this document we have broken the corals into seven groups. The Black Corals that are distinguished by having a brown or black axial skeleton and pinnules that extend off the branches and/or central stem. The Bamboo Corals which have an articulated skeleton composed of boney calcareous nodules alternating with gorgonian nodes. The Gorgonians which have small possibly extended polyps, a firm axial skeleton that may also be calcareous and multi-branching. The Soft Corals which form spongy colonies of various size, and have retractable fleshy polyps. The Sea Pens that have a flexible axial skeleton, a basal bulb for anchoring into the sediment and polyps that cover half the length or more of the colony. The Cup Corals which have solitary or aggregating polyps, a calcareous calyx (cup) and polyps which may be extended. And the Hydrocorals which have a hard antler-like skeleton and branches with star-shaped pores with retractable polyps.

Single Coral Calyx



Sea Pen

Black Corals Cladopathidae

Chrysopathes speciosa

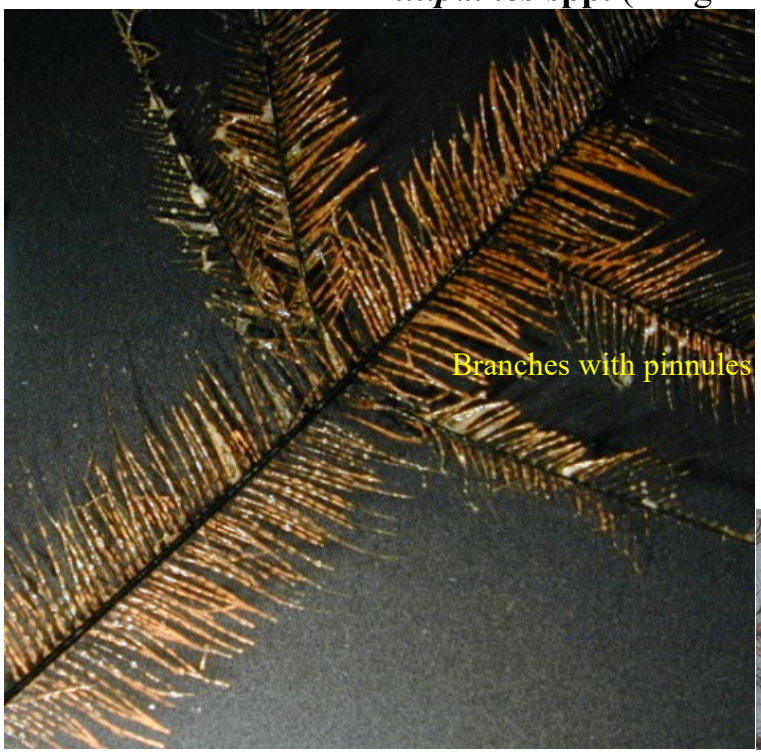
Description
This large bush-like black coral has a shiny black corallum (skeleton). The short (up to 1 cm) primary pinnules are arranged equidistantly around the axis usually in 4 rows near the tips of the branches but increasing to 6 rows near the base and in bilateral groups of 2-3 one from each row. The arrangement of the pinnules in each grouping do not follow a semi-spiral pattern around the axis. The primary pinnules are not the same length or shorter than the pinnules in the anterior and posterior rows. The polyps if present, are white or pale pink. Height to 75 cm.
Similar species
Similar species of *Trissopathes, Bathypathes* and *Lillipathes* have longer pinnules with different branching.
Distribution
Alaska to California, 225-1400 m.

Trissopathes pseudotristicha (False-lined Black Coral)

Description
This large bush-like black coral has a shiny black corallum (skeleton). The corallum is highly branched with the stem and branches generally in a single plane and bear primary pinnules arranged in 4 rows, 2 anterior (or anterolateral) and 2 posterolateral. The pinnules are also arranged alternately in bilateral groups consisting of 1 anterior and posterolateral pinnule. The long posterolateral primary pinnules (up to 2.6 cm) are usually longer than the anterior primary pinnules (up to 1 cm possibly more). Long (up to 1.5 cm) secondary pinnules are common on the anterior primary but rare on the primary posterolateral pinnules. The (2-4 mm in diameter) light polyps are uniserially on the upper or lateral sides of both the pinnules and sub-pinnules. Maximum corallum height and width have not be determined.
Similar species
Similar species branch differently and/or have differing pinnule arrangements.
Distribution
The ranges have not been fully defined, currently the Eastern and Central Pacific, 2828-4477 m.

Black Corals Schizopathidae

***Lillipathes* spp.** (Long-stemmed Black Coral)

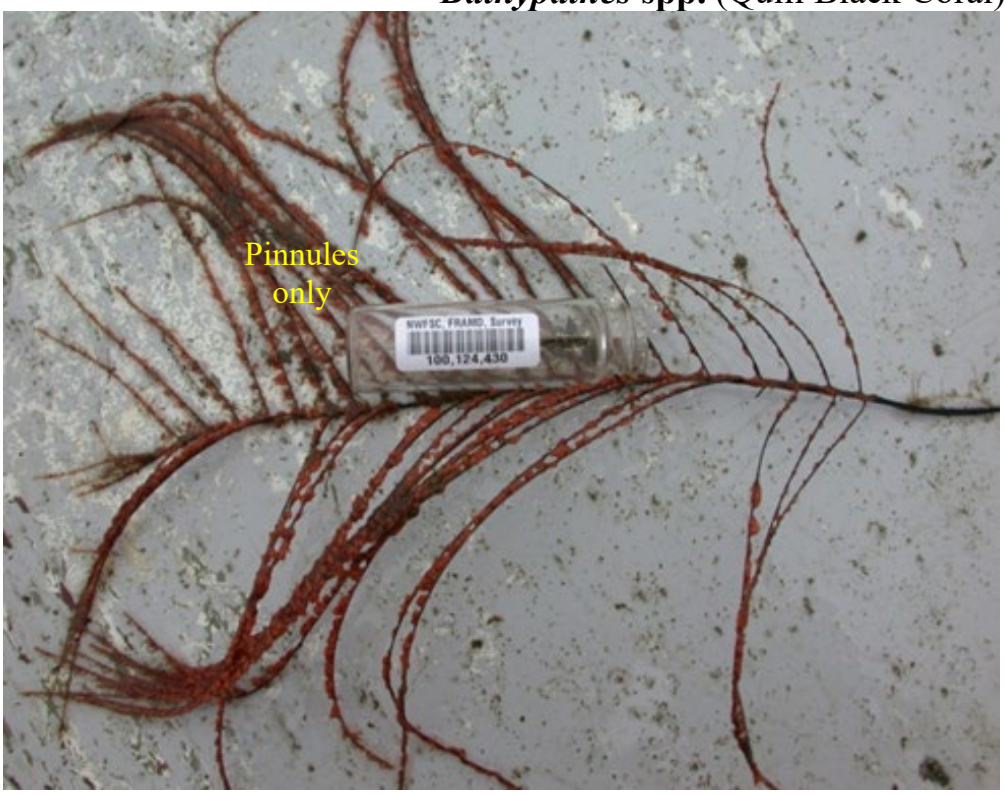


Description
This black coral has large, fan shaped colonies branching on one plane. There is a central stem with lateral branches, and each branch has long, slender pinnules. The skeleton is black and shiny, and the polyps are red-orange. Height to 1 m or more.

Similar species
Chrysopathes speciosa has much smaller pinnules and white polyps. *Bathypathes spp*. does not branch only very long pinnules.

Distribution
North of Pt. Conception, 800 m and below.

***Bathypathes* spp.** (Quill Black Coral)



Description
This black coral does not branch. The central stem has lateral rows of long, curved pinnules. The shiny black skeleton has red-orange polyps. Length to 50 cm or more.

Similar species
Chrysopathes speciosa and *Lillipathes* spp. branch and have short pinnules.

Distribution
North of Pt. Conception, 800 m and below.

Bamboo Corals Isididae

Keratoisis spp. (Forked Bamboo Coral)

Description
This is a large, tree-like gorgonian with forked, calcareous segments joined by dark brown nodes; branching occurs at forked calcareous segments. The color of living polyps is orange. Height to 2 m.
Similar species
Isidella sp. branching occurs at nodes.
Distribution
Aleutian Islands, Alaska to California, 1200 m and below.

Isidella spp. (Articulated Bamboo Coral)

Description
This is a large tree-like gorgonian with calcareous segments joined by dark brown nodes; branching occurs at nodes. The color of living polyps orange-brown. Height to 2 m.
Similar species
Keratoisis branches from forked calcareous segments.
Distribution
Aleutian Islands to California, 720-1050 m

Gorgonian Corals Primnoidae

Callogorgia kinoshitae

Description
This gorgonian has slender, fan-like colonies branching typically in opposite alternating pairs on one plane. The curved polyps face upward, always in whorls, circling the skeleton. The skeleton is brassy or gold, with white or pale pink. Height to 75 cm.

Similar Species
Plumarella spp. polyps are arranged alternating rows not whorls. *Swiftia* spp. has stouter branches and large red polyps.

Distribution
SE Alaska to southern California, below 500 m. Specimens have been collected during survey north of Pt. Conception at depths from 99-1646 m.

Plumarella spp.

Description
This gorgonian has slender, fan-like colonies which grow in paired or multiple branching patterns. The polyps do not encircle the skeleton but are arranged in two alternating rows.

Similar Species
Callogorgia polyps are in whorls, encircling the skeleton. Several species of *Plumarella* are found in the North Pacific the differences are slight making field identification beyond the generic level problematic.

Distribution
SE Alaska to California, 500 m and below.

Gorgonian Corals Primnoidae

Parastenella spp.

Description
This gorgonian has a black or golden skeleton, branches profusely in all directions and white to orange polyps.
Similar Species
Multiple species are known to occur along Oregon and California, but differences are slight making field identification problematic.
Distribution
The range has not been defined but has been confirmed off Oregon and California at depths of 600 m and below.

Primnoa pacifica (Red Tree Coral)

Description
This orange, pink to red primnoid coral has a rigid axis that is loosely dichotomously branched forming a fan-like colony mostly in a single plane. The polyps are densely and randomly arranged along all sides of the branches.
Similar Species
Primnoa pacifica var. *willeyi* has more slender, twisted and often recurved polyps with a narrow waist and bulbous distal end.
Distribution
From Honshu, Japan to La Jolla, California, 6-900 m.

Gorgonian Corals Primnoidae

Primnoa pacifica* var. *Willeyi (Red Tree Coral)

Description

This orange to red coral has basal scales that are generally smaller than the marginal but often the same size as the medials or inconspicuous. However, they can be as large and spinous as the typical variety. The slender polyps are twisted and narrow in the middle are often recurved and have a bulbous distal end.

Similar Species

Due to overlap in most diagnostic characteristics and the geographical and depth ranges the only constant difference is the shape of the polyps. The polyps of the *Willeyi* variant are more slender, twisted, often recurved and have a narrow waist and bulbous distal end.

Distribution

The Aleutian Islands and western Gulf of Alaska to British Columbia, 183-755 m.

Acanthogorgiidae

Acanthogorgia gracillima* var. *typica (Slender Glass Shard Gorgonian)

Description

This bright yellow coral is highly branched (not always entirely in one plane) with a somewhat dichotomous to pinnate pattern. The branches come off the main stem at right angles then curve quickly upwards. The non-retractable columnar shaped polyps have 8 obliquely angled double rows of straight or curved spindle shaped transparent spines. These transparent spines form a crown shaped ring around the top of the polyp. Two long upward projecting spines at the basal end of each of the 8 double rows form the points of the crown.

Similar Species

The bristle-like spines along the top of the polyp distinguish this genera from the other genera in the family as well as the species of *Primnoa* encountered.

Distribution

As a genus the *Acanthogorgia* are widespread in the Indo-Pacific region. The geographic and depth ranges for this species have not been totally defined.

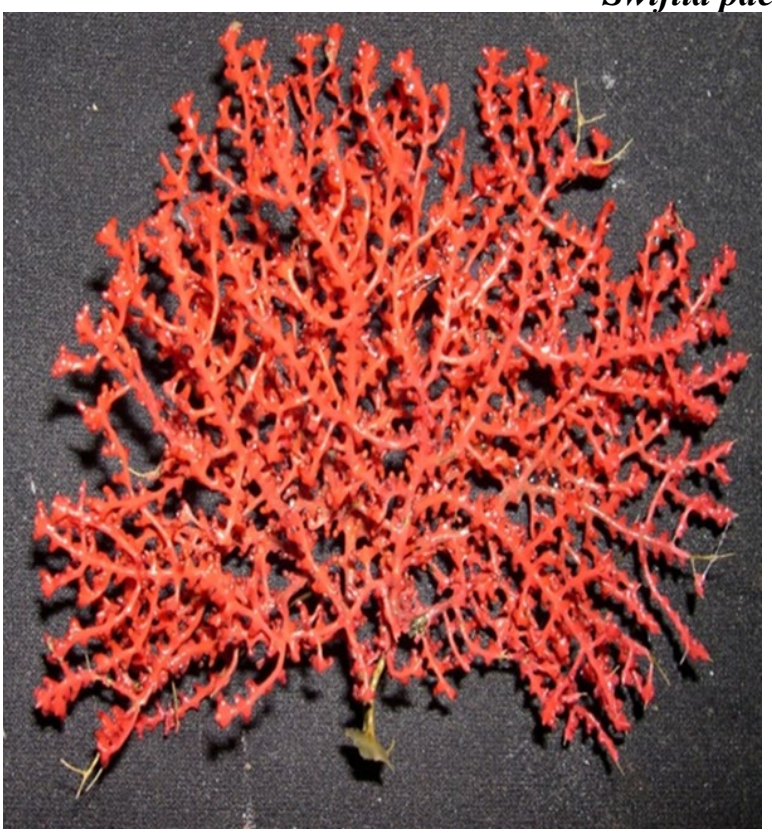
Gorgonian Corals Acanthogorgiidae

Calcigorgia spiculifera (Pink Gorgonian)

Identification
The thick fleshy colonies have a mixture of openly lateral and irregularly dichotomous branching. The branching tends to be in a single plane giving the colony a fan-like shape. However, the branching can be divergent into multiple planes. The overall color varies from light pink to orange or white. Height to 30 cm.
Similar species
Paragorgia arborea has large, hard knobs and smaller polyps.
Distribution
The Aleutian Islands to the Straight of Juan de Fuca, 20-200 m.

Gorgonian Corals Plexauridae

Swiftia pacifica



Description
This bright red, gorgonian has small, flexible fan shaped colonies of dark red, white or pink retractable polyps arising from the multiple branches. The branches have flattened knobs on the edges and a green or brown skeleton
Similar species
Swiftia spp. are very similar in appearance and are difficult to distinguish in the field. *Eugorgia rubens* is thicker, pink-purple in color with white polyps. *Adelogorgia phyllosclera* has thicker, rougher branches with blunt tips.
Distribution
The Bering Sea, Aleutian Islands and the Eastern Pacific Ocean to southern Chile, 90-2900 m.

Gorgonian Corals Plexauridae

Swiftia kofoidi

Description
The color varies from dark red or purple to bright orange. The colony has multiple, dense, intertwined but divergent branches they lack the connections between the branches (anastomosis). The colony is irregularly pinnate (branching from each side of the axis).

Similar species
Swiftia spp. are very similar in appearance and are difficult to distinguish in the field. *Eugorgia rubens* is thicker, pink-purple in color with white polyps. *Adelogorgia phyllosclera* has thicker, rougher branches with blunt tips.

Distribution
Alaska to California, 40-1829 m

Swiftia simplex

Description
This red, flexible gorgonian has slender branches with retractable red polyps that may be visibly extended on small knobs. Height to 50 cm diameter to 5 mm.

Similar species
Swiftia spauldingi has the same general shape, but is smoother w/out the knobs with retractable white polyps. Other similar species branch profusely and have larger flattened or triangular shaped and/or different colored polyps.

Distribution
Alaska to California, 200-800 m.

Gorgonian Corals Plexauridae

Swiftia spauldingi

Description
Swiftia spauldingi are slender, whip-like, sparsely branched and irregularly dichotomous (subdividing well above the base). The smooth branches are round in cross section, the fairly stout terminal branches are nearly as large as the mainstem. The color ranges from bright coral, orange to red. The retractable polyps are usually white but occasionally light pink.
Similar species
Swiftia sp. are very similar in appearance and are difficult to distinguish in the field. *Eugorgia rubens* is thicker, pink-purple in color with white polyps. *Adelogorgia phyllosclera* has thicker, rougher branches with blunt tips.
Distribution
Bering Sea to California, 200-800 m and below.

Muricea fruticosa (Brown Gorgonian)

Description
The main branches of this large bush-like gorgonian subdivide on all sides of the axis very near the base and further branching off randomly. The color of the mainstem is usually brick to brownish red. The color of the thick branches varies with length from a faded brick red to brown. The polyps are bright white and when extended give the colony a fuzzy white appearance.
Similar species
Muricea californica is very similar in appearance but maintains a single color throughout and has golden colored polyps.
Distribution
Southern California to Baja, the Gulf of California and the west coast of Mexico to Panama intertidal to over 30 m but typically from 15-30 m.

Gorgonian Corals Plexauridae

Muricea californica (California Golden Gorgonian)

Description

The main branches of this large fan-like gorgonian subdivide very near the base and randomly further out but are generally in a single plane. The color of the mainstem and thick branches can be brown, golden brown, reddish brown to purplish but remains uniform along the entire length. The golden or yellow polyps when extended give the colony a fuzzy appearance.

Similar species

Muricea fruticosa branches in multiple planes and has white polyps.

Distribution

Southern California through Baja and the Gulf of California and the west coast of Mexico to Panama intertidal to 455 m.

Gorgoniidae

Eugorgia rubens (Purple Gorgonian)

Description

This gorgonian has thick central branches with a lacework of interwoven purple or pink branches. Polyps are white, usually retracted from view. Height to 60 cm.

Similar species

Some *Swiftia spp.* have a similar lacework of branches but are bright or dark red and encountered deeper than 700 m.

Distribution

Southern California to Baja California, 20-50 m.

Gorgonian Corals Gorgoniidae

Leptogorgia chiliensis (Red Gorgonian)

Description
This bright red gorgonian has a narrow skeleton with many long, smooth branches growing in multiple planes, and white polyps if extended.
Height to nearly 1 m.
Similar species
Swiftia simplex has bumpy knobs and red polyps with less branching. It occurs in deeper water.
Swiftia spauldingi is shorter with less branching, smooth with white polyps.
Distribution
The genus is widespread throughout the Atlantic Ocean, Mediterranean Sea and the NE Pacific, 5-231 m possibly deeper.

Adelogorgia phyllosclera

Description
This orange, red or brown gorgonian has thick, rough (4-6 mm) blunt tipped branches with yellow-orange polyps. Growth to over 60 cm.
Similar Species
May be confused with *Swiftia spp.* has thinner branches with flattened knobs.
Distribution
Southern California to Mexico, 30-583 m.

Gorgonian Corals Paragorgiidae

Paragorgia arborea (Peppermint/Bubblegum Coral)

Description
This pink or red spongy tree-like gorgonian branches on multiple planes. The thick, flexible branches often end with swollen knobs. The white or pale pink polyps retract into star-shaped depressions. Height to 3 m.
Similar species
Paragorgia pacifica, is considered a synonym of *Paragorgia arborea*. *Adelogorgia phyllosclera* has thinner, red/orange rough branches forming at the base.
Distribution
Alaska to Mexico, 200-800 m possibly greater.

Soft Corals

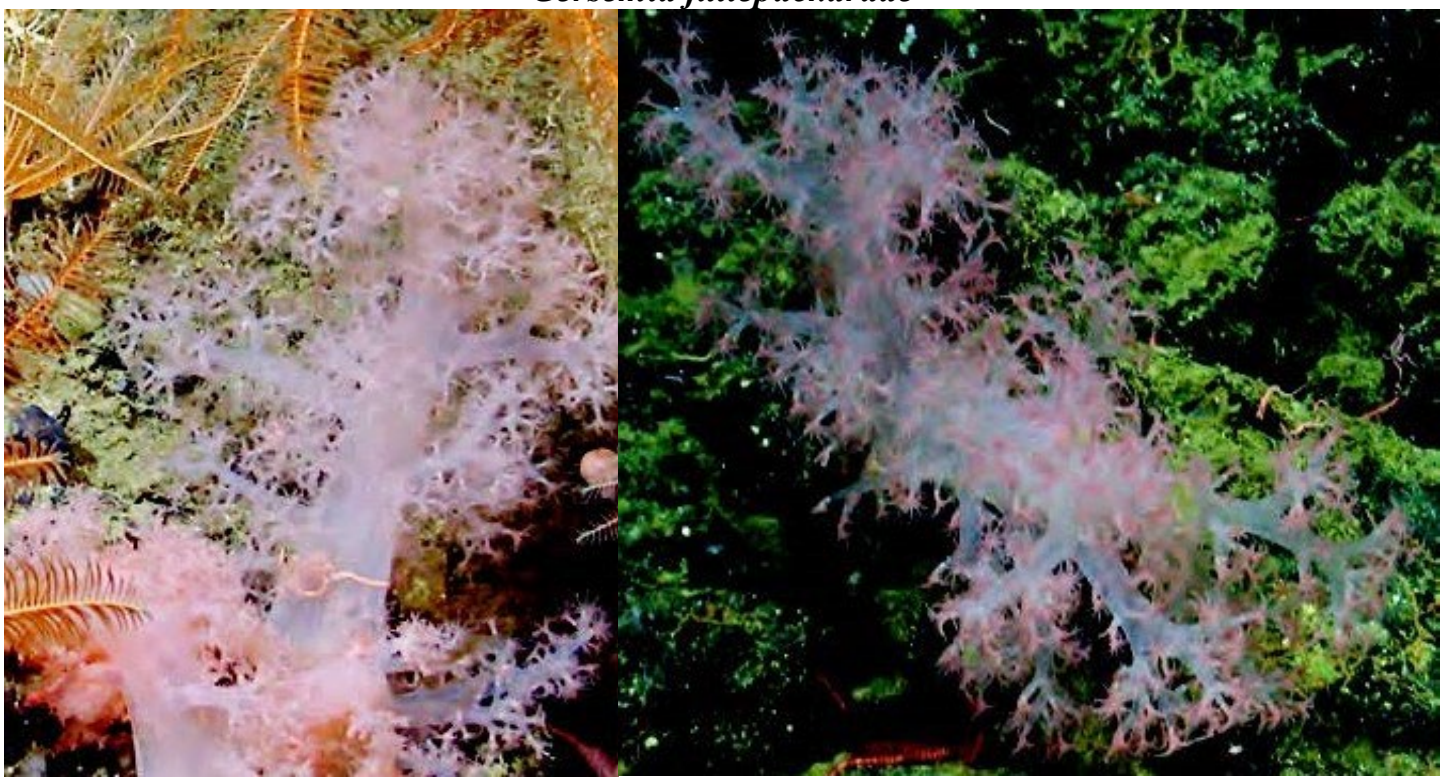
Nephtheidae (Carnation Corals, Colt Soft Corals)

Gersemia spp.

Description
Body and polyp color varies between genera, species and between individuals of the same species. Colors include various shades of red, orange, pink, yellow, purple, white or translucent blue. Erect colonies are tree-like with a thick central stalk with multiple thin branches within a short distance giving them a fluffy appearance. The calyces (cup shaped structures) supporting bundles of non-retractile polyps are clustered at the ends of the short terminal branches. The sclerites (hard spicules that support the stem and branches) are often colored. The stalk sclerites are usually modified or irregularly shaped.
Similar species
Also known under the genus *Alcyonium*. The overlap of the morphological characters of Nephtheidae make field identification problematic.
Distribution
Circumglobal in temperate to polar seas, 21-2034 m.

Soft Corals Nephtheidae

Gersemia juliepackardae



Description

The two mostly opposite rows of primary branches off the thick central stalk begin just above the holdfast. The primary branches then branch giving rise to several smaller secondary branches toward the distal ends. Although some polyps usually in groups of 2 occur on the mainstem most are concentrated on the outer edges of the secondary branches. The bulbous, oval shaped distal portion of the non-retractile polyp has 8 chevron shaped points composed of pinkish sclerites but no distinct crown. The basal portion of the polyp is tubular. The tentacles and distal ends of the polyps are pink. The basal portion of the polyp, holdfast and lower portion of the mainstem are white. The branches and the middle to upper portions of the mainstem are pink.

Similar species

The overlap in the morphological characteristics within species of this genus and between the approximately 20 genera in this family make field identification to the species level problematic.

Distribution

The total geographic and depth ranges have not been determined. The known range is between 33.1° N and 47.9° N at depths of 520-2034 m.

Soft Corals Alcyoniidae (Flame Corals)

Alcyonium spp.

Description

Growing in knobby clumps this colonial coral consists of a holdfast and a main stem or stalk with crowded and rounded thick leathery lobes or branches. The small completely retractile polyps are concentrated on the distal ends of the lobes and have a lobe-like not a catkin (cylindrical flower shaped) arrangement.

Similar species

Also known as *Gersemia rubiformis* (Sea Strawberry, Sea Raspberry) the lobate branches, retractile polyps and the warty spindles, radiates and ovoid or club tipped sclerites are more closely aligned with the Alcyoniidae.

Distribution

The Arctic to California, 0-1249 m

Heteropolypus ritteri (Mushroom Coral)

Description

These red, gray, or pink singular, mushroom shaped colonies have large, un-clustered variously colored retractable polyps. Diameter of colony 10 - 15 cm.

Similar species

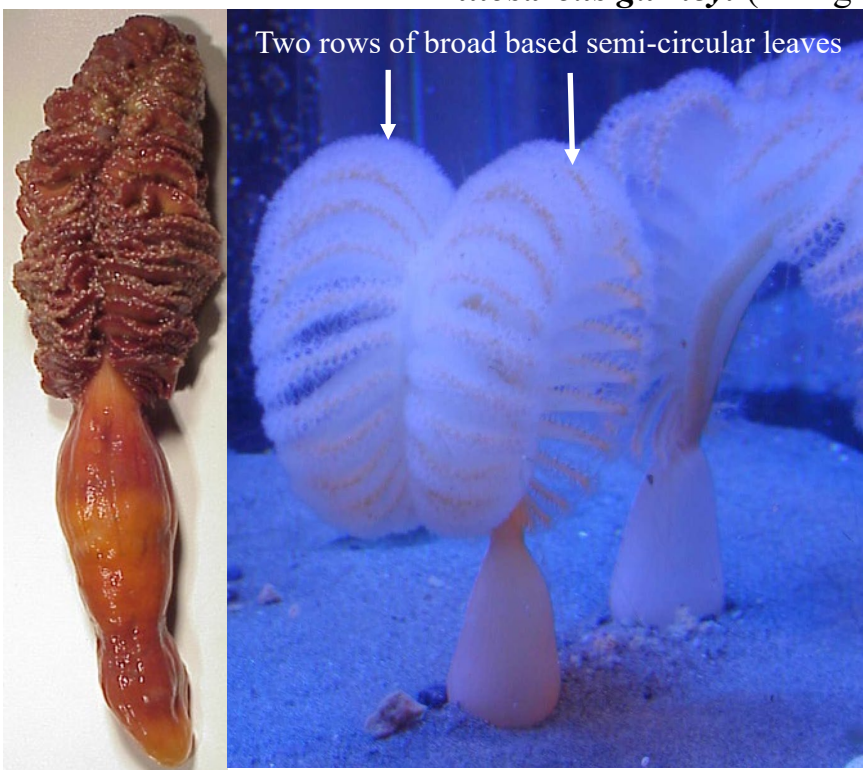
Formerly known as *Anthomastus ritteri* is now considered a synonym.

Distribution

Bering Sea to Mexico, 200 m and below.

Sea Pens Pennatulidae

Ptilosarcus gurneyi (Orange Sea Pen)



Description
The basal portion (bulb) of the mainstem (about ½ the total length) of this orange to brown sea pen is thick and bulbous. The distal end is fusiform and tapers to a fine point. The 2 rows of broad based, rounded and semi-circular leaves are smooth on the sides. The thick leaf edge is covered by polyps arranged in 4 rows each cell armed with 2 sharp pinnules. Height to 20 cm.

Similar species
The thick muscular bulb and 2 rows of rounded semi-circular leaves distinguish *Ptilosarcus gurneyi* from other sea pens in this guide.

Distribution
Alaska to Mexico, 16-475 m.

Pennatula phosphorea californica

Description
This sea pen has a slender beige to whitish stalk. The alternating fan shaped leaves are triangular in cross section. The leaf margins have a spiky or sharp appearance and there are about 15 regularly spaced polyps along each leaf. The leaves are brownish red to purple with yellow highlights due to the concentration deep blood-red sclerites. Total length to 40 cm usually much smaller.

Similar species
Alternating fan shaped leaves distinguish *Pennatula phosphorea californica* from other sea pes in this guide.

Distribution
Southern Oregon to Mexico, 50-2760 m.

Sea Pens Anthoptilidae

Anthoptilum grandiflorum

Description
This thick, fleshy, sea pen, often has a curved orange stalk. The dark red, brown or burgundy polyps are fused and very close together. Height to 60 cm.
Similar species
Ptilosarcus gurneyi has a maximum length of about 15 cm and is not curved. *Pennatula phosphorea californica* has a maximum length of about 10 cm and has a thin peduncle.
Distribution: Cosmopolitan, 200-2000 m possibly greater.

Umbellulidae

Umbellula spp.

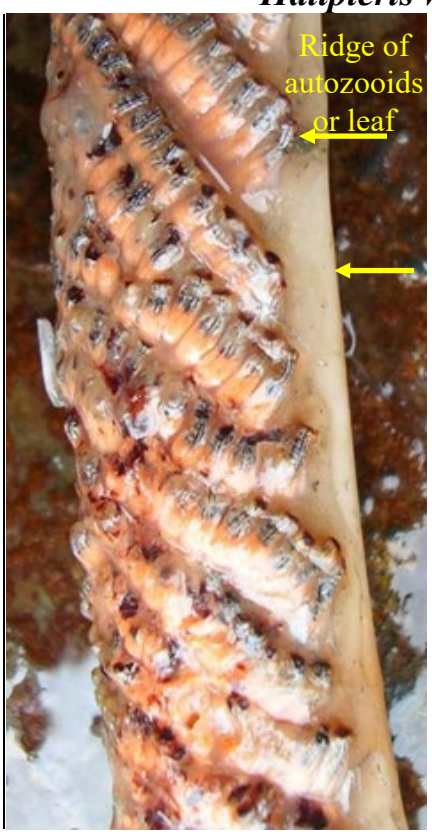
Description
This small sea pen has a light brown stalk and six large, drooping, elongated brown or purple polyps at the distal end. Height to 30 cm.
Similar species
Although not easily confused with other sea pens, the differences between species occurring in the survey area are very slight making field identification problematic.
Distribution
Muddy substrates throughout region, 600 m and greater.

Sea Pens Halipteridae

Halipteris spp.

Description
This commonly occurring, long and slender sea pen has polyps appearing as ruffles. The axis is round in cross-section, and the color of the polyps is brown or purple. Occurs in mud
Height to about 70 cm, cross-section 2-3 mm diameter, polyps 6 mm in length.
Similar species
The purple to purple brown polyps distinguish this deepsea species from the other species of this genus encountered.
Distribution
Alaska to Mexico, 75-1500 m possibly greater.

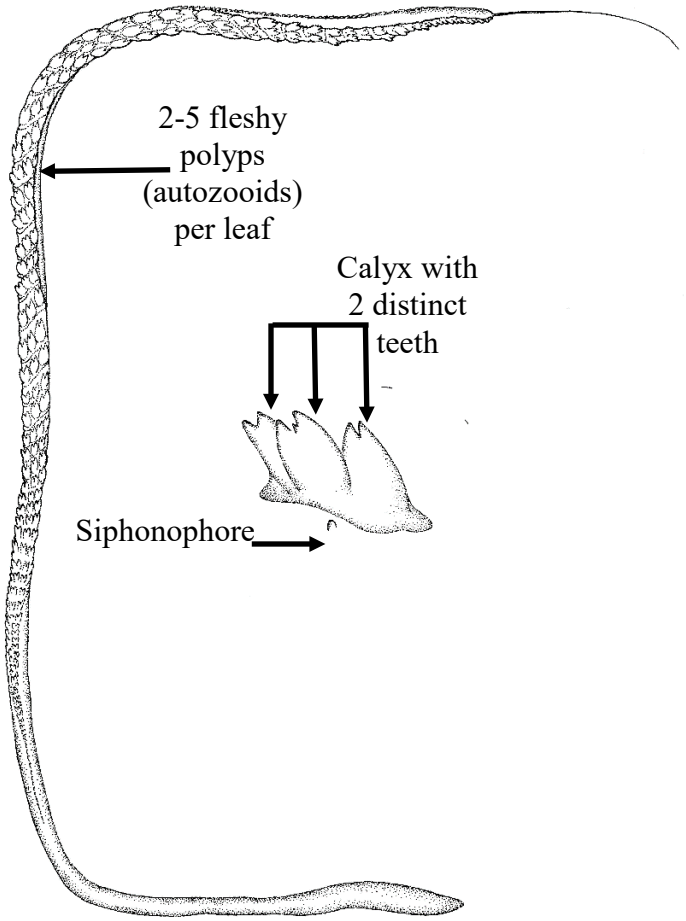
Halipteris willemoesi (Two-Toothed Sea Pen, White Sea Pen)



Description
This is a common whitish to tan to light orange, long and slender sea pen. The whitish to tan, round, rigid mainstem (rachis) extends the length of the colony. The whitish, tan to light orange polyps appear as raised ridges also called leaves. The 8-15 autozooids (polyp, individual animal in a colony that at some time in its development can feed itself) occur in many oblique rows along 2 longitudinal axis and are often united at the base with the adjacent autozooid forming ridges emerging from opposite sides of the mainstem. The ridges do not encircle the mainstem (rachis) leaving one side bare. The anthocodiae (distal portion of the bifurcated polyp) is retractile into the calyces that have 2 teeth. Length to about 140 cm.
Similar species
Halipteris willemoesi is also known as *Balticina willemoesi*. *Halipteris californica* (*Balticina californica*) has fewer rows of leaves (approximately 100) and 2-5 longer fleshy polyps per leaf.
Distribution
Alaska to Mexico, 36-1950 m.

Sea Pens Halipteridae

Halipteris californica (Short Sea Whip)



Description

The round whitish to tan, rigid mainstem (axis, rachis) of this long and slender sea pen extends the length of the colony. The brown polyps appear as raised ridges also called leaves. The 2-5 autozooids (polyp, individual animal in a colony that at some time in its development can feed itself) occur in many oblique rows along 2 longitudinal axis and are often united at the base with the adjacent autozooid forming ridges emerging from opposite sides of the mainstem. The ridges do not encircle the mainstem leaving one side bare. The anthocodiae (distal portion of the bifurcated polyp) appears non-retractile into the calyces that have 2 teeth. Length to about 1 m.

Similar species

Halipteris californica is also known as *Balticina californica*. *Halipteris willemoesi* (*Balticina willemoesi*) has more rows of leaves (approximately 200) and 8-15 polyps per leaf.

Distribution

The geographic and depth ranges have not been fully defined. Specimens have been collected from southern California at depths of 444-1981 m.

Virgulariidae

Acanthoptilum gracile (White Sea Pen)

Description

The smooth whitish to light tan mainstem is circular to elliptical in cross section. The alternating light tan to burgundy, slender polyps on the antero-lateral face of the stem are acute at the tip and broad based. The polyps occupy the upper half of the animal and are quite small at the basal end but grow progressively larger anteriorly reaching and retaining full size at the extreme tip giving it a feathery appearance.

Similar species

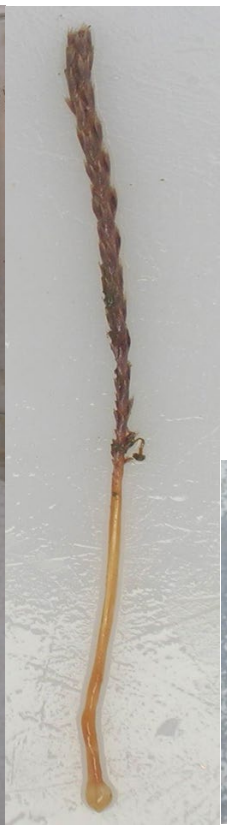
The slender form, cylindrical mainstem without grooves, proportionally larger leaves and smaller polyp bearing portion of the stem distinguish *Acanthoptilum gracile* from similar species.

Distribution

Oregon to California, subtidal to 2000 m.

Sea Pens Stachyptilidae

Stachyptilum superbum (Exquisite Sea Pen)



Description

This polyps of this short stubby sea pen have completely grown together and appear to spiral (whorls) around the mainstem. There are 4-7 polyps per whorl. The dark polyps are fully retractile into the heavily spinulated calyx that has 2-6 large spicules protruding from the top. The mainstem has a deep, even, undulating groove on the ventral surface.

Similar species

Funiculina quadrangularis has fleshy polys and is square in cross section. *Protoptilum spp.* have a bulbous base, and the polyps are not as spiky.

Distribution

Oregon to Panama, 388- 1244 m.

Funiculinidae

Funiculina quadrangularis (Tall Sea Pen)

Description

A tall (up to 2 m), narrow sea pen with a calcareous white mainstem that is square in cross section with the upper third characteristically curved. The white to pale pink to burgundy polyps are arranged irregularly along the mainstem and tend to form oblique rows. Growing to 60 cm this sea pen has a pale colored stalk that is square in cross section and the orange to pink fragile polyps are easily shed.

Similar species

The irregular arrangement of the polyps around the smooth, square mainstem distinguishes *Funiculina quadrangularis* from similar species

Distribution

Probably worldwide, 20- 2740 m.

Sea Pens Protoptilidae

Distichoptilum gracile (Two-toothed Sea Pen, Saw-Toothed Sea Pen)

Description
Two lateral rows of stiff triangular reddish polyps line the long slender stem giving this sea pen a serrated appearance. The axis is 2-3 mm in diameter and up to 1.5 m long.
Similar species
The square mainstem (rachis, axis) with 2 lateral rows of stiff alternating triangular polyps and serrated appearance distinguish this sea pen from other species.
Distribution
Circumglobal, 650- 4300 m.

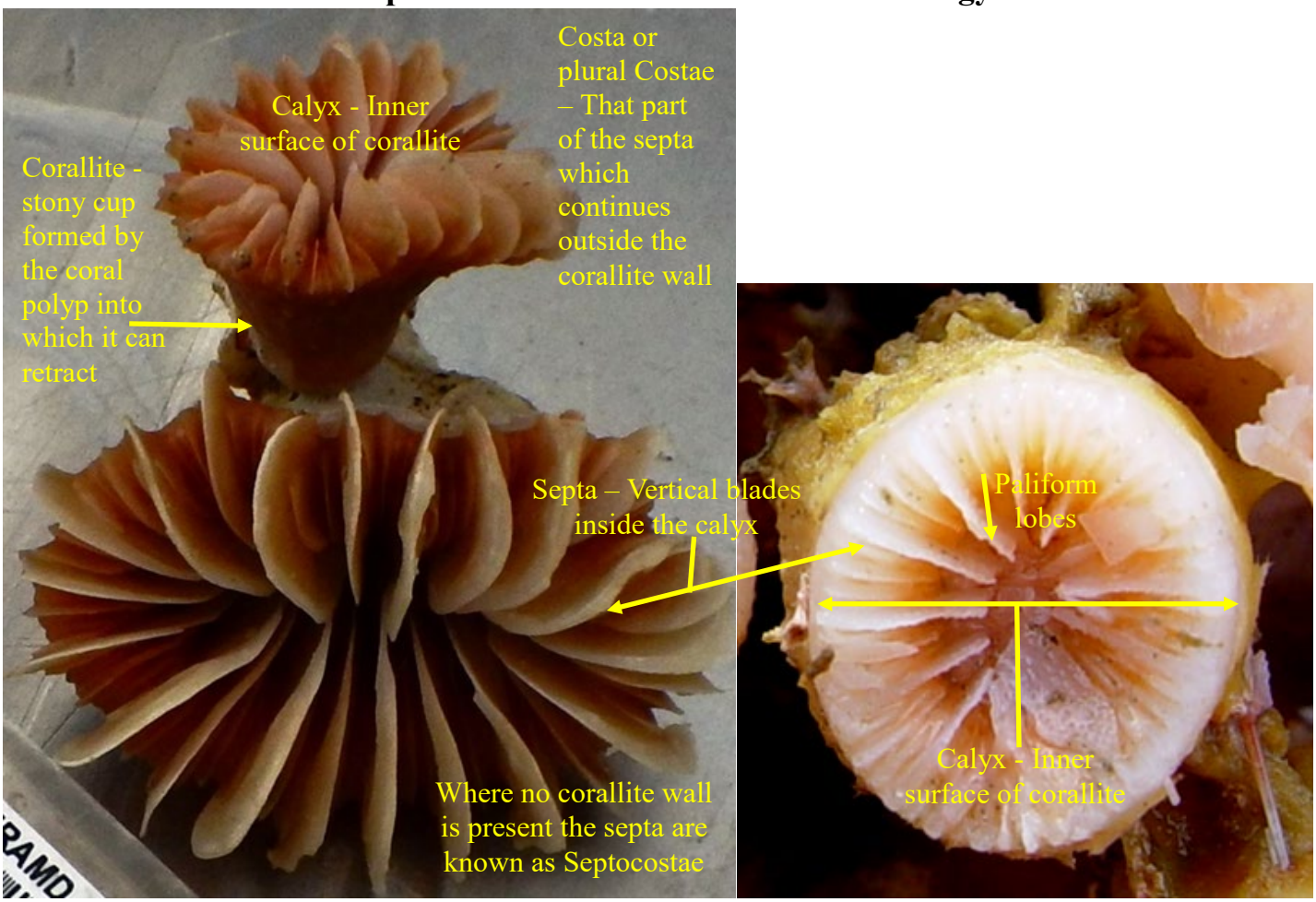
Protoptilum spp.

Description
The pale pink to purple polyps of this elongate narrow sea pen are flattened and falling in oblique rows of 5 or less. The variable, flattened polyp calyces have 0-8 terminal teeth. The whitish to pale tan or pink mainstem has a bulbous peduncle. Total length to 30 cm.
Similar species
Stachyptilum superbum has spiky polyps. Other deep-sea species encountered are darker, much taller, and have numerous ruffled polyps.
Distribution
In the NE Pacific along the continental shelf and slope, 250- 4000 m

Cup Corals Scleractinia

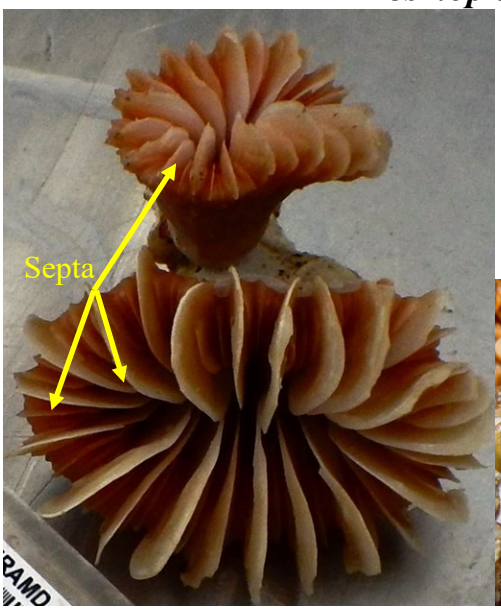
Cup coral polyps form a skeletal cup or Corallite by secreting a crystalline form of calcium carbonate or Aragonite. Corallites vary in length and diameter. The inner surface of the corallite is known as the Calyx, and the vertical blades inside the calyx are the Septa. In some species the septa continue outside the corallite wall and these ridges are known as Costa or plural Costae. In some species where there is no corallite wall the costae are referred to as Septocostae. The septa, costae and Septocostae may have ornamentation and can vary widely in thickness and size. Some species develop Paliform lobes, these are rods or blades rising from the inner margins of the septa which can form a circle called the paliform crown. Cup corals can be colonial or individual. Colonial species come in several forms. Plocoid colonies are where each corallite has a surrounding wall. Phaceloid colonies have long tubular walls. In cerioid colonies several polyps share a common wall. Branching corals have axial or radial corallites. Axial corallites are shallow and found near the tips of the branches, radial corallites are on the sides of the branches.

Cup Coral Characteristics and Terminology



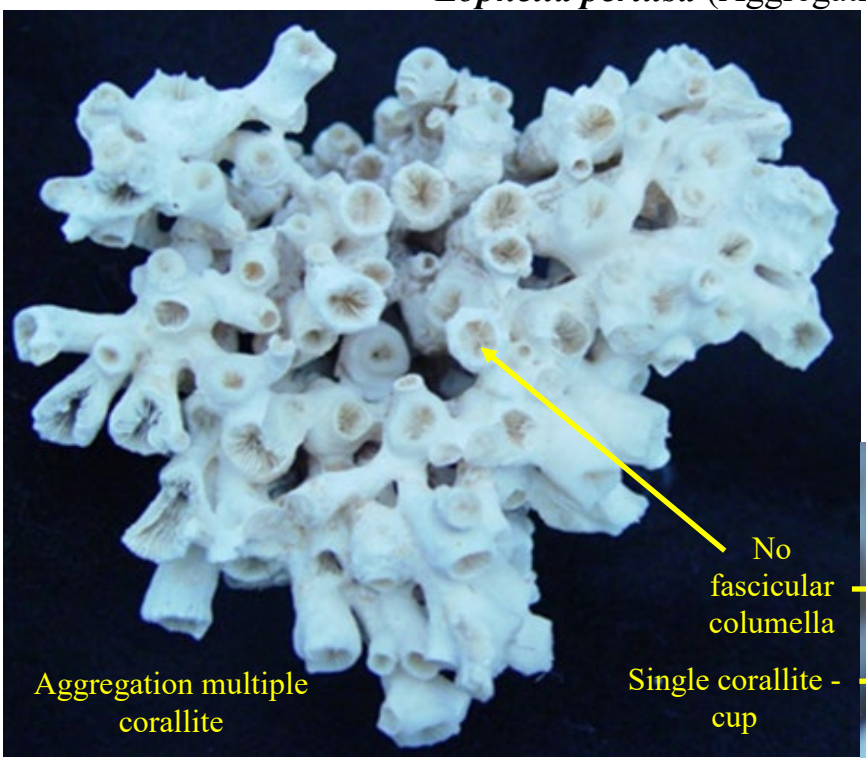
Cup Corals Caryophylliidae

Desmophyllum dianthus (Giant Trumpet Coral)

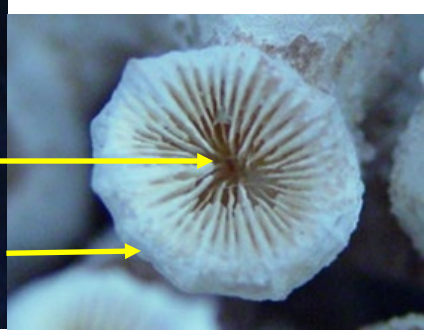


Description
This large, solitary coral has blade-like septa and a pale orange to light brown trumpet-shaped calyx. Height to 7 cm, width to 8 cm.
Similar species
Other cup corals lack the trumpet shape of the calyx.
Distribution
Cosmopolitan, tropical to polar, 200-2500 m

Lophelia pertusa (Aggregating Coral)



Description
These light orange or white tube shaped corals form large aggregations. The calyx (cup) lack the small bundled central column separated from the septa (fascicular columella) up to 12-25 mm.
Similar species
Coenocyathus bowersi is smaller and has fascicular columella.
Distribution
Cosmopolitan, 80-500 m.



Cup Corals Caryophylliidae

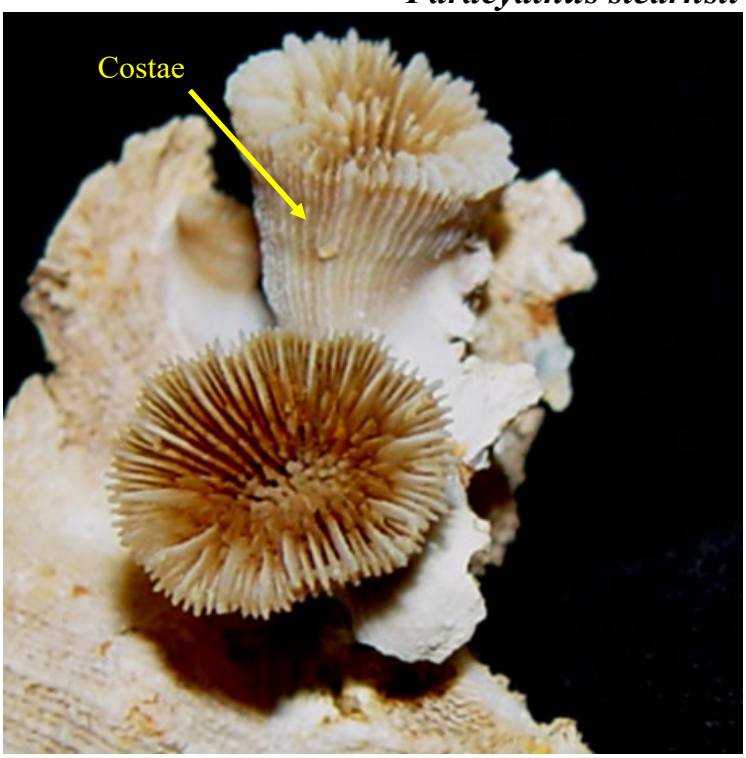
Coenocyathus bowersi

Description
These white tube shaped corals can form large aggregations. Corallites are elliptical to circular and range from 2 -12 mm in diameter and 4-16 mm in height, however widely spaced corallites can be up to 25 mm. The costae are flat, broad, slightly convex and granulose. Each calice has 6-14 primary septa that are larger than the rest however, septa symmetry is very irregular and most calices have a mixture of development stages producing very irregular septal patterns.

Similar species
This species is highly variable in development with corallites of different stages throughout and between colonies making identification in the field problematic.

Distribution
From Monterey Bay, Cortez Bank and the Channel Islands in the United States to Isla Guadeloupe, Mexico (Sea of Cortez) to Panama, 9-302 m.

Paracyathus stearnsii (Brown Cup Coral)



Description
These solitary, light to dark brown, turbinate corals are firmly attached to the substrate by a large base that can be twice the diameter of elliptical to circular calyx. A narrow and shallow intercostal striae separates the low, rounded costae that are equal in width and covered with low, rounded granules.

Similar species
Characteristics used to identify corals can be difficult at best to determine in the field making identification problematic.

Distribution
From Skidgate in the Queen Charlotte Islands to Bahia Asuncion, Baja California to Tiburon Island in the Gulf of California, 20 -134 m.

Cup Corals Flabellidae

Polymyces montereyensis (Monterey Cup Coral)

Description
These solitary, white corals are conical with a flat base (trochoid). The rings of septa in the elliptical calyx have a small triangular apex giving a slightly serrated appearance.
Similar species
Characteristics used to identify corals can be difficult at best to determine in the field making identification problematic.
Distribution
Cortez and Tanner Banks to Monterey Bay and the Channel Islands to Cape Blanco, Peru, 69-212 m.

Dendrophylliidae

Dendrophyllia oldroydae (Oldroyd's Cup Coral)

Description
These white corals have a yellow layer of living tissue (coenosarc) over the skeleton. There is a strong basal stem with strong branches forming the primary shoots for the weaker lateral branches (sympodial branching) forming large bushy colonies. The short, stout corallites project perpendicularly 4-7 mm from the main branch. Distal corallites are inclined distally and elongate. The elliptical calices can reach up to 15 mm. The slightly convex costae are equal in width are separated by narrow intercostal striae and covered with small granules.
Similar species
Characteristics used to identify corals can be difficult at best to determine in the field making identification problematic.
Distribution
Redondo California to Baja, and the Gulf of California to Columbia and the Galapagos and Cocos Islands, 40-576 m.

Cup Corals Dendrophylliidae

Dendrophyllia californica

Description
These white corals form small sparse colonies not often exceeding 5 cm in either height or width, or more than 6-7 horn shaped (ceratoid) corallites. The finely granular, slightly convex costae are separated by narrow, porous intercostal striae.
Similar species
Characteristics used to identify corals can be difficult at best to determine in the field making identification problematic.
Distribution
Known primarily from the Pacific coast of Baja California, 42-93 m.

Brachiopods Brachiopoda

Brachiopods are molluscs with two shells and a mantle, similar to bivalves. A noticeable external difference is that bivalve shells enclose the body laterally, while brachiopod shells enclose the body dorso-ventrally. The shells are usually unequal, the dorsal (brachial) shell overlapping the ventral (pedicle), and are held together either muscularly (class Inarticulata) or with a tooth-and-socket hinge (class Articulata). Some species live attached to substrate by the pedicle, an extension of the body wall, and the mantle of most species have chitonous setae, possibly for protection or sensation.

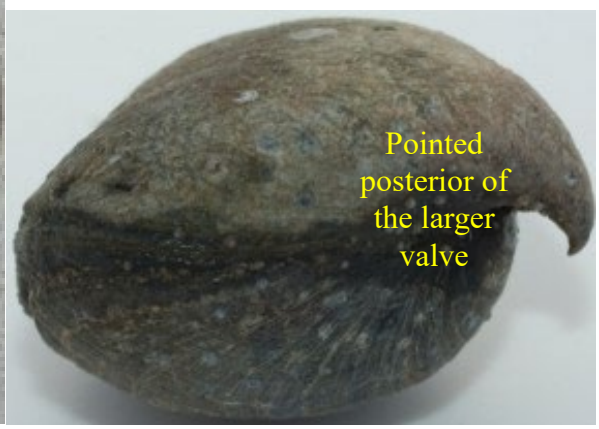
Novocrania philippinensis

Description
This whitish brown sub-rectangular to rounded/oval brachiopod is strongly depressed. The thickness of the animal is usually less than half the width. Lacking a pedicle, the lower half of the shell is firmly attached to the substrate. Length to 2.5 cm.
Similar species
Formally known as *Crania californica*. Not likely to be confused with other species.
Distribution
In the eastern North Pacific from 32º N to 51º N, 120-200 m.

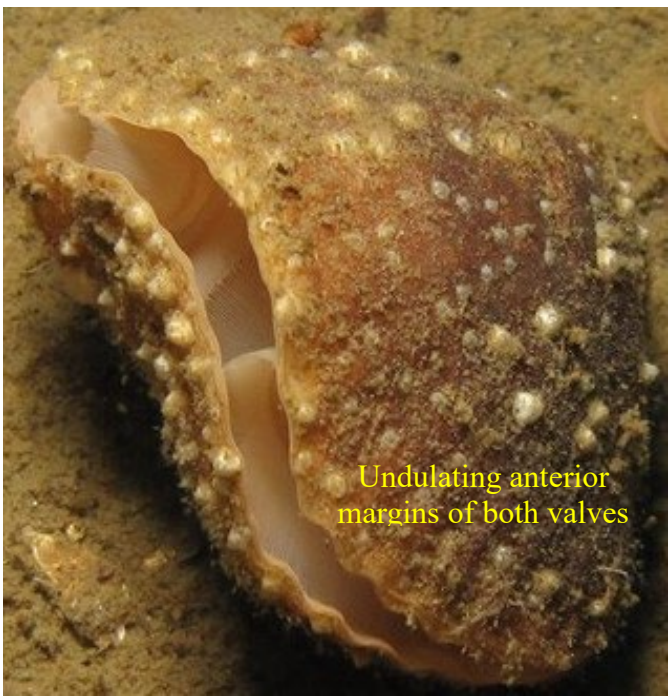
Brachiopods

Hermithiris psittacea

Description
The shell color of this brachiopod varies from a dark blue to nearly black or a variety of shades of gray and brown. The posterior beak of the larger valve is sharply pointed and is not obliterated by the pedicle opening. Length to 2.5 cm.
Similar species
Not likely to be confused with other species.
Distribution
Circumpolar, 15-1100 m.



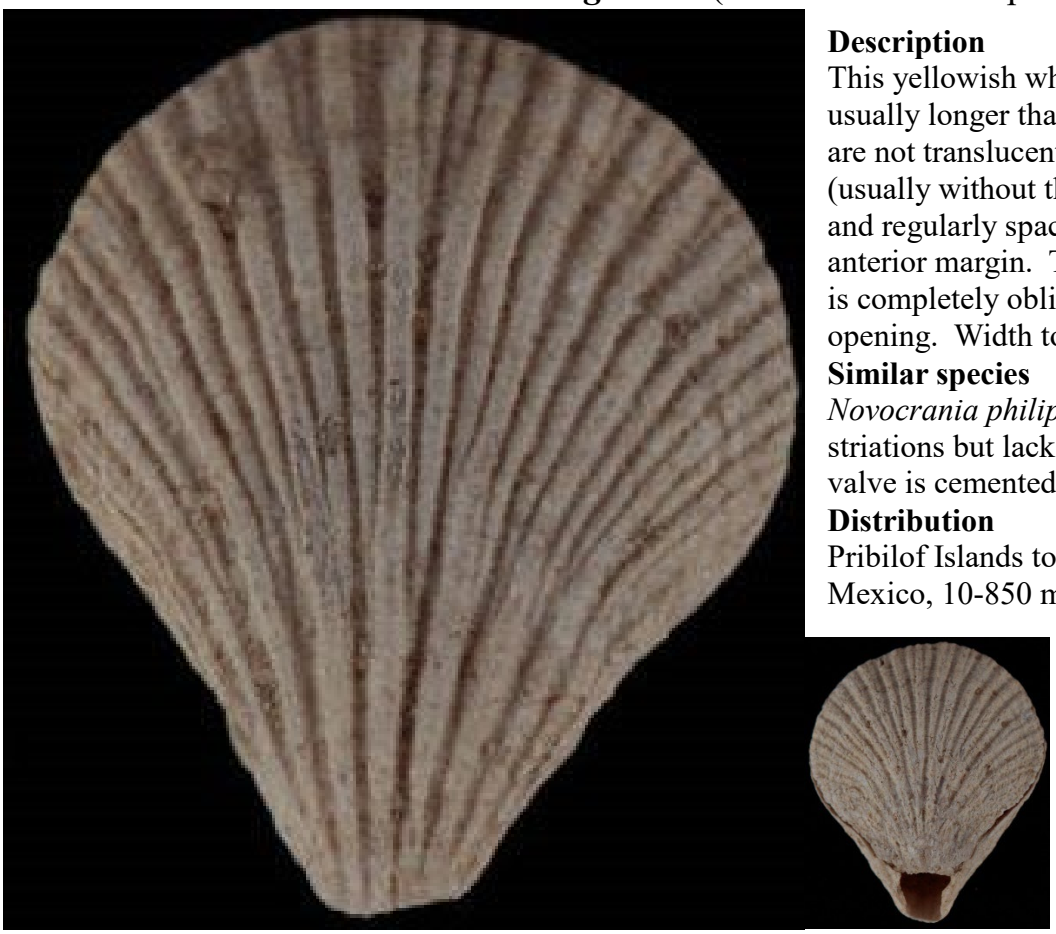
Terebratalia transversa



Description
This shell of this brachiopod is broader than long. The anterior margin of both valves is strongly undulate. The pedicle opening has a slightly elevated median ridge and at the anterior margin opposite the pedicle a broadly rounded notch. The color is variable but most often gray, yellow, tan, brown or reddish. Width to 5.6 cm.
Similar species
Only brachiopod in the area with both the shell being broader than long and having strong undulations of the anterior margins of both valves.
Distribution
Alaska to Baja California, rarely in the low intertidal zone, most common subtidal to 1800 m.

Brachiopods

Terebratulina unguicula (Snake's Head Lamp Shell)



Description
This yellowish white to gray brachiopod is usually longer than broad. The valves (shells) are not translucent, have radiating striations (usually without the concentric growth lines) and regularly spaced small teeth along the anterior margin. The apex of the larger valve is completely obliterated by the pedicle opening. Width to 5.6 cm.

Similar species
Novocrania philippinensis have radiating striations but lack the pedicle and the ventral valve is cemented firmly to the substrate.

Distribution
Pribilof Islands to Baja and the west coast of Mexico, 10-850 m.

Laqueus californianus (California Lamp Shell)

Description
This brachiopod has a fleshy stalk or pedicle used to attach to the substrate. The thin translucent shell is white with a thin light tan periostracum. The smooth to prominently ribbed inflated shells are at least as long as wide. The anterior margins of the valves are straight, smooth and lack teeth. Length to 5 cm.

Similar species
Not likely to be confused with other species.

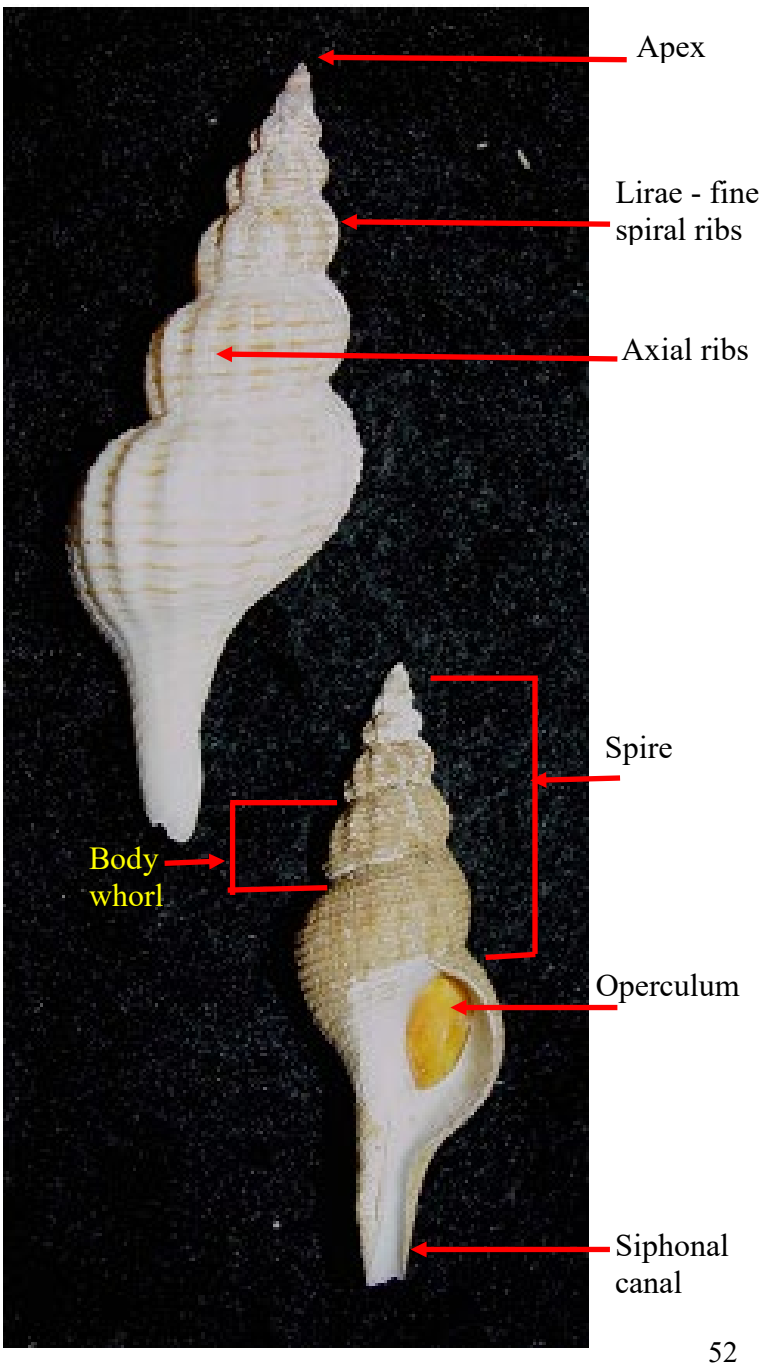
Distribution
Alaska to Mexico, 1-500 m possibly deeper.

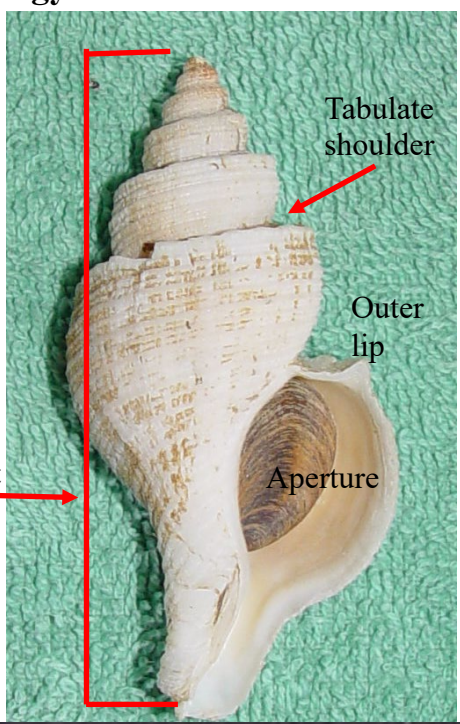
Mollusca Gastropoda

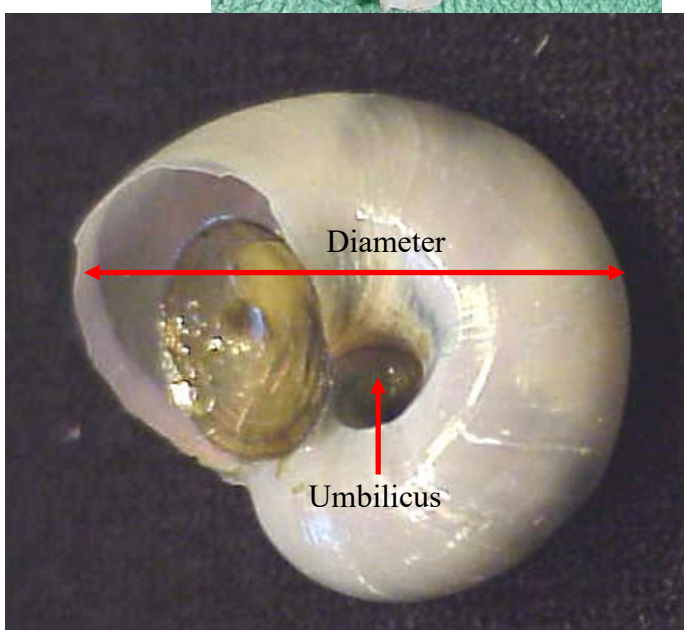
The shell and operculum of marine snails are most commonly used for field identification. Shells are asymmetrically spiraled, and the body undergoes torsion (twisting) in the larval stage of development. The foot, which can be extended, has a disc called the operculum, which closes the aperture for protection of the body. Shells can be spiraled sinisterly (counter clockwise) or dextrally (clockwise) and may be described as fusiform (spindle-shaped) or conical (cone-shaped). The whorls (turns of shell) above the body whorl make up the spire. The shoulder (upper edge of whorl) may be tabulate or have projections. A periostracum, or outer covering on the shell, may be present, as well as an open umbilicus, a hole into the inner coiled shell. This may be within the base of the columella, the inner axis of the whorls.

Snails

Snail Characteristics and Terminology

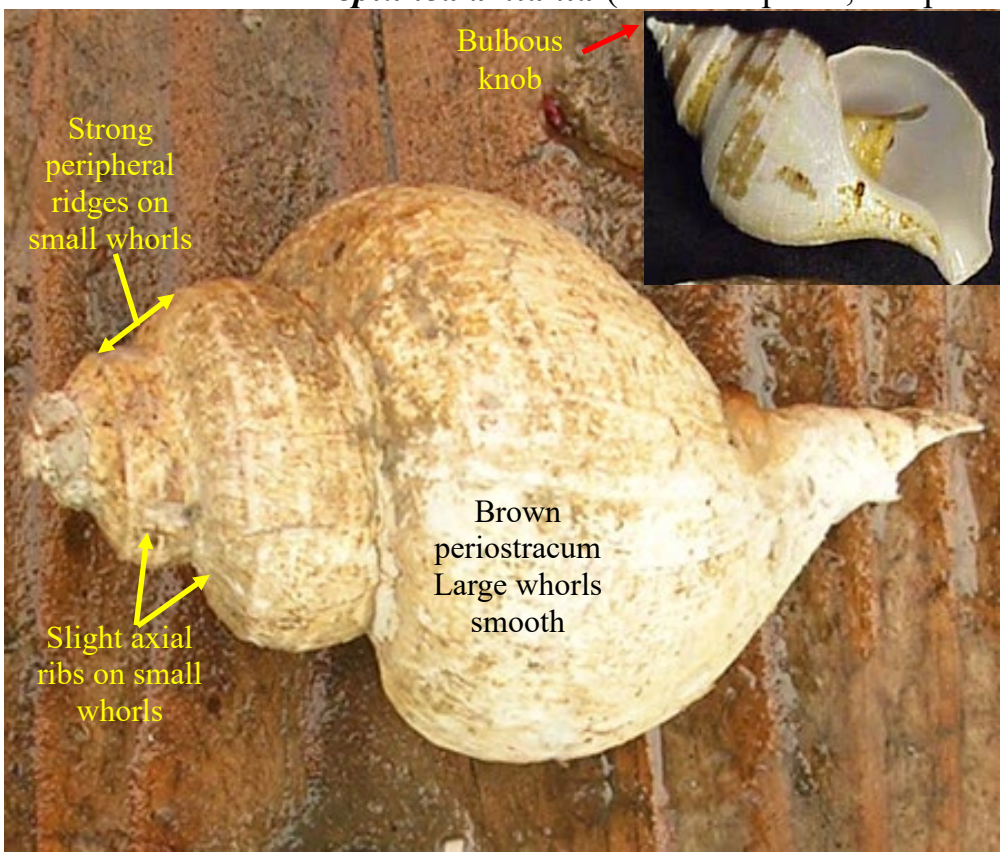






Snails

Neptunea amianta (White Neptune, Deep-sea Whelk)

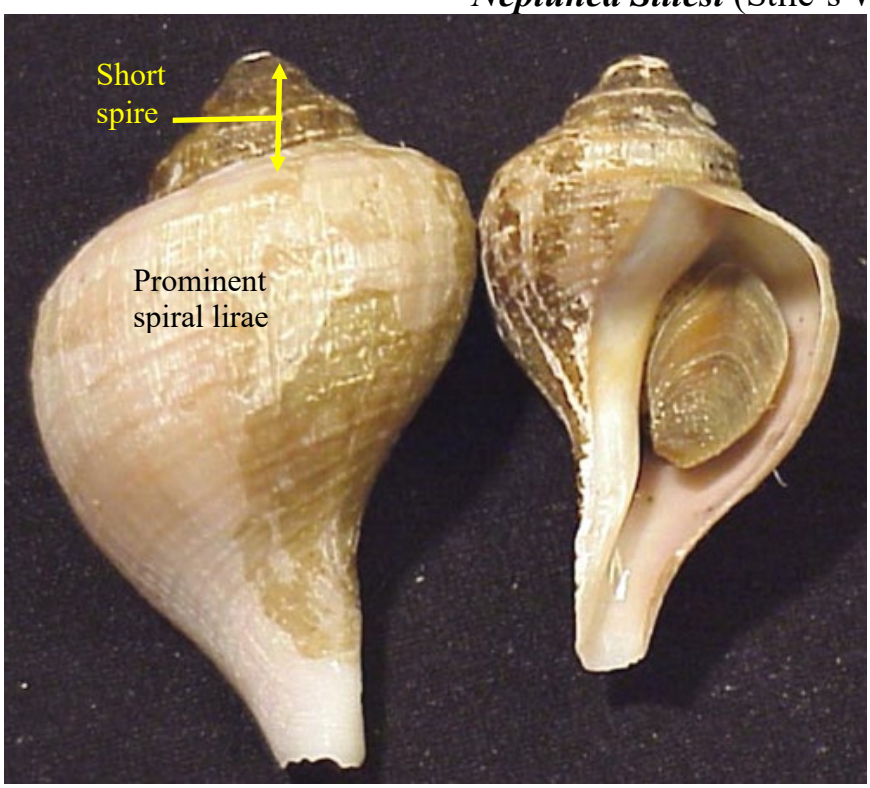


Description
This snail has a thin, chalky white shell under a brown periostracum. There are 3-4 whorls, the smaller whorls have axial ribs and strong peripheral carinae (ridges). The larger whorls are smooth. The canal is short and the lip is thin and easily broken. Undamaged the apex of the spire is bulbous knob. Height to 10 cm.

Similar species
Neptunea stilesi has a shore spire. *Neptunea humboldtiana* has wide yellow aperture. *Neptunea pribloffensis* has prominent, dark ribs and a long spire.

Distribution
Bering Sea to Mexico, 400 m and below.

Neptunea Stilesi (Stile's Whelk)



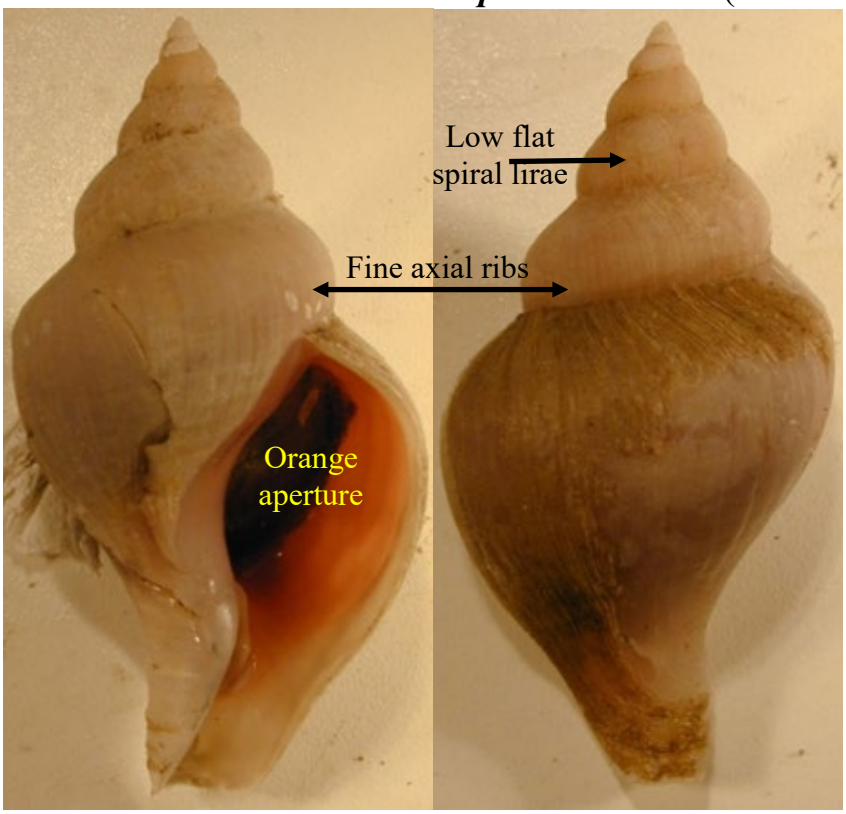
Description
This moderately sized snail has a creamy white shell with a brown to greenish brown periostracum. There are usually 4 whorls. The body whorl is somewhat inflated and the smaller whorls form a short (approximately a quarter of the total length) spire. All whorls have reddish brown spiral lirae. However, the intensity of the color varies widely. Height to 10 cm.

Similar species
The short spire and prominent spiral lirae distinguish *Neptunea stilesi* from other related species.

Distribution
Southeastern Alaska to northern California, 50-400 m.

Snails

Neptunea smirnia (Chocolate Whelk)

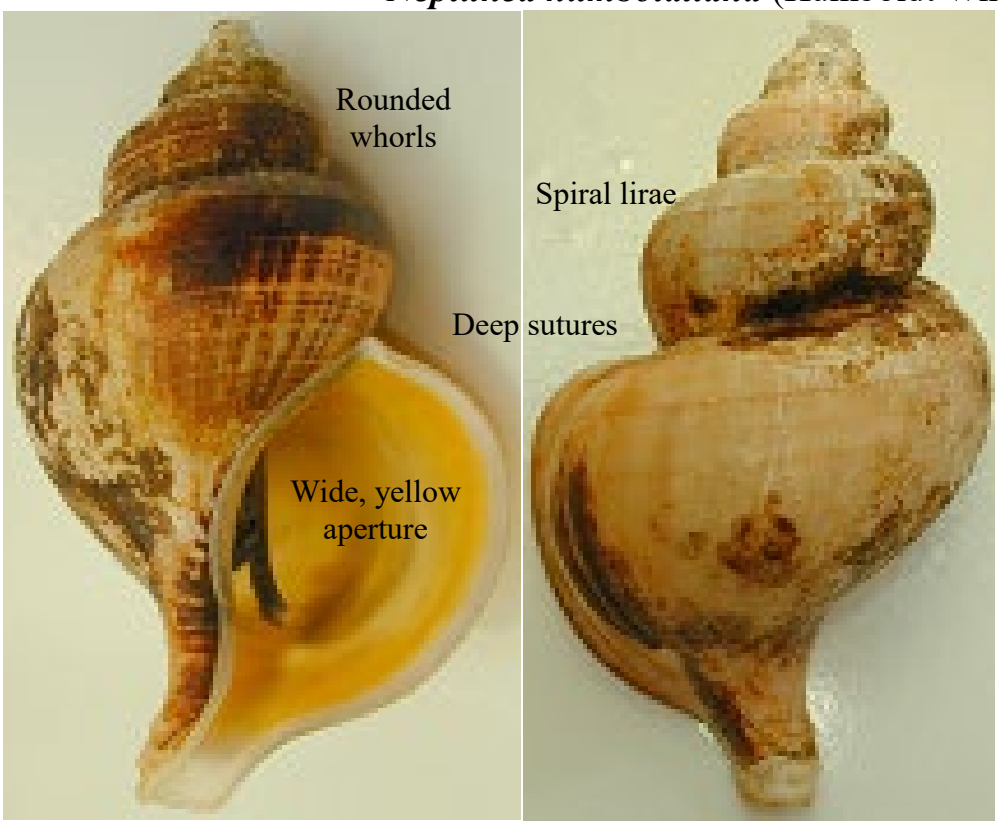


Description
This white, tan to purple-brown snail has a thin olivaceous periostracum. Usually 5-6 whorls sometimes showing faint axial ribs or lines. The smaller whorls with 4-5 low, wide, flat spiral ribs that become obsolete on the larger whorls. The attenuated spire is somewhat tall (about ½ the total length). The wide ovate to angular aperture has an expanded white lip and an orange to brownish orange throat. The short, wide canal is somewhat recurved. Height to 15 cm.

Similar species
The smooth shell and orange aperture distinguish *Neptunea smirnia* from other related species.

Distribution
Southeast Alaska to central California, 20-300 m.

Neptunea humboldtiana (Humboldt Whelk)



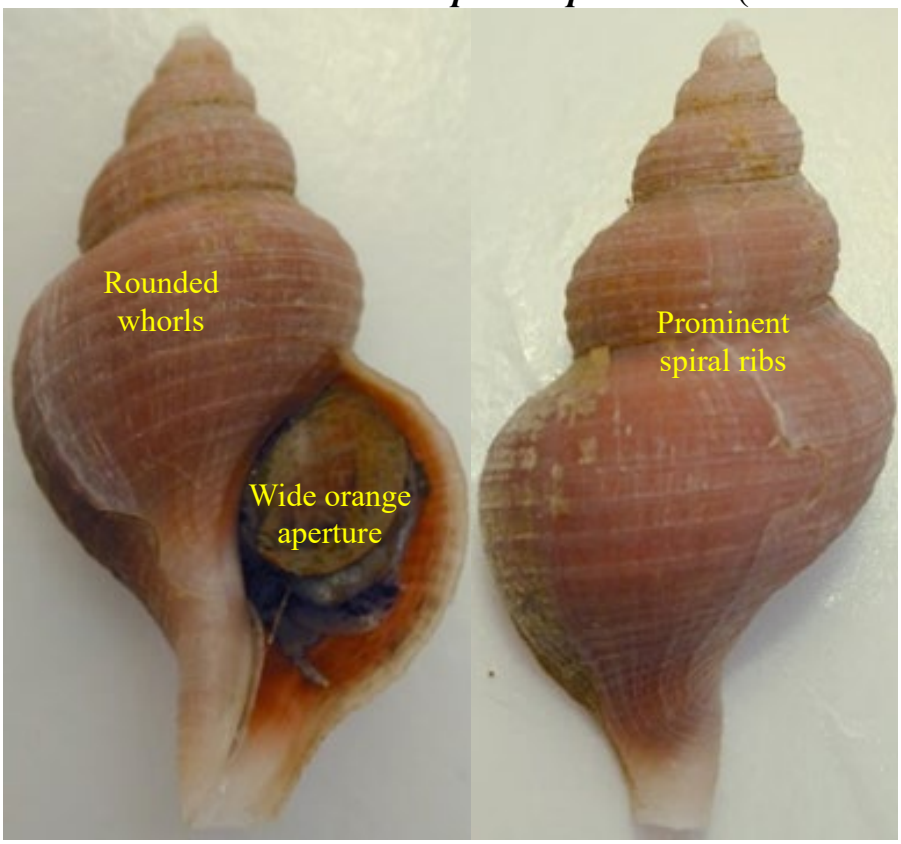
Description
This large, whitish, relatively short spired species has about 5 rounded whorls with deep sutures. The smaller whorls have a few brownish spiral a lire with or without fine intercalaries. The body whorl is usually smooth but can be lirate. The wide aperture has a yellow throat and a widely flared white lip. Adults often develop a prominent secondary lip-flange. Height to 15 cm.

Similar species
Neptunea smirnia has an orange aperture and more whorls.

Distribution
Washington to northern California, 100-300 m.

Snails

Neptunea phoenicea (Phoenician Whelk)

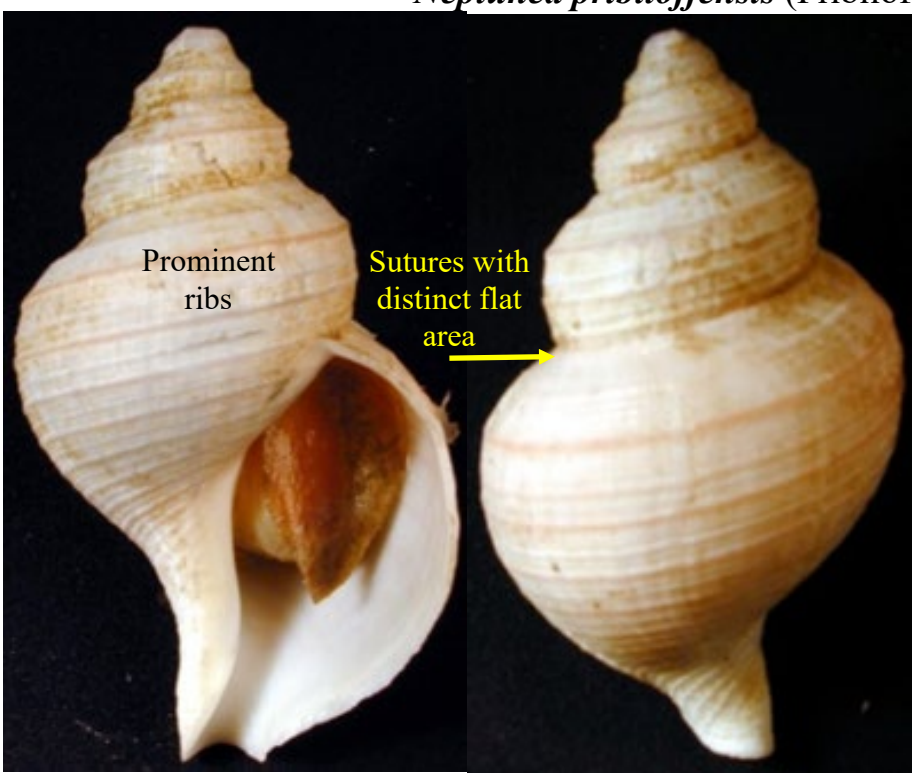


Description
This light brown to purplish brown has 6-7 sculptured, round whorls. The smaller whorls have 4-5 strong spiral lire the larger whorls have numerous fine inter-lirae spiral lines. The whorls taper to a long (about ½ the total length) spire. The wide aperture has a narrow light lip and an orange throat. Height to 10 cm.

Similar species
Neptunea smirnia has a smooth shell and small spire. *Neptunea pribiloffensis* has a white shell and lacks the orange aperture.

Distribution
Southeast Alaska to central California, 2-400 m.

Neptunea pribiloffensis (Pribilof Whelk)



Description
This whitish tan thin shelled species becomes increasingly orange on the distally on the spire. There are about 6 evenly rounded whorls. The suture has a distinct flat or excavated space on the whorl in front of it. Each whorl has a series of spiral lirae the strongest at the shoulder and a series of flat finer close set threads except on the canal where they are wider and become obsolete. The broad aperture has a thin, sharp outer lip and a short, wide canal. Height to 12 cm.

Similar species
Neptunea phoenicea has a brown shell and light spiral ribs. *Neptunea humboldtiana* has a bright yellow aperture and light lirae (spiral ribs).

Distribution
Bering Sea to California, 50-600 m.

Snails

Neptunea tabulata (Tabled Whelk)

Description
This white snail has a thin green periostracum. The 6 whorls are tabulate (flat or concave on the top), forming a shoulder, and have faint lirae (spiral ribs). The aperture is wide with a whitish outer lip and a whitish to light tan throat. Height to 10 cm.
Similar species
The tabulate whorls should distinguish this species from others in this guide.
Distribution
Southeastern Alaska to southern California 25-400 m.

Neptunea ithia (Slender Whelk)

Description
The shell and aperture of this very slender snail are brown to orange in color. There are few whorls and a long spire. Height to 7 cm.
Similar species
The slender shell, long spire, and few whorls should distinguish this species from others in this guide.
Distribution
Washington to central California, 50-600 m.

Snails

Fusinus barbarensis (Santa Barbara Spindle Shell)

Description
This white to tan, spindle shaped shell has a brown periostracum. The 7 rounded whorls form a somewhat long tapered spire. The earlier whorls have 8-12 strong axial ribs that become less prominent on later whorls. The early whorls have 4 usually dark brown, prominent spiral lirae with secondary lirae arising between the primaries, so that by the final whorl it is covered by numerous lirae of varying strength and spacing. The somewhat narrow aperture is the same length as the long canal and has lirate outer lip. Height to 10 cm.

Similar species
Many species of the genus *Fusinus* occur within the geographic range of the NMFS surveys. However most are too small and/or occur in waters too shallow (less than 30 m) to be taken in NMFS trawls.

Distribution
Central California to Baja California, 50-350 m.

Aforia goodei (Goode's Aforia)

Description
The shell of this long, slender snail is white with a light brown periostracum. It has a prominent ridge in the middle of each whorl and a long aperture. Height to 7.5 cm.

Similar species
The ridge in the middle of whorls should distinguish it from other species in this guide.

Distribution
Alaska to Mexico, 1000 m and below.

Snails

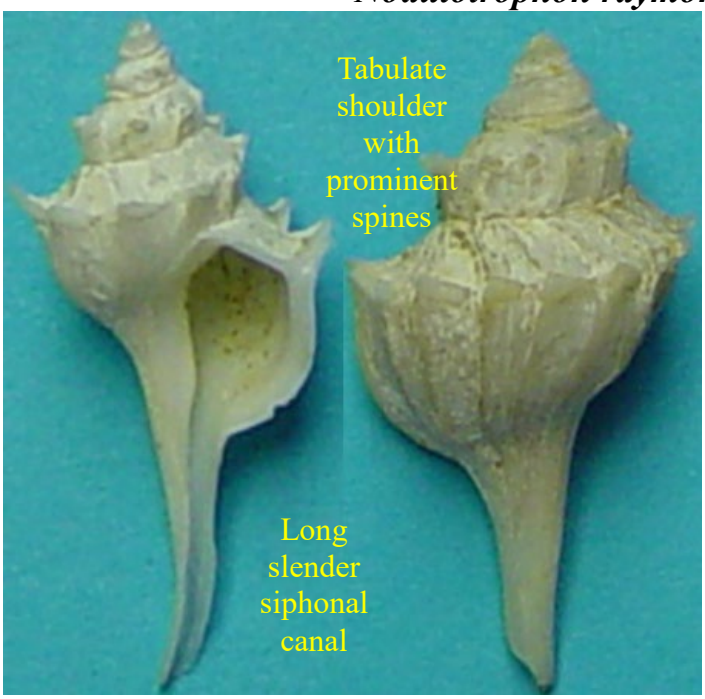
Boreotrophon tripherus (Rotund Trophon)

Description
This small, spindle shaped, white to tan snail has a brown periostracum and a white inner shell. Spiral lirae are present but are weak and do not override the axial ribs. The strong axial ribs are poorly developed on the acutely angled shoulders but form numerous small, strong, sharp laterally directed spines at the shoulder. The whorls form a tapered spire that is approximately a third of the total length. The somewhat wide canal has curved outer lip and a white throat. The straight canal is about the same length as the aperture. Height to 2.5 cm.

Similar species
There are several similar species of *Boreotrophon* that may be taken in NMFS trawl surveys. The angled shoulder with small spine and large aperture should distinguish this species from others in this guide.

Distribution
Gulf of Alaska to Southern California, 400-900 m.

Nodulotrophon raymondi (Raymond's Trophon)



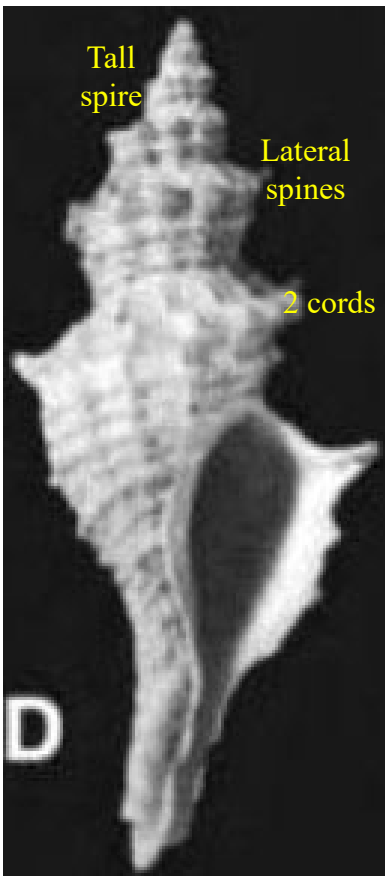
Description
The body whorl of this small white snail is highly constricted at the base. Spiral lirae if present are weak and do not override the axial ribs. The strong axial ribs are poorly developed on the concave, tabulate shoulder but form numerous (11-14 on final whorl) strong, sharp laterally directed spines at the shoulder. The aperture is somewhat wide but is shorter than the long, straight canal. Height to 3.5 cm.

Similar species
Formerly known as *Boreotrophon raymondi*. *Boreotrophon tripherus* has smaller shoulder spines, a longer spire, and more numerous axial ribs. *Scabrotrophon stuarti* and *Scabrotrophon grovesi* have much larger, ornate spines or blade-like vertices.

Distribution
British Columbia to southern California, 80-500 m.

Snails

Scabrotrophon grovesi (Grove's Spiny Trophon)

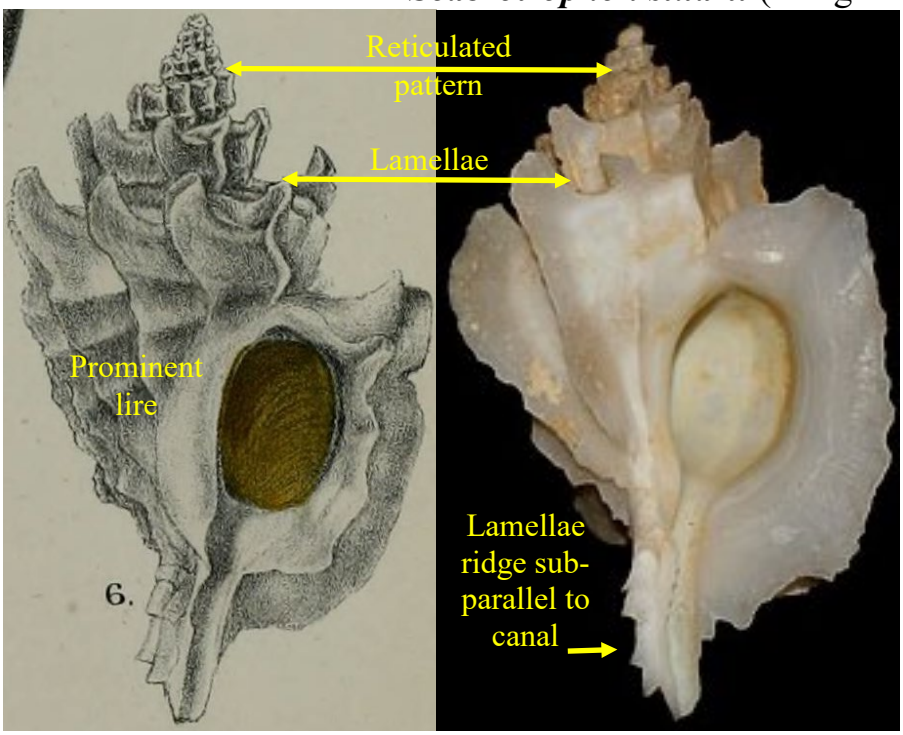


Description
This small white snail has a high spire of 5 relatively wide whorls. There are 2 strong cords (ridge-like spiral sculptures) on the whorls the upper cord being strongest. The upper cord develops open laterally directed spines by the 3rd whorl. The body has a strong shoulder cord and 5-7 additional cords. The open canal has 5 weak cords and is about the same length as the aperture. Height to about 3 cm.

Similar species
Several species of *Scabrotrophon* occur off the U.S. West Coast most are too small to be captured NMFS trawls.

Distribution
Southern California, 70-590 m.

Scabrotrophon stuarti (Winged Trophon)



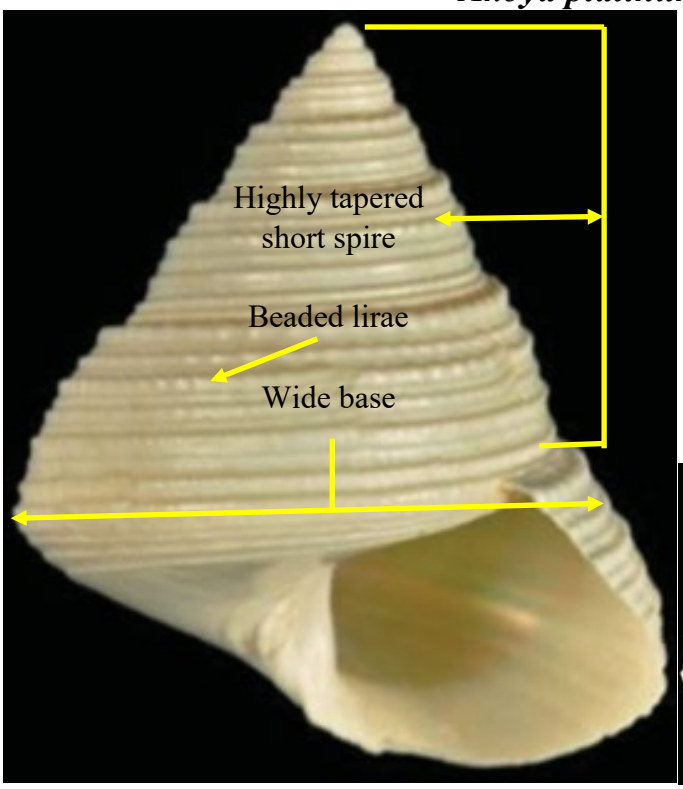
Description
This white snail has thin lamellae. Above the angle of the whorls the lamellae extend upwards and curve to the right. The lirae on the spire become more prominent on each whorl anteriorly and form a reticulated pattern with the lamellae. The lamellae become layered upon each other on the lower part of the shell forming a ridge running sub-parallel with the canal.

Similar species
Formerly known as *Boreotrophon stuarti*. The ornate lamellae distinguish *Scabrotrophon stuarti* from similar species.

Distribution
The Pribilof Islands to southern California, intertidal to 500 m.

Snails

Akoya platinum (Silvery Topsnail)



Description
This white/iridescent silver-green snail has a thin wide, conical shell with a short highly tapered spire. The many prominent and often beaded lirae found on juveniles become smoother with age. Height to 3.5 cm.

Similar species
Formerly known as *Calliostoma platinum* and along with *Calliostoma titanium* are now considered synonyms. The small size and greatly tapering shape should distinguish this snail.

Distribution
Gulf of Alaska to Baja California, 100-800 m.

Daphnella cortezi

Description
This tall, dark tan to brown, slender snail has both axial and spiral sculptures on the early whorls. The axial ribs are strong on the earlier whorls but give way to the spiral cords so that the final whorl has numerous spiral lirae of various strength and spacing. The 5-7 rounded whorls form a long slender spire. The long aperture has a flared lip of uneven thickness. Height to 7 cm

Similar species
Fusinus barbarensis has axial ridges on all whorls, *Colus griseus* only grows to 3 cm and has a shorter siphonal canal.

Distribution
Southern California, 0-150 m.

Snails

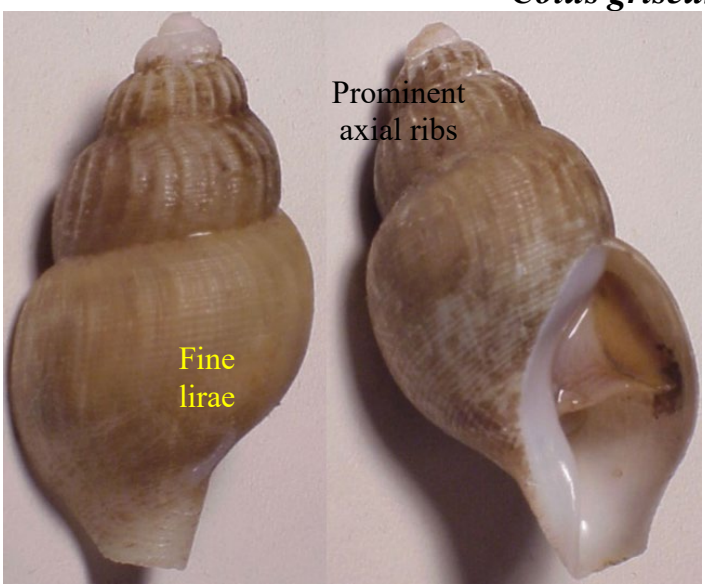
Exilioidea rectirostris

Description
This outer shell of this small white snail usually has a light brown mid-whorl band. The inner shell is white. The dark yellow brown periostracum gets lighter across the base. The 6 inflated, rounded whorls taper to a somewhat tall spire with the apex usually eroded off in adults. The whorls have numerous, strong, curved axial ribs (becoming obsolete on the later whorls on the dorsal side of mature shell) and fine raised spiral lirae. The aperture is small (less than half the shell length) and the canal is long. Height to 3 cm.
Similar species
Exilioidea kelseyi has slender whorls, a shorter canal, and a darker periostracum.
Distribution
Southeastern Alaska to Baja California, 60-800 m.

Exilioidea kelseyi

Description
This outer shell of this cream colored snail usually has a light brown mid-whorl band and a dark grayish brown periostracum. The inner shell is white. The 7 slender whorls taper to a somewhat tall spire with the apex usually eroded off in adults. The whorls have numerous, strong, curved axial ribs (becoming obsolete on the later whorls on the dorsal side of mature shell) and fine raised spiral lirae. The aperture is small (less than half the shell length) and the canal is of moderate length. Height to 3 cm.
Similar species
Exilioidea rectirostris has rounded and more inflated whorls, a longer canal, and a lighter periostracum.
Distribution
British Columbia to southern California, 50-200 m.

Colus griseus (Gray Whelk)



Description
This whitish snail has a green or brown periostracum. The shell has a raised spire and less than 8 rounded whorls that have both axial and spiral structures. There are 23-28 low, broad axial ribs that extend onto the body whorl but become increasingly faint on the anterior half. The outer lip of the aperture has a concave curve where it meets the short (less than half the aperture length) canal. Height to 3 cm.
Similar species
Formally known as *Plicifusus griseus* is now considered a synonym. Other *Buccinum* and *Colus* spp. lack axial ribs.
Distribution
Bering Sea to southern California, 800 m and below.

Snails

Aulacofusus trophius (Ribbed Whelk)

Description
This short white snail has a thin olivaceous brown periostracum. The 5 well rounded whorls have an eroded apex and a distinct but unadorned suture. The axial ribs appear as faint lines. The sharp, narrow spiral lirae are separated by somewhat wider flat interspaces which, on the last whorl, are also divided by a shallow median groove. This pattern is more or less uniform over the entire surface. The wide, simple, white, aperture has a thin, slightly reflected lip and a short canal. Height to 3.5 cm.

Similar species
Formerly known as *Colus trophius*. *Latisipho tahwitanus* has inflated whorls, making the shell wide with fine axial ribs. *Buccinum strigillatum* has inflated whorls, a wider aperture, an oval operculum, and a short siphonal canal.

Distribution
Bering Sea to southern California, 800-1500 m.

Latisipho tahwitanus (Tahwitan Whelk)

Description
This small white tan snail has a dull olivaceous brown to brow periostracum. There are about 6 well rounded whorls (apex usually eroded) with a deep suture. The spiral lirae (appear as fine grooves with wider flat interspaces) are distributed equally over the whole shell. The fine axial ribs show as somewhat curved lines especially on the body whorl. The simple aperture has a thin outer lip and the recurved canal is very short. Height to 3 cm.

Similar species
Formerly known as *Colus tahwitanus*. The inflated, wide whorls, fine spiral and axial ribs distinguish this from the other species in this guide.

Distribution
Southeastern Alaska to Oregon, 150-400 m.

Snails

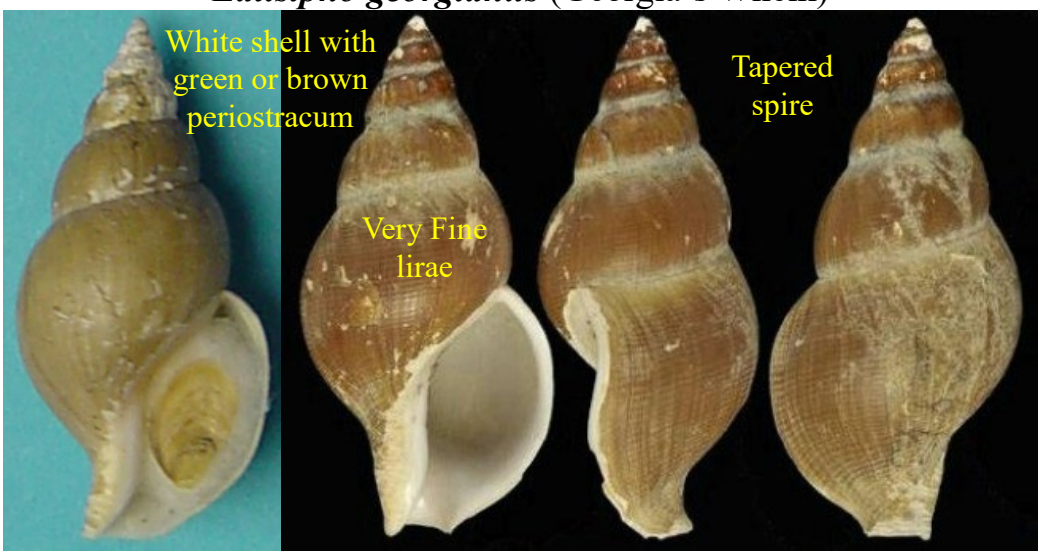
Latisipho aphelus (Oblique Whelk)

Description
This small white snail with a thin greenish gray to green periostracum. The 6 smooth, well rounded whorls have a distinct but not deep or channeled suture. The whorls are marked with faint axial and a few obscure spiral lines. The moderate aperture has a thin outer lip and a short, wide, well defined and recurved canal. Height to 3 cm.

Similar species
Formerly known as *Colus aphelus*. *Latisipho georgianus* has numerous fine lirae (spiral striations) and a more tapered spire. Other *Colus* spp. have spiral or axial ribs.

Distribution
Bering Sea to northern California, 400 m and below.

Latisipho georgianus (Georgia's Whelk)



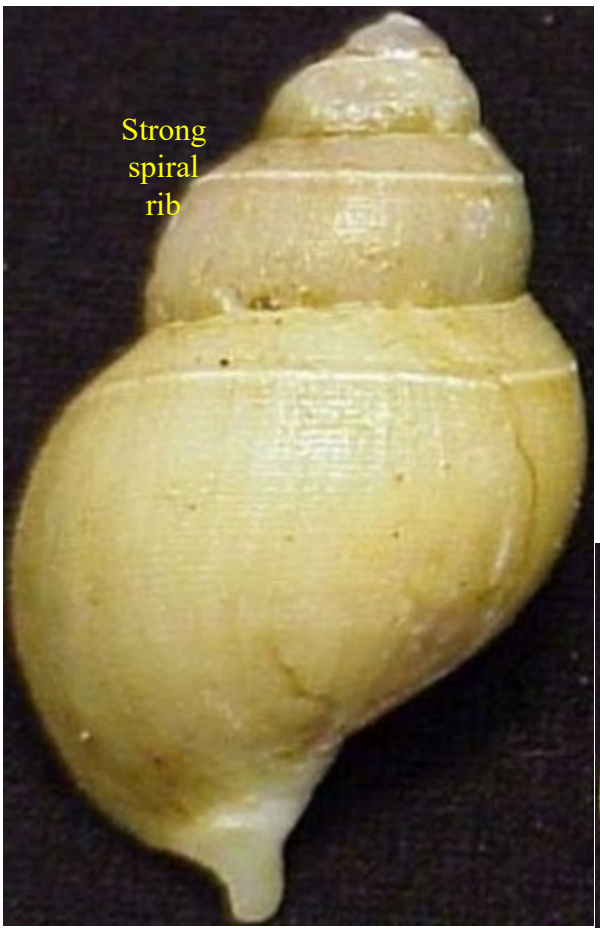
Description
This shell of this small white snail varies from moderately thick and solid to thin and fragile. The whorls range from slightly, to strongly convex with a tight dark brown, olive, greenish gray or yellowish gray periostracum. The numerous spiral lirae are uniform over the whole shell and are separated by spaces of various widths. The axial ribs appear as incremental lines. The moderate aperture has a short, usually straight (may be bent to the left) canal. Height to 3.5 cm.

Similar species
Formerly known as *Colus georgianus*. Similar species are not as tapered and the spiral lirae and axial ribs if present are different.

Distribution
Kurile Islands to central California, 2-1112 m.

Snails

Buccinum viridum (Turban Whelk)

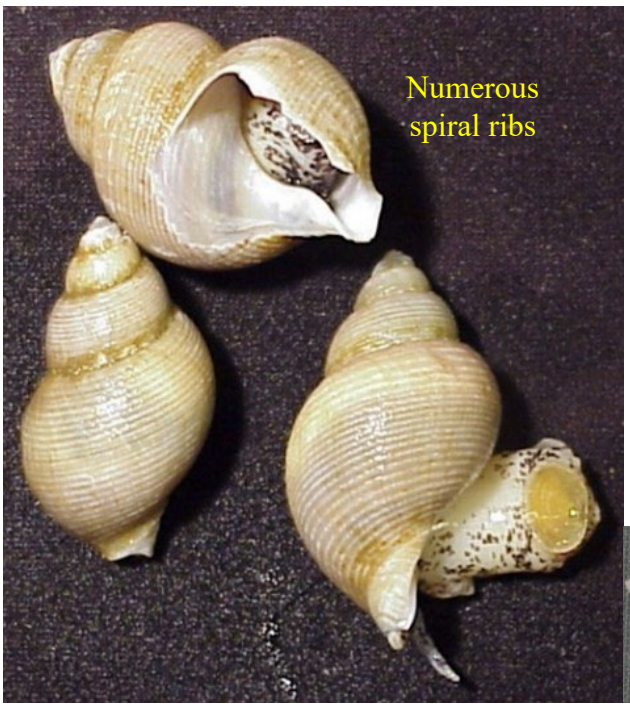


Description
This small white, yellow or beige snail has thin shell with a thin olive brown periostracum. The inflated whorls have a somewhat rounded shoulder and are separated by a deep suture. The spiral lirae are thin and closely spaced below the shoulders where there is a single strong spiral lirae. The axial ribs appear as fine weakly recurved lines. The large ovate aperture has a thin outer lip and a short wide canal. Height to 4.5 cm.

Similar species
The single spiral rib distinguishes *Buccinum viridum* from similar species.

Distribution
Bering Sea to central California, subtidal to 757 m.

Buccinum strigillatum (Striated Whelk)



Description
This small, solid chalky white snail has 7 rounded whorls separated by a deep suture. The shell has a pale to dark brown, hairy epidermis. There are numerous narrow spiral lirae separated by spaces of various width spread evenly over the whole shell. The wide white aperture has an expanded and thickened outer lip. The short, wide canal is somewhat recurved. Height to 4 cm.

Similar species
Colus trophius is elongate with a longer siphonal canal.

Distribution
Gulf of Alaska to Baja California, 75-1000 m possibly deeper.

Snails

Antiplanes catalinae (Left-handed Turrid)

Description
This small snail is coiled sinisterly or counterclockwise. The brown, spindle-shaped shell often has a white spiral band. The 8-10 evenly rounded whorls have fine spiral lirae and axial ribs that show as fine lines. The long spire is highly tapered. Height to 6 cm.

Similar species
Previously known as *Antiplanes perversa* is now considered a synonym. *Antiplanes* sp. A is broader (inflated) smaller, has a heavier shell and a green periostracum.

Distribution
Alaska to California, 90-300 m

Antiplanes **sp. A** (Green Left-handed Turrid)

Description
This small white snail has 8-11 evenly rounded counterclockwise whorls and a long highly tapered spire. The whorls have fine spiral lirae and axial ribs that show as fine lines. The light olive green to green periostracum often has a thin darker line mid-whorl. The small U-shaped aperture gives way to a short canal. Height to 4 cm.

Similar species
Antiplanes catalinae is larger, narrower (less inflated), thinner shelled and lacks the green periostracum.

Distribution
Washington to central California, 300-800 m.

Snails

Fusitriton oregonensis (Oregon Triton)

Description
This relatively large light brown snail has 6 distinct, rounded whorls separated by well-developed sutures and covered with a heavy, hairy brown periostracum. The whorls have distinct spiral lirae that overlay the axial ribs forming a node at the intersection forming a checkered pattern. The moderate aperture has a somewhat rounded outer lip. The well-developed fully open canal is about a third the length of the aperture. Height to 15 cm.

Similar species
The bristly periostracum distinguishes it from similar species.

Distribution
Bering Sea to southern California, 2-200 m.

Nassarius fossatus (Channeled Basket Shell)

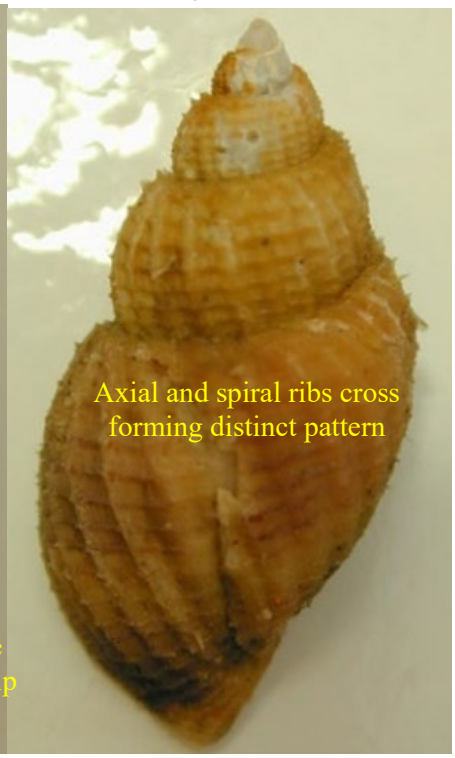
Description
This small white to whitish brown with dark brown bands under a closely adherent periostracum. The evenly rounded whorls form a tapered spire. The spiral lirae and axial ribs are of equal strength and produce fine even cancellations giving the shell a beaded, basket like texture. The aperture has a deep notch but no discernable canal and a highly lirate outer lip. Height to 4.5 cm.

Similar species
The deep notch distinguishes *Nassarius* from similar genera.

Distribution
SE Alaska to California, 0-100 m.

Snails

Cancellaria crawfordiana (Crawford's Nutmeg)



Description
This relatively small cream colored snail has a fuzzy brown periostracum. The upper part of the rounded whorls is slightly tabulate. The strong axial ribs extend to the canal and are crossed by narrow spiral lirae that override the axial ribs and form a node at the intersection. The outer lip of the long aperture is highly lirate and the canal is short. Height to about 5 cm.

Similar species
Cancellaria cooperi lacks spiral ribs, the uniformly brown periostracum, and has angular knobs of the whorls.

Distribution
Oregon to Baja California, 50-400 m.

Cancellaria cooperi (Cooper's Nutmeg)

Description
This high spired yellow brown to orange brown snail has low dark brown spiral lirae of varying strength and spacing. The wide axial ribs form projecting nodes at, but do not cross the slightly concave shoulder. The long, wide aperture has a slightly lirate outer lip, a short canal, and the snail lacks an operculum. Height to 10 cm.

Similar species
The distinct shape and color pattern distinguish *Cancellaria cooperi* from other similar species.

Distribution
Monterey Bay to Baja California, 15-280 m.

Snails

Megasurcula carpenteriana (Carpenter's Turrid)

Description
The shell is broadly fusiform with a long, acute spire and small knobs on the shoulder. There are about 8 whorls that are somewhat concave above the distinct suture and convex below. The light orange shell has numerous dark reddish brown spiral lines of various strength and spacing that become very concentrated near the sutures, appearing almost as a thick solid band. The spiral lirae appear as somewhat fine lines. The axial ribs appear as fine lines that follow the curvature of the outer lip. The long (as long as or longer than the aperture), narrow aperture becomes proportionately wider with age and has an acute outer lip. The moderate canal is slightly twisted. Height to 11 cm.

Similar species
Cancellaria cooperi has larger angular knobs, axial ribs and a wider aperture. *Megasurcula stearnsiana* is smaller and has broader brown spiral bands.

Distribution
Central California to Baja California, 15-300 m.

Megasurcula stearnsiana (Stearns's Turrid)

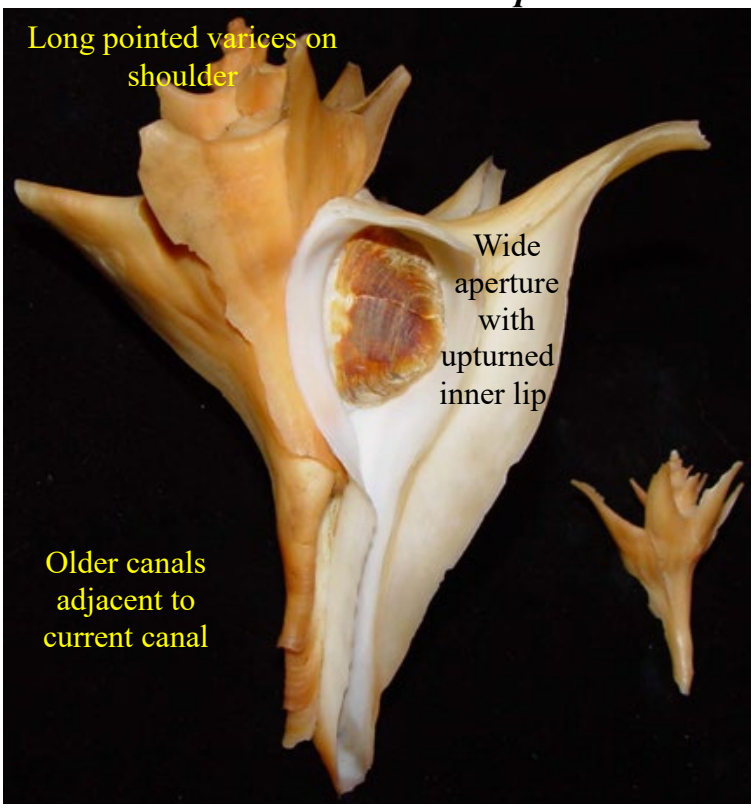
Description
The shell is broadly fusiform with an acute spire. There are about 9 whorls that are somewhat concave above the distinct suture and convex below. The cream to orange shell has a wide brown spiral band below the suture, followed by 9-10 narrow but clearly defined bands that are about as wide as the interspace on the body whorl, with 1-2 visible on the spire. The interior of the long (longer than spire), narrow aperture is yellowish with dark brown spots on the acute outer lip due to the dark bands. The first 2 whorls are smooth with the later whorls having numerous spiral lirae. The axial ribs appear as lines that follow the curvature of the outer lip. Height to 6 cm.

Similar species
Megasurcula carpenteriana shell has thinner brown spiral bands and small angular knobs on the whorls.

Distribution
Central California to Baja California, 15-200 m.

Snails

Austrotrophon catalinensis (Catalina Forreria)

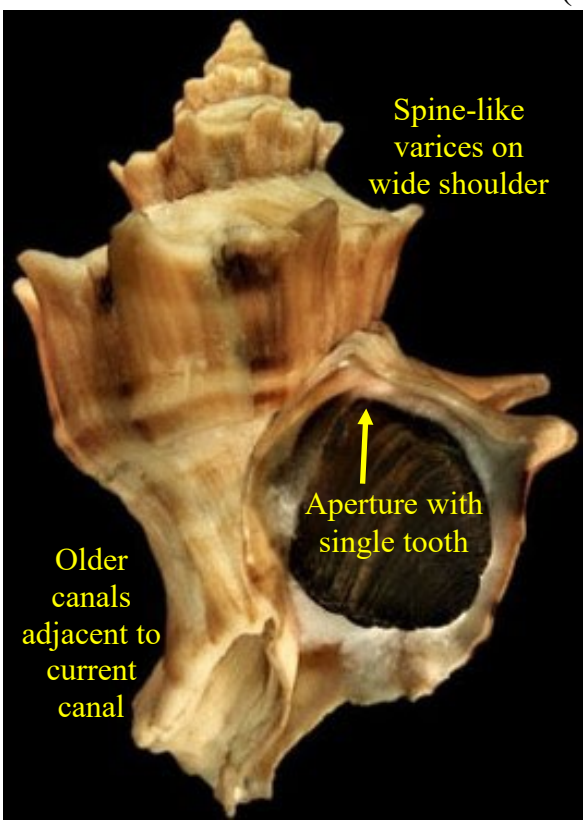


Description
The fragile light brown shell often has darker axial markings and faint spiral bands. Each whorl has 6-7 sharp, projecting and upturned varices (elevated axial ridges) appearing as spines on the shoulder, and a somewhat low spire. The wide, white aperture has a raised inner lip. The long, open canal is nearly straight or twisted to the left, often with older canals adjacent to the current canal. Height to 10 cm.

Similar species
Forreria belcheri has a heavier shell, more spines on wide shoulders and a prominent spine on the lip.

Distribution
Southern California to Baja California, 40-180 m.

Forreria belcheri (Giant Forreria, Belcher's Chorus Shell)



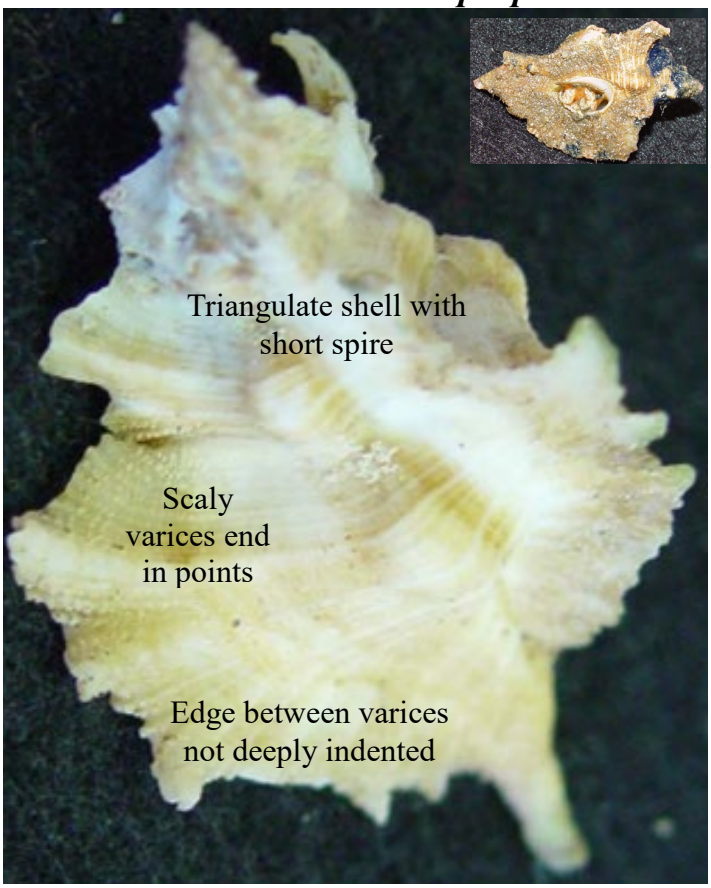
Description
This cream to tan species has light and dark bands around the large, heavy shell. The inner shell is white. The 5-7 whorls have 10-12 large spine-like varices (elevated axial ridges) appearing as spines on the wide shoulder, and a low to moderate spire. The large aperture has a thin outer lip with a single large tooth at the lower end. The twisted and upturned open canal has older canals immediately adjacent to the current canal. Height to 19 cm.

Similar species
Austrotrophon catalinensis has a fragile shell, fewer spines on the shoulders and lacks the tooth on the lip.

Distribution
Central California to Baja California, intertidal to 46 m.

Snails

Pteropurpura vokesae (Wrinkle-wing Murex)



Description
The white, elongate and somewhat triangular shell consists of about 7 whorls with a narrow shoulder. The axial sculptures are beside the 3 varices (elevated axial ridges). There is a recurved, axial ridge between the varices. There are also about 6 major and about 6 minor spiral ridges as well as numerous small, extremely scaly, fine spiral ridges (most noticeable on the dorsal surface) on the last varix that extends almost to the end of the closed canal. Height to approximately 7 cm.

Similar species
Pteropurpura macroptera has scalloped varices and beaded spiral ribs.

Distribution
Southern California to Baja California, 20-100 m.

Pteropurpura macroptera (Frill-wing Murex)

Description
The shell consists of 8-9 whorls. The color varies from purplish brown with minute pale mottling, to tan with somewhat darker broad spiral bands, to all white or brown with white bands. The surface has obsolete, flat spiral threads that are more prominent on the dorsal surface and sometimes showing minute spiral striations. The flat varices form 5-6 non-recurved projecting points separated by moderate indentations, giving the edge a scalloped appearance. The thickened, ovate aperture has a projecting yellowish margin. The interior has about 6 nodular denticles on the anterior two thirds of the outer lip. The long totally closed canal is sharply curved to the right. Height to 7cm.

Similar species
Pteropurpura vokesae has highly scaled varices with little to no indentation between, and a roughly triangulate shell.

Distribution
Southern California to Baja California, 20-100 m.

Snails

Crossata californica (California Frogsnail)

Description
The thick heavy shell of this medium to large snail consists of 6 whorls. The body whorls have multiple spiral bands of tubercles and multiple blunt peripheral knobs. The white aperture is longer than the spire and has anterior and posterior canals of similar length. The outer lip has a protruding varix that is not aligned with those of the body, and groups of denticles along the inner edge. The expanded inner lip stands out against the body whorl. The 10-16 lire that cross the inner portion of the inner lip give it, and the columella a corrugated appearance. In life the cream shell has spiral brown lines of various strength and spacing. However, the shell color is masked by variously colored algae growing on and impregnating the shell. Length to 15 cm.

Similar species
Kelletia kelletii shell is elongate has rounded knobs, and is less colorful.

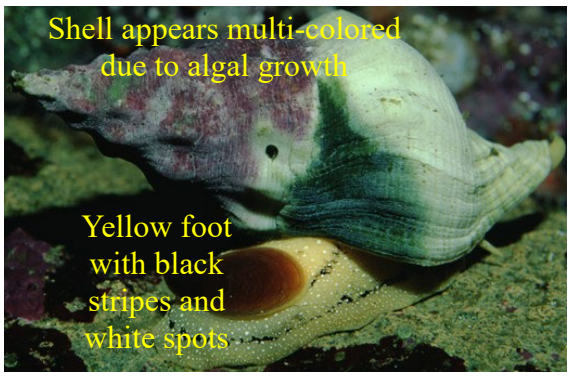
Distribution
Central California to Baja California, 1-80 m.

Kelletia kelletii (Kellet's Welk)

Description
The large, heavy, elongate spiral shell has rounded knobs. The shell color is white with fine brown spiral lines of various strengths and spacing. However, this coloration is masked in older snails by variously colored algae growing on and impregnating the shell. The mantle and foot are yellow. The foot also has black stripes and white spots.
Length to 18 cm.

Similar species
Crossata californica is less elongate and the knobs are more pointed.

Distribution
Monterey Bay to Baja California, 0-70 m.



Snails

Calinaticina oldroydii (Oldroyd's Moonsnail)

Description
This relatively large, thin shell consists of 4 whorls with a slightly elevated spire. The deep, narrow umbilicus is partially obscured by the partially reflected thin parietal wall. The spiral lirae appear as fine lines. The axial sculptures appear as growth increments. The light brown shell has a thin brown periostracum that becomes shaggy inside the umbilicus. The foot can be massive, much larger than the shell. Height to 7 cm.

Similar species
Euspira lewisii has a thick callus near the umbilicus.

Distribution
British Columbia to Baja California, 30-400 m.

Euspira lewisii

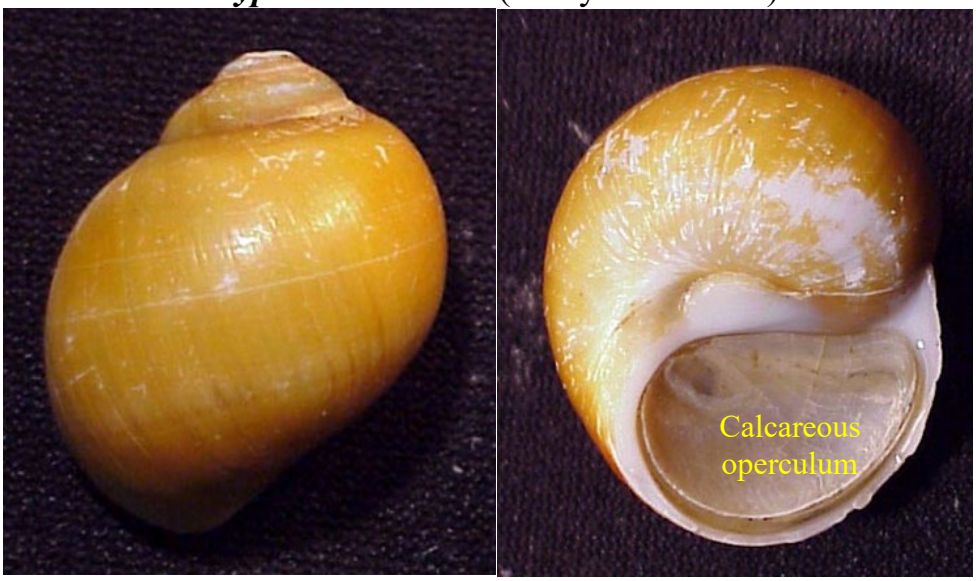
Description
This relatively large, thin shell consists of 5-6 whorls (the body whorl comprises the bulk of the animal) with a slightly elevated spire. The deep, narrow umbilicus is partially obscured by the large shiny callus on the inner lip of the aperture that spreads out onto the body whorl. The outer shell color varies from cream to pinkish, beige or yellow brown, the inner shell is not pearly. The diameter and height are nearly equal, with both approaching 15 cm.

Similar species
Calinaticina oldroydii has a thinner shell and lacks a distinct callus.

Distribution
Southeast Alaska to Baja California, 0-100 m.

Snails

Cryptonatica russa (Rusty Moonsnail)



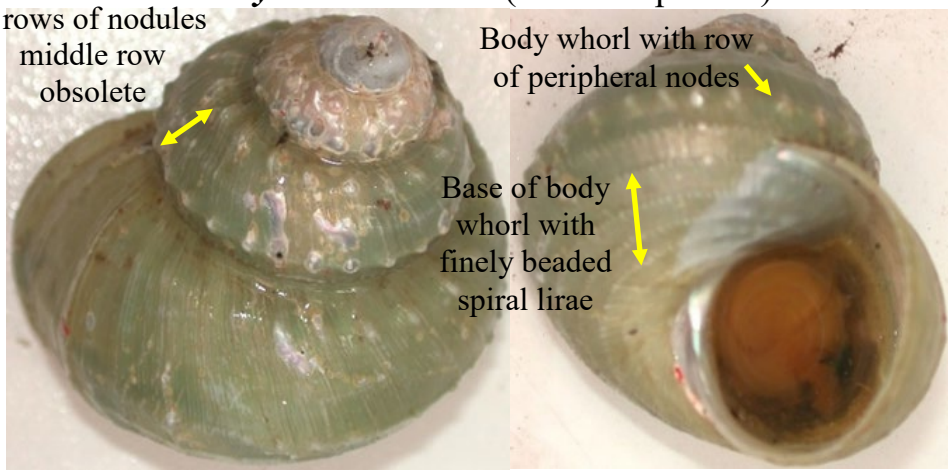
Description
The rusty orange shell consists of about 3 fully round smooth whorls but has no umbilicus. The spiral lirae and axial ribs appearing as faint lines. This snail has a hard, calcified operculum. Diameter to 4 cm.
Similar species
The calcified operculum should distinguish it from other moonsnails.
Distribution
Bering Sea to Catalina Island, 50-400 m.

Solariella nuda (Naked Solarelle)

Description
This small, polished, turbinate shell of about 4 whorls appears smooth except for the obscure spiral markings that do not mar the surface. The rounded whorls flatten in front of the suture. The white shell has various shades of pink and blue nacre showing through. Diameter to 2.5 cm.
Similar species
Not likely to be confused with other species
Distribution
Alaska to Mexico, 400 m and below.

Snails

Bathybembix bairdii (Green Top Snail)



Description
The shell of this green snail consists of about 4 rounded whorls separated by a distinct suture. On the early whorls the spiral lirae appear as 3 rows of nodules connected by fine axial ribs, on later whorls the middle row may be obsolete. The final whorl has a row of prominent peripheral nodes. The spiral lirae on the base of the body appear as several finely beaded lines. The inside of the shell is a nacreous (lustrous, pearly) white. The umbilicus is closed on adult shells. Height to 5 cm.
Similar species
The shell shape and pustules should distinguish this species.
Distribution
British Columbia to Mexico, 300-1400 m.

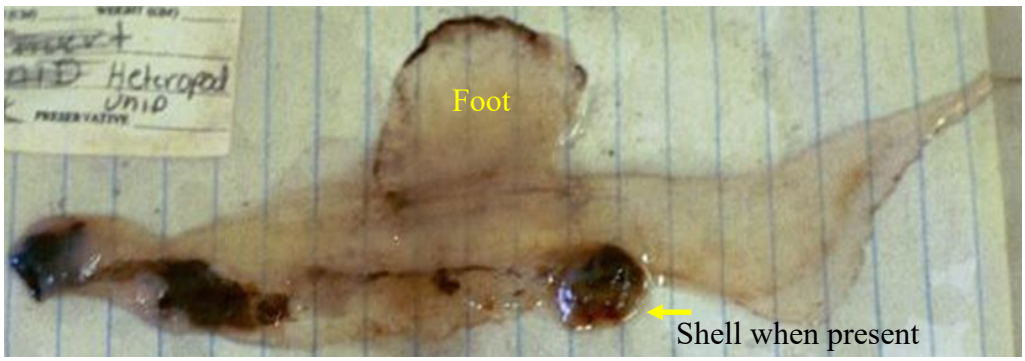
Nucella lamellosa (Frilled Dogwinkle, Wrinkled Purple)

Description
This snail has a strong but not highly polished shell, a horny operculum and a well-developed spire with 7 or fewer whorls. Each whorl has 1-2 prominent spiral ridges which are flattened near the sutures making them appear angled. There is a short siphonal canal or notch but no anal notch. Height to 5 cm and length to 10 cm.
Similar species
A true chameleon that varies widely in shape, size, color and color pattern. They can be long and narrow to short and stout. Shells can be smooth, have frills (axial lamellae) and/or spiral bands. Calm water specimens can be highly sculptured with large frilly lamellae while moving water specimens can be nearly smooth. Color can be any combination of white, orange, brown, to purple with any combination of spots, blotches and bands.
Distribution
The Bering Strait to central California, low to mid intertidal.

Pelagic Gastropods

The classifications Heteropoda and Pteropoda are invalid. Under the class Gastropoda the former Pteropoda are in the order Thecosomata and the former Heteropoda in the order Neotaenioglossa and the family Carinariidae. Pelagic gastropods have reduced or absent shells. They swim upside down using the undulating foot for propulsion. Heteropods and Pteropods are very similar. However, differences that distinguish the two orders are based on differences in gill and shell structure that are difficult to recognize in the field.

Carinaria cristata

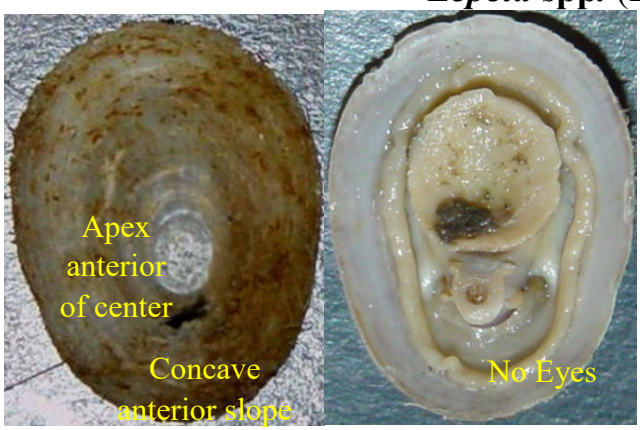


Description
This large, transparent brown to pale blue pelagic gastropod has a small brown conical shell (often lost during capture). Length to 15 cm.
Similar species
Differences between the numerous species in the Northeast Pacific are slight making identification problematic.
Distribution
North Pacific, pelagic.

Limpets

Limpets are a group of mainly marine snails that have a conical (patelliform) shell and strong muscular foot. Although members of the Gastropoda they are polyphyletic (multiple groups that descended independently from different ancestors). Limpets are members of an ancient marine clad, among the many families within this clad are the Lepetidae (Blind Limpets), Patellidae (True Limpets) and Fissurellidae (Keyhole Limpets) that belong to the Patellogastropoda, Vetigastropoda and the Siphonariidae (False Limpets which use a siphon to pump water over their gills) respectively. The name Limpet is used to describe many distantly related groups of marine and freshwater snails not just the true limpets but to all snails that have a simple broadly conical shell that is not or appears not to be coiled in adults.

***Lepeta* spp.** (Lepetidae, Blind Limpets)



Description
This apex of this usually white, somewhat oblong, conical shell is anterior of center with a horseshoe shaped opening and a concave anterior slope. The axial lines are crossed by concentric lines. The eyes and nuchal cavity gill are absent. Length to 2 cm.
Similar species
External differences amongst the genera and species of Lepetidae are slight making field identification problematic.
Distribution
Alaska to Mexico, 100 m and below.

Limpets

Puncturella rothi (Fissurellidae, Keyhole Limpets)

Description
The relatively thin elongate oval shell is narrower anteriorly with distinctly compressed and nearly parallel sides. The anterior slope is slightly convex and the posterior slope slightly concave. The long, narrow foramen (opening) is constricted in the middle and narrows and tapers anteriorly (keyhole shaped). There are approximately 30 strong, beaded, radial ribs originating near the apex with smaller, beaded, secondary ridges filling the spaces. The axial ribs give the shell edge a crenulated (irregularly wavy or serrate) appearance.
Diameter to approximately 2 cm.
Similar species
External differences amongst the genera and species of Fissurellidae are slight making field identification problematic.
Distribution
Bering Sea to California, 283-521 m.

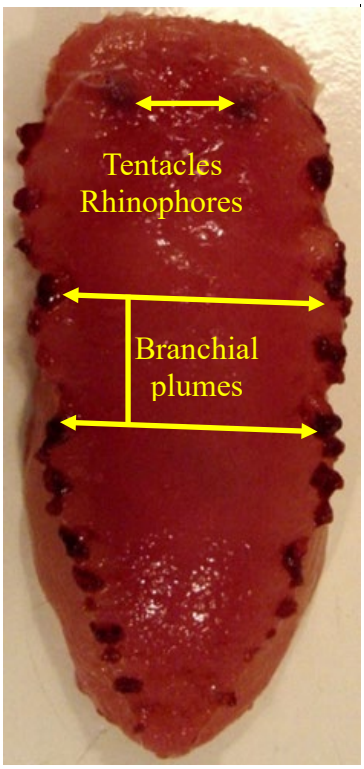
Nudibranchs and Sea Slugs

The common name Sea Slug is used to describe a wide range of marine invertebrates that have some resemblance to terrestrial slugs. Most are however marine gastropods or sea snails that have evolved to where they have completely lost or due to the shell being greatly reduced and/or internalized appear to have lost their shell. Sea slugs vary greatly in size, color and body shape. Most are translucent but many species are highly colored which can be a warning to predators. Like all gastropods, they have small sharp teeth called radula, and most have a pair of rhinophores or sensory tentacles used primarily for smell on their head with a small eye at the base. Many also have horn or spike shaped projections (cerata) on their backs which increase surface area and aid in respiration.
As a group the nudibranchs are soft bodied marine molluscs that shed their shells after the larval stage. Often referred to as “Sea Slugs” they are a family of the opistobranchs. Many species of “Sea Slugs” belong to different distantly related taxonomic groups which are confused with nudibranchs. Most species nudibranchs are marine and occur at a wide range of depths, from intertidal to over 700 m worldwide. However, a few species can be found in brackish environments. Mainly benthic animals, a few neustonic species are found floating upside down just under the surface and pelagic species which swim in the water column. Body forms vary greatly. However, unlike most other gastropods, nudibranchs exhibit bilateral symmetry externally but not internally. Nudibranchs are commonly divided into two main groups, dorid and aeolid (also known as eolid). Dorid nudibranchs have branchial or gill plumes that form clusters on the back and the fringes on the mantle. Aeolids have cerata (horn or spike shaped outgrowths) across the dorsal surface to increase surface area and aide in respiration instead of a branchial plume.

Nudibranchs

Nudibranch Characteristics and Terminology

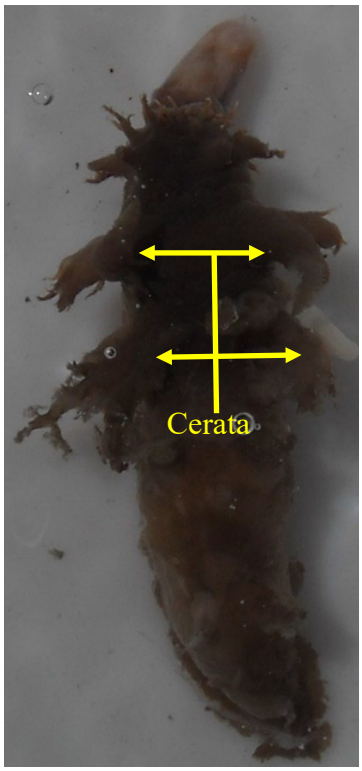
Dorid Nudibranch



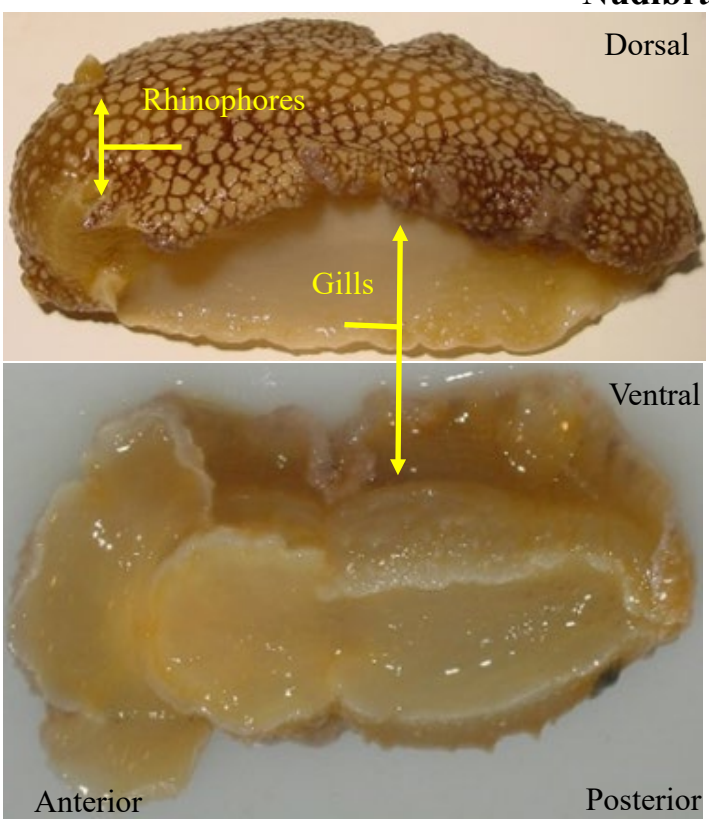
Anterior

Posterior

Aeolid Nudibranch



Nudibranch sp. A



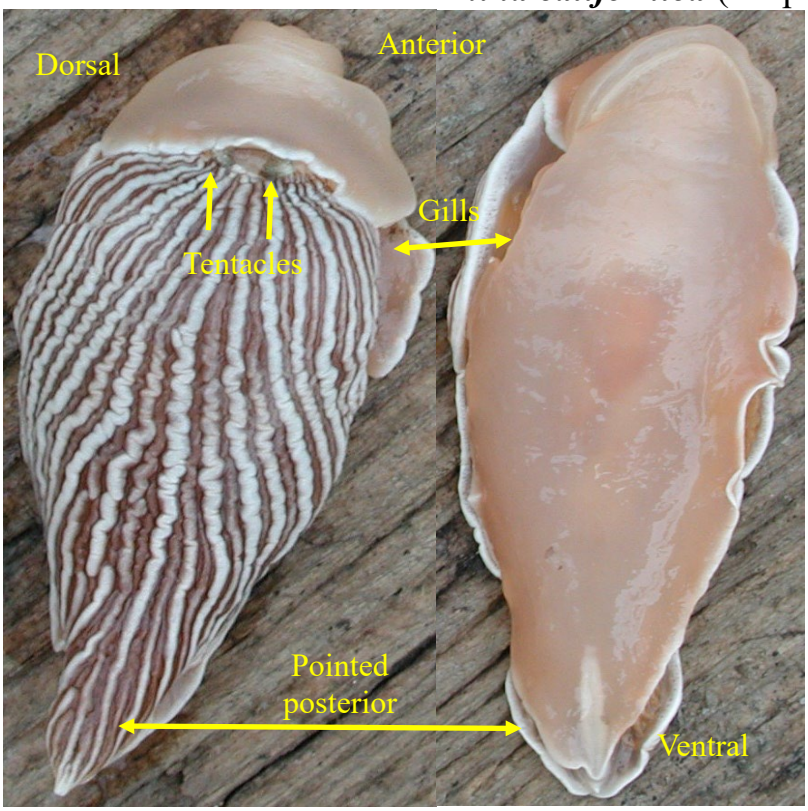
Description
This somewhat robust nudibranch is broad and flat dorsally with relatively flat vertical sides giving the animal a box-like appearance. Although it lacks cerata (horn or spike shaped out growths) or tubercles, the dorsal mottling is slightly raised giving a rough appearance when the animal contracts. The dorsal side is dark brown to yellowish brown with tan or yellowish tan mottling. The smooth lateral and ventral sides are a translucent light tan to yellowish tan. Length to 20 cm.

Similar species
Not likely to be confused with other nudibranchs in this guide.

Distribution
Central California, 200-400 m.

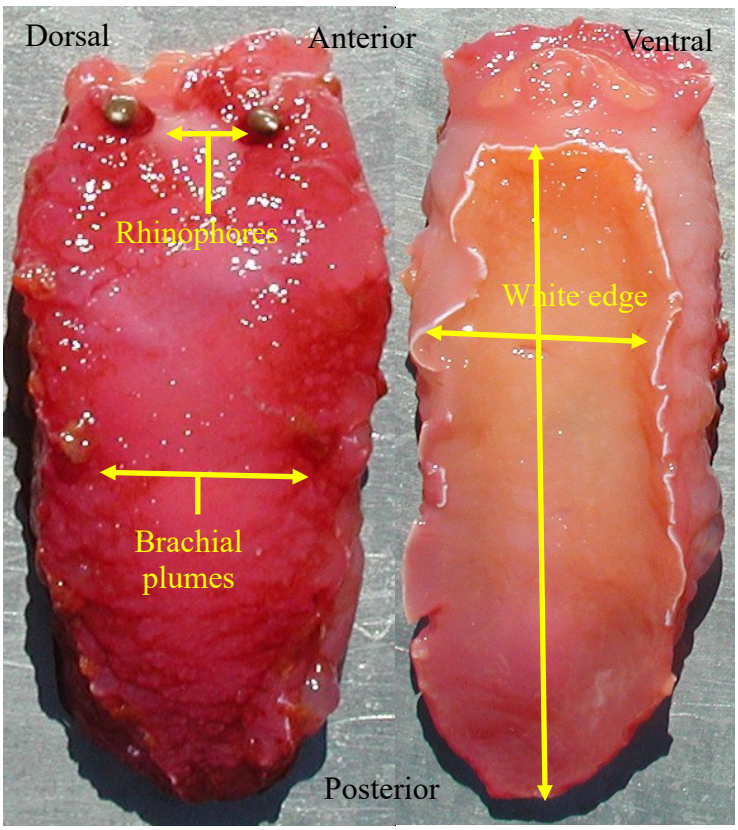
Nudibranchs

Armina californica (Striped Nudibranch)



Description
This broad, flat nudibranch tapers sharply to a pointed posterior end. The dorsal side has distinct brown and white stripes. The lateral and ventral sides are translucent light tan to pinkish tan. Length to 7 cm.
Similar species
The distinct dorsal coloration pattern distinguish this species from others in this guide.
Distribution
Alaska to Panama, 5-300 m.

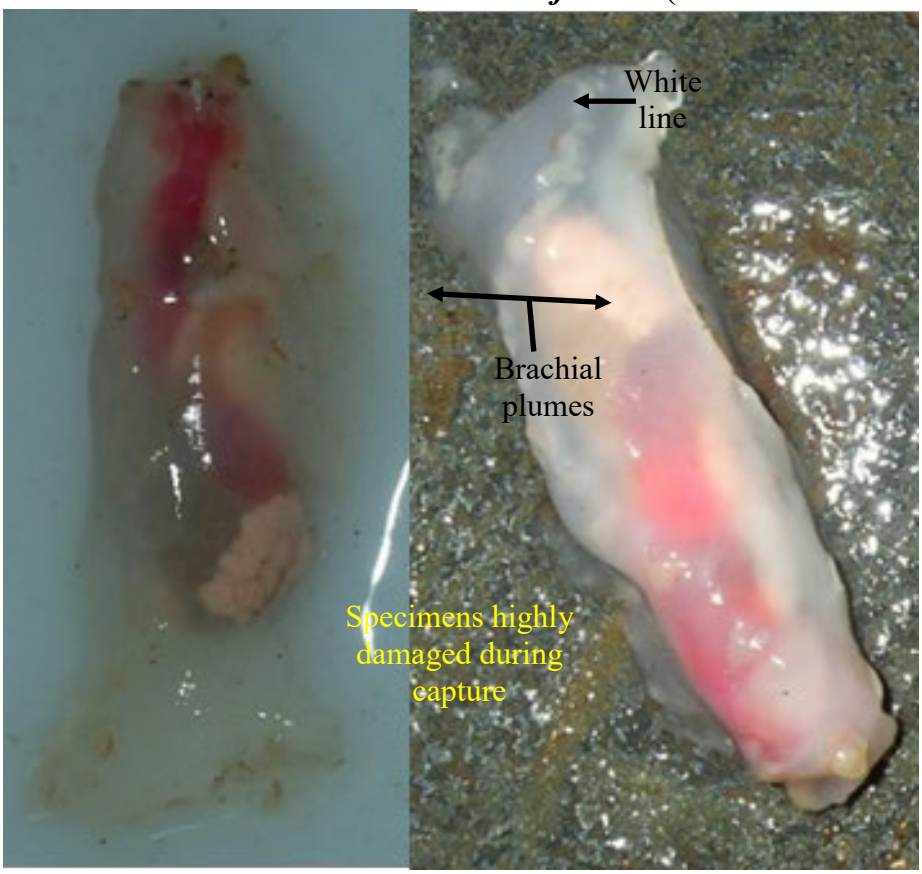
Tritonia diomedea (Rosy Tritonia)



Description
This robust nudibranch is longer than wide and wider than high. There is a row of gills along the lateral margin on each side of the dorsum. The color is variable but uniform pink, red, or purplish brown. There is no color pattern, but there can be a narrow white line along the margin of the dorsum, the margin of the foot and the edge of the rhinophore sheath. Length to 21 cm.
Similar species
The distinct dorsal coloration pattern distinguish this species from others in this guide.
Distribution
Japan through Alaska to Panama, intertidal to 656

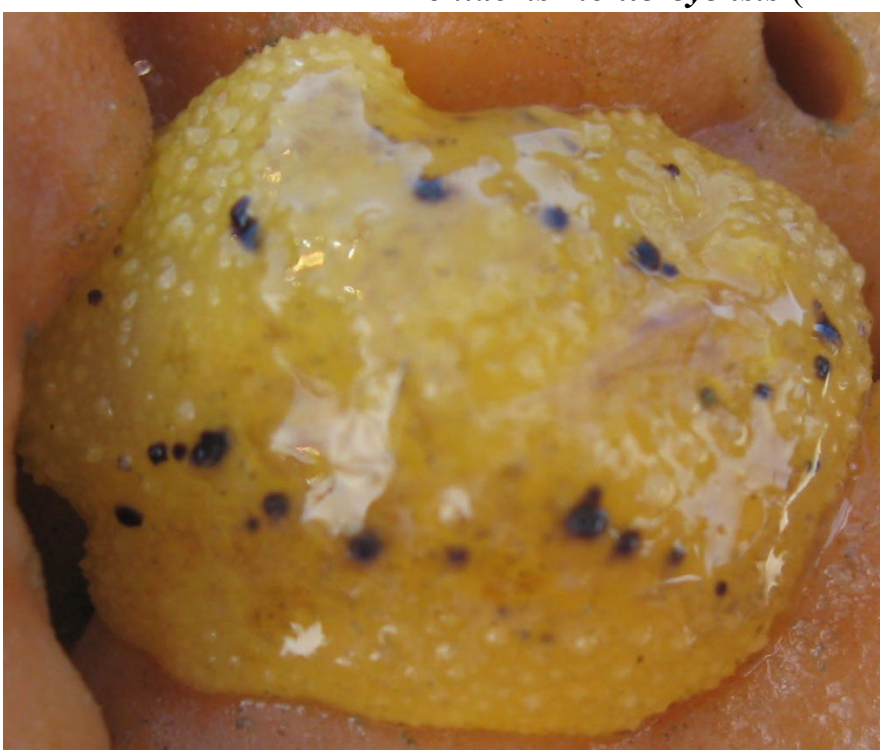
Nudibranchs

Tritonia festiva (Diamondback Tritonia)



Description
This small slender nudibranch has a row of branchial plumes along the lateral margin on each side of the dorsum. The color varies but is uniform translucent grey, white, or pale pink with a series of undulating white lines and rings on the dorsum (highly visible on undamaged specimens). Length to 4 cm.
Similar species
The distinct dorsal coloration pattern distinguish this species from others in this guide.
Distribution
Japan through Alaska to northern Baja California, sometimes intertidal but usually 10-200 m.

Archidoris montereyensis (Monterey Dorid)



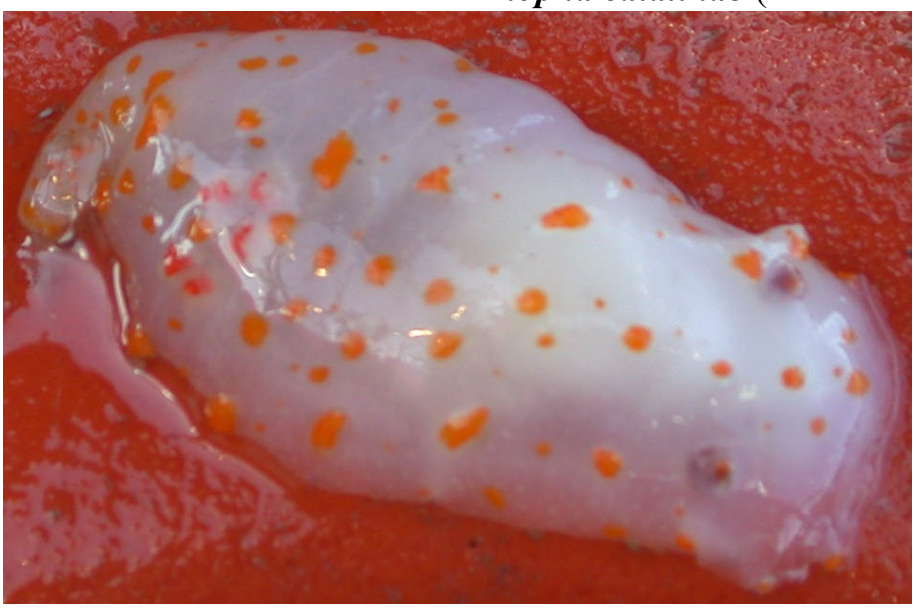
Description
This lemon yellow nudibranch has prominent tubercles on the dorsum. The rhinophores have a stout base and taper from base to tip. The dorsum has seven yellow branchial plumes and prominent tubercles. The number and pattern of the black spots on the dorsum is highly variable but the spots are between and on the tubercles. Length to 15cm but usually around 4cm.
Similar species
Other species have dark spots on or between the tubercles.
Distribution
Alaska to San Diego, intertidal to over 50 m.

Nudibranchs

Doris odhneri (White-knight Nudibranch)

Description
This elongate, somewhat elliptical, nudibranch is rather broad and somewhat highly arched. The firm dorsal surface is covered with low, round to conical, spiculate tubercles of various sizes with the larger tubercles generally near the dorsal mid-line and the smaller tubercles to the outer margins but not totally segregated. The undulating margin of the mantle is rather broad and somewhat thin. The narrow (approximately ¼ body width) ventral surface has a granular texture. The body is white often with the internal organs showing through as a light pink mass. The tips of the larger tubercles appear crusty with a distinct white color. This distinct white color also occurs on the edges of the gill plumes and rhinophores. The small tubercles along the edge of the mantle are so tightly packed they appear as pure white lines. The finer divisions of the gills are transparent with distinct white edges. Length to approximately 20 cm.
Similar species
Formerly known as *Archidoris odhneri*.
Distribution
Alaska to San Diego, intertidal to over 50 m.

Triopha catalinae (Clown Dorid)



Description
This opaque white nudibranch has an elongated shape that is flatter towards the head then farther back and has a tail like a slug. The rhinophore sheath can be smooth or bumpy with a white, cylindrical stalk. There are large conical or round orange tubercles on the dorsum and flat orange patches on the dorsum and sides. Length to 15 cm.
Similar species
Not likely to be confused with other species in this guide.
Distribution
Alaska to Baja California, intertidal to over 50 m.

Nudibranchs

Philine bakeri (Ocean Won Ton, Bubble Snails, Headshield Slugs, Paper Bubbles)

Description
This broad, flattened nudibranch has and internal shell and well developed headshield used to help burrow into sandy substrates and keep the sand from entering the mantle. The overall color varies from a creamy white to light yellowish tan. Length to 6 cm.
Similar species
The Order Cephalaspidea is a diverse group of marine gastropods (many known only from shells and/or sparse anatomical data). The nine species of interest to the WCGFBTS represent three families (Laonidae, Philinorbidae, and Philinidae) and range from Hawkins Island, Alaska through Baja, California at depths less than 1 to over 4100 m. Although some of these species are structurally distinct they are visually very similar and the methods used for positive identification are not practical in the field.
Distribution
Central California to south central Baja California, 0-100 m.

Aplysia californica (California Sea Hare)

Description
The foot of this large species has dorsal flap-like extensions (parapodia). The prominent rhinophores sort of resemble hare or rabbit ears hence the name. The gill is enclosed within the parapodia which are joined about halfway between the exhalent siphon and tail. The soft body is tan, brown or red, often mottled with light and dark areas and reticulating patterns. Often producing purple ink when disturbed. Length to 45 cm.
Similar species
Aplysia vaccaria (Black Sea Hare) has the parapodial junction immediately behind the exhalent siphon, is uniformly dark brown to black sometimes with fine white or gray markings and does not produce ink.
Distribution
Yaquina Bay, Oregon to Baja and the Gulf of California most common at depths less than 18 m.

Aplysia vaccaria (Black Sea Hare)

Description
The largest of all gastropods (up to 90 cm and 14 kg) has a firm, uniformly dark brown to black body that may have fine white to gray markings. The parapodial junction is immediately behind the exhalent siphon. Does not produce ink.
Similar Species
Aplysia californica is soft bodied and produces purple ink when disturbed.
Distribution
Central California and Channel Islands to Baja and the Gulf of California to 30 m most commonly under 18 m.

Right Gilled Sea Slugs

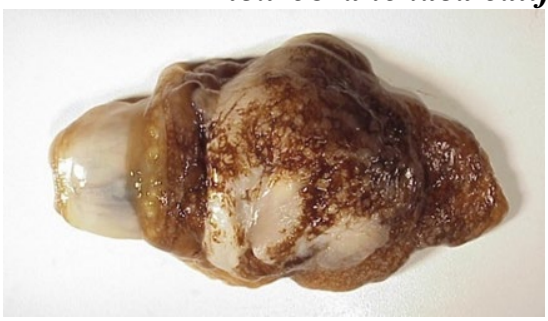
Berthella californica (White Side-gilled Slug)

Description
This translucent white, cream or orange colored animal has white spots covering the dorsum and often a white line along the dorsal border. It can be differentiated from the nudibranchs by the large gill protruding from the right side and the rhinophores protruding from under the anterior dorsal margin. Length to 5 cm.

Similar species
The large gill protruding from the right side and rhinophores originating under the anterior dorsal margin distinguish this species from others in this guide.

Distribution
Alaska to Panama and the Galapagos Islands, intertidal to over 50 m.

Pleurobranchaea californica (California Sea Slug, Side-gilled Slug)



Description
California sea slugs are medium to large pleurobranchs, with a large oral veil, a reduced mantle skirt and no shell. The broad, oral veil has sensory papillae along the anterior edge. The light brown dorsum has irregular dark brown mottling and small white/light patches. The dorsum is covered with small rounded tubercles and scatted larger tubercles that can extend to a tapered point. The large gill is visible on the right side. The broad, thick and muscular foot is rounded and bilabiate (2 parts) in front and bluntly pointed, with a large, median ventral gland at the rear. Length to 21 cm.

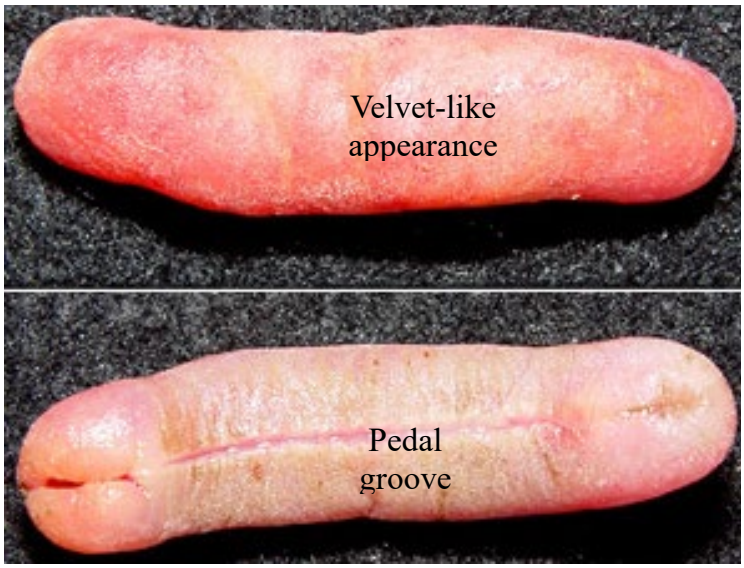
Similar Species
Not easily confused with other species in this guide.

Distribution
Oregon through California, 3-400 m.

Solenogastres
Solenogasters Aplacophorans

Solengasters/Aplacophora are a group of approximately 300 species of shell-less worm-like marine molluscs. Their distribution ranges across all oceans. Although most species occur along the continental shelf and slope, a few species occur at depths below 4000 m. Unlike other shell-less gastropods, where the shell has secondarily been lost, the solengasters are more closely aligned with more ancient molluscs which had not yet developed shells. Solengasters are generally small and are bilaterally symmetrical, the body being long and slender or short and broad. The body lacks any definitive subdivisions, making determining anterior from posterior difficult. A mid-dorsal longitudinal keel can be present. The ventral surface has a median longitudinal groove (pedal groove) which terminates at the anterior end in a concavity (pedal pit) and at the posterior end in the anus. The pedal groove contains a central ridge which is considered to be the foot. The epidermis of the pedal groove is heavily ciliated and contains several mucus glands. The animals have a tough outer skin (cuticula), reinforced with one or more layers of small calcareous spicules. When set vertically the spicules give the animal a velvet-like appearance. However, they are usually at a shallow angle or flat against the cuticula.

Neomenia spp.

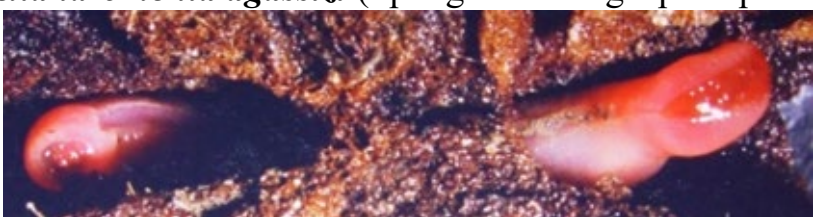


Description
Detailed description for this non-descript aplacophoran follow that given for the class. This animal is generally a uniform pink to red, but can be lighter ventrally. Length to 10 cm, diameter to 2.5 cm.

Similar species
Not easily confused with other species in this guide

Distribution
Alaska to California, 400-800 m possibly greater.

Alexandromenia agassizi (Sponge-dwelling Aplacophoran)



Description
Detailed description for this small, slender, pink to red aplacophoran follow that given for the class. Length to 5 cm.

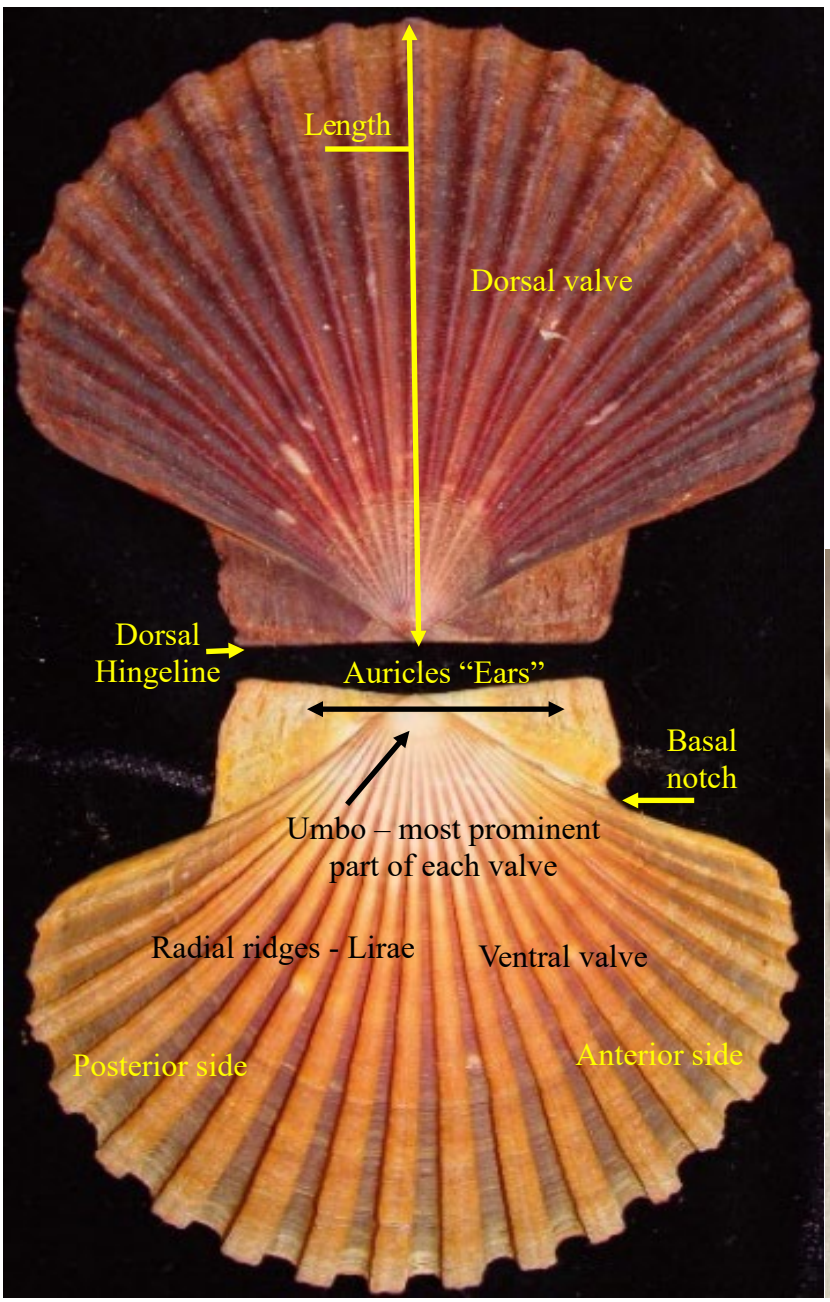
Similar species
Not likely to be confused with other species in this guide

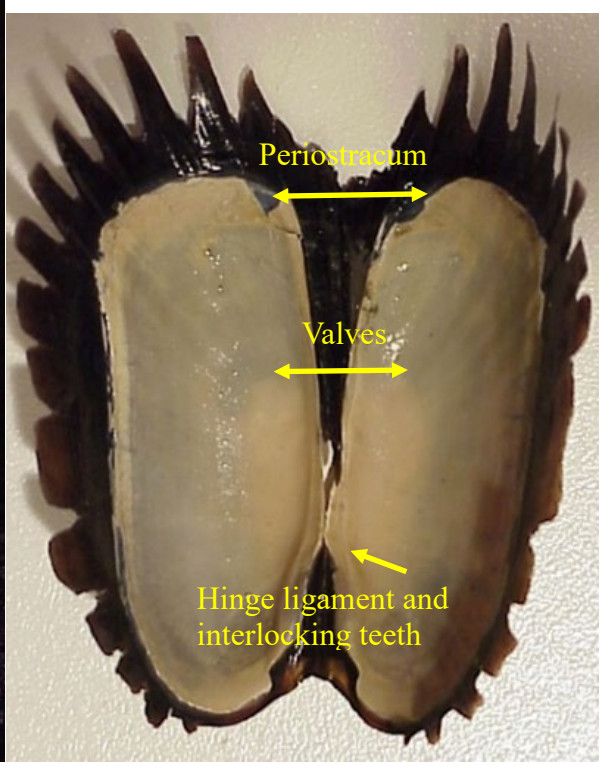
Distribution
Oregon to the Galapagos Islands, 400-800 m.

Bivalves Bivalvia

Bivalvia is a class of marine and freshwater molluscs that include the clams, oysters, cockles, mussels, scallops and many other families. As a group, bivalves do not have a head and lack some of the usual structures associated with molluscs like the radula (minutely toothed tongue like structure used in feeding) and odontophore (underlying cartilage supporting the radula). Most are filter feeders that use their specially developed gills (ctenidia) for both respiration and feeding. The laterally compressed body is wholly or partially enclosed by a shell. The shell is composed of calcium carbonate and consists of two halves or valves. The valves are joined together along one edge (hingeline) by a ligament and usually a set of interlocking teeth on each valve forming the hinge. This allows for the shell to open and close without having to detach the valves. The shell is generally bilaterally symmetrical and may have radial and or concentric ridges.

Bivalve Characteristics and Terminology





Bivalves

Delectopecten vancouverensis (Glass Scallop)

Description
The translucent white transparent shell of this small, fragile scallop allows the light orange to pink viscera to show through. The structure of the nearly equally convex valves varies from numerous faint lirae (radial ridges) and concentric ridges to almost smooth. The auricles are asymmetrical. The anterior is much larger than posterior with a well-developed basal notch. Length to 4 cm.
Similar species
Not likely to be confused with other species in this guide.
Distribution
Alaska to Mexico, 50-1000 m possibly greater.

Acesta sphoni (Siphon's Giant File Clam)

Description
The valves of this large, slim, moderately inflated shell are about equal in size and are covered with a thin pale brown periostracum. There is a distinct gape between the valves and a straight, somewhat long hingeline. The shell has approximately 52 rounded radial ribs and the concentric sculpture consists of growth lines. Length to 12 cm.
Similar species
Acesta mori is rounder, more inflated and has fine radial ribbing for a smooth appearance.
Distribution
San Francisco California to Baja and the Gulf of California, 400-1075 m.

Acesta mori

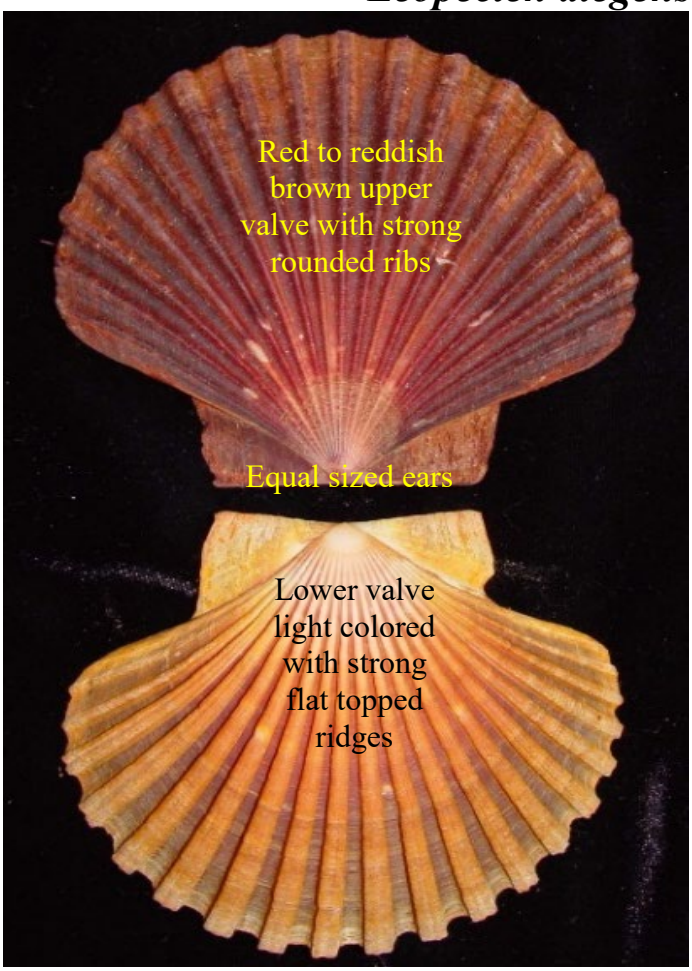
Description
This valves of this large, white, round, highly inflated shell are about equal in size and stained light brown along the margins with a short straight hingeline. The fine narrow radial ribs that become obsolete at the umbo but become coarse anteriorly. The concentric sculpture consist of fine lines that give the ribs a wavy appearance.
Similar species
Acesta sphoni is longer, less inflated and has numerous strong lirae (radial ribs).
Distribution
Southern California to Baja and the Gulf of California, 300-2450 m.

Bivalves

Patinopecten caurinus (Weathervane Scallop)

Description
This broad circular scallop has similar sized ears (auricles) on each side of the hinge. The upper valve is red, pink or gray with 17 heavy radial ridges. The lower valve is lighter and has 24 ridges. Length to about 25 cm.
Similar species
The lower valve of *Leopecten diegensis* is convex and deeper than the upper, and both valves have approximately the same number of radial ridges.
Distribution
The Bering Sea to northern California, 20-200 m.

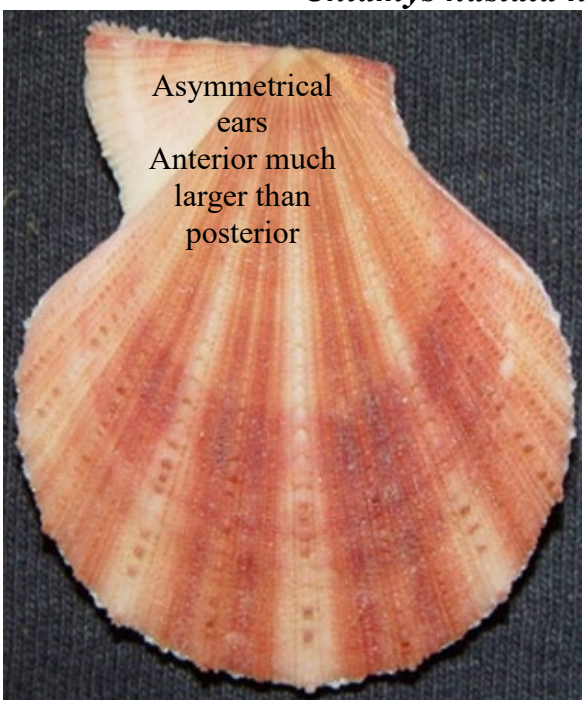
Leopecten diegensis (San Diego Scallop)



Description
This classic fan shaped scallop has equal sized ears (auricles) on each side of the hinge. The lower valve is somewhat convex with heavy flat topped ribs. The upper or left valve is flat or slightly convex with rounded ribs. The valves are different colors the lower is a soft orange, white or yellow and the upper is brown to reddish brown and can have white specks or blotches. Length to 14 cm.
Similar species
Synonyms include *Euvola diegensis*, *Pecten diegensis* and *Pecten floridus*.
Distribution
Northern California to Baja California, 9-400 m possibly greater.

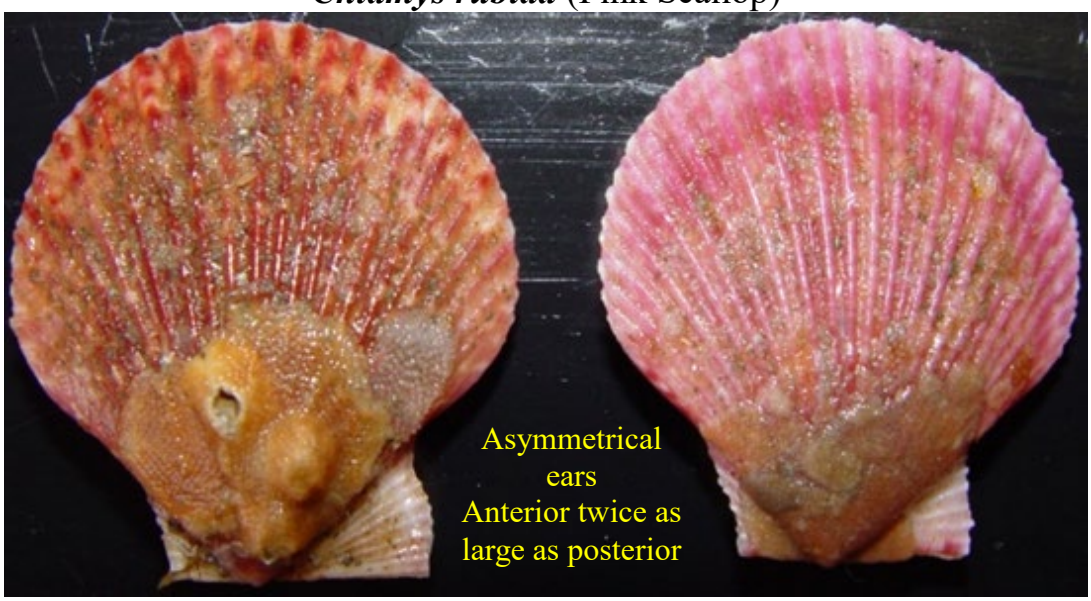
Bivalves

Chlamys hastata hericia (Spiny Scallop, Spear Scallop)



Description
This fan shaped scallop is longer than wide. The shell is composed of two convex valves each with a small number of broad ribs radiating from the umbo (highest point of each valve) and covered with blunt spines with fine striations between the ribs. The background color is usually white with radial bands of pale purple on the right or lower valve which is paler than the left. Annual growth rings are visible usually as concentric bands of darker color. The ears or auricles are irregular with the anterior much larger than the posterior. Length to 8 cm.
Similar species
The large undulations in the shell should distinguish this species.
Distribution
Gulf of Alaska to San Diego, Low tide line to 140 m.

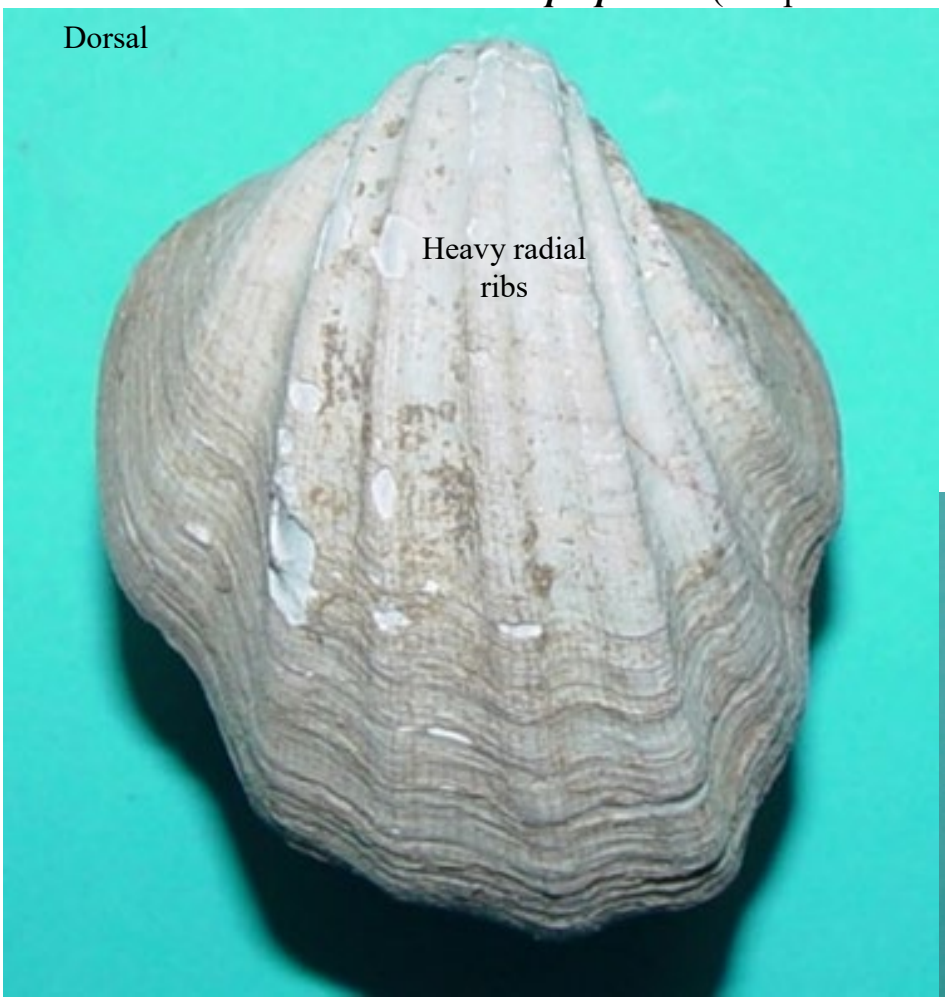
Chlamys rubida (Pink Scallop)



Description
This fan shaped scallop is rather round in shape. The shell consists of two convex valves with no purple blotch inside the hinge. Each hinge has 20-30 prominent ribs but do not have any prominent spines. The anterior auricle or ear is usually twice the size of the posterior. The left or upper valve is red-purple, pink, white or yellow, the right or lower valve is lighter in color. Length to 7 cm.
Similar species
Chlamys hericia has spines. *Leopecten diegensis* has a flat upper and convex lower valve.
Distribution
Aleutian Islands to San Diego, uncommon south of Puget Sound, low intertidal to 300 m.

Bivalves

Halicardia perplicata (Deep-sea Heart Clam)



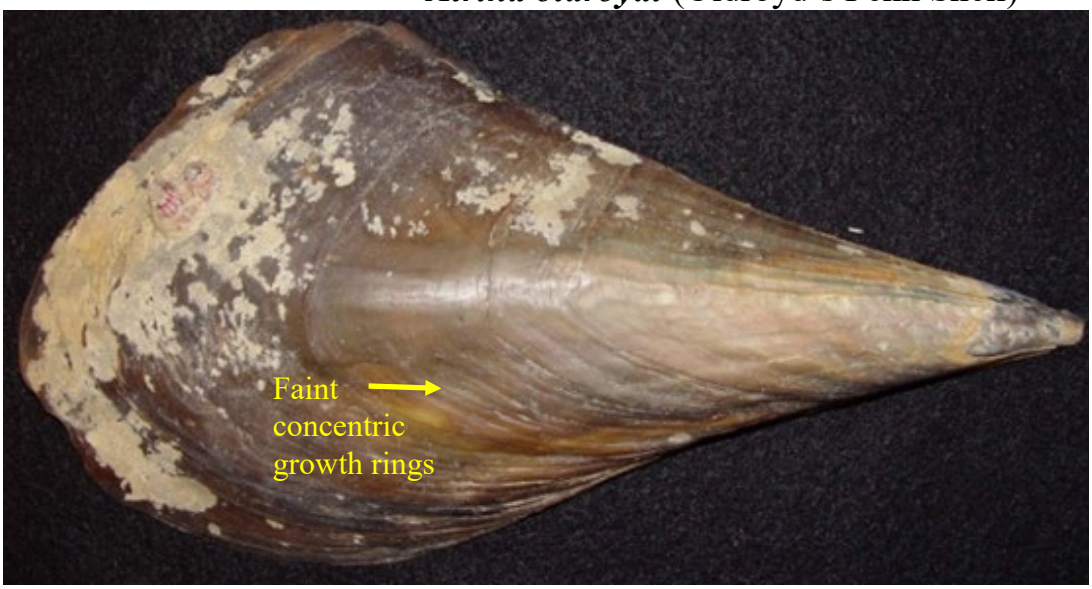
Description
This moderately sized clam has very inflated appearance dorsally. The upper valve has about ten very heavy radial ribs. The ventral view is heart-shaped. The shell is white with a gray/green to gray/brown periostracum. Length to 5 cm.
Similar species
The heart shape should distinguish this species.
Distribution
Alaska to Ecuador 550-3000 m.

Vesicomya spp. (Cold Seep Clam)

Description
These medium sized clams have thick elongate to elliptical valves with little sculpturing except for the concentric growth lines. The valves are white with a brown periostracum. Length to 10 cm.
Similar species
There are multiple species of cold seep clams (Vesicomyidae). Descriptions and differentiations are unclear, and soft tissue examination is necessary for identification in some species.
Distributions
Aleutian Islands to California, 550-3225 m.

Bivalves

Atrina oldroydi (Oldroyd's Penn Shell)



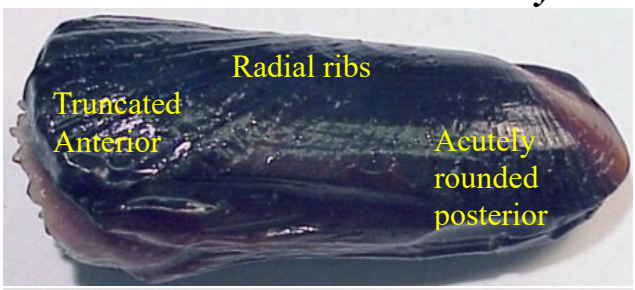
Description
This large wedge-shaped bivalve has smooth to nearly smooth valves as there may be faint ribs and/or concentric growth rings. Length to 40 cm.
Similar species
Atrina texta has large scale-like projections at the tip of the shell and deep radial ridges.
Distribution
Southern California to Baja California, 40-90 m.

Atrina texta (Woven Penn Shell)

Description
This large wedge-shaped bivalve has radial ridges and large scale-like projections at the tip of the shell. Length to 40 cm.
Similar species
Atrina oldroydi is nearly smooth.
Distribution
Southern California to Mexico, 40-90 m.

Bivalves

Solemya reidi (Gutless Awning clam)

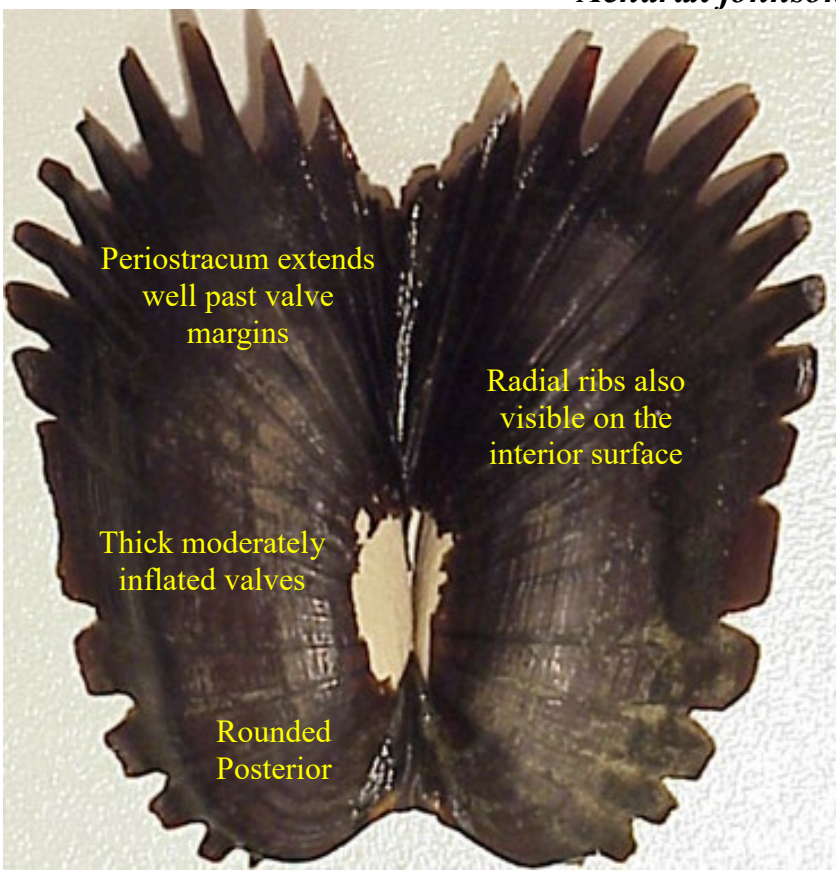


Description
This elliptically shaped clam is more acutely rounded at the posterior end. The dorsal and ventral margins are nearly parallel the entire length. The valves are very thin, lightly calcified and fragile with a smooth brown or black periostracum that extends far past the edges of the valves. Length to 6 cm.

Similar species
Acharax johnsonii is similar but larger in size and with a black periostracum that extends into finger-like projections.

Distribution
Alaska to central California, 10-800 m.

Acharax johnsonii



Description
This clam is more acutely rounded posteriorly and truncated anteriorly. The moderately thick, poorly mineralized, and somewhat inflated valves have low broadly spaced radial ribs that are also visible on the dull interior. The thick, dark brown to black periostracum extends well beyond the margins. Length to 15 cm.

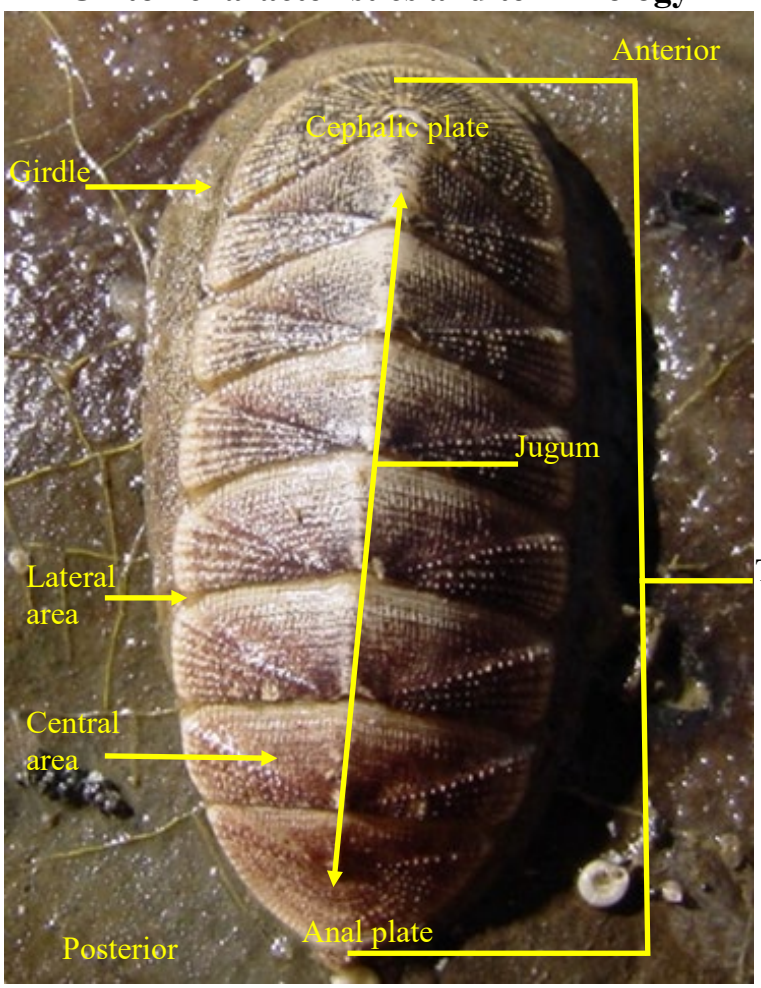
Similar species
The thick shell distinguishes this clam from similar species

Distribution
Sitka Alaska to Peru possibly to Conception, Chile, 100-5379 m.

Chitons

Chitons are a group of marine molluscs consisting of about 940 living species. Common names include sea cradles and coat of mail shells. All chitons have a protective dorsal shell made up of eight articulating valves composed of the carbonate material known as aragonite. The plates overlap front and back providing protection but articulate allowing the body to flex. This flexibility allows movement over uneven surfaces and even allows the animal to curl into a ball. The valves are embedded in a tough muscular girdle that in most species surrounds the body. In some species the valves are reduced and enclosed by the girdle. Although there is no complete head, the crescent shaped, anterior most valve is known as the cephalic or head plate. Although chitons do not have tails, the posterior most valve is called the anal or tail plate. The inner layer of the middle six valves can be produced anteriorly as an articulating flange known as the articulamentum and/or produced laterally as notched insertion plates that function as attachment points for the valves and soft body. Similar insertion plates may also be attached to the convex anterior border of the cephalic plate and to the convex posterior border of the anal plate. The eight valves vary in color and sculpturing. The sculpturing of the valves is important taxonomically. Important characteristic include the visible layer of the living shell (tegmentum), the longitudinal median line along the dorsal valves (jugum), the shape of the valves, the texture of the central and lateral areas of the plates. Ornamentation of the girdle which may have scales or spicules and often parallel lengthwise striations is also important.

Chiton characteristics and terminology



Chitons

Leptochiton americanus (American Leptochiton, Elevated Leptochiton)

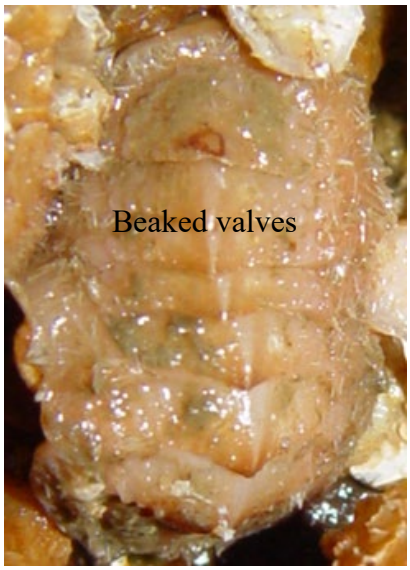
Description
The cephalic plate is approximately 30% smaller than the intermediate valves. The posterior margin is highly triangular with a rounded notch at the apex. The rounded shell plates bear longitudinal rows of granules. The anal plate is moderately sloped. The shell plates are white but are usually stained brown or black. Length to about 3 cm.
Similar species
Leptochiton belknapi has uniformly granular and angled shell plates.
Distribution
Oregon to northern Chile, 400-1400 m.

Leptochiton belknapi (Belknap's Leptochiton)

Description
This is a moderately sized elongate oval chiton. The intermediate valves are somewhat or incompletely keeled (subcarinate). The visible layer of the shell (tegmentum) is sculptured with small granules evenly arranged quincuncially (group of 5 forming a square with a spot in the center :·:). The dorsal side of the girdle is densely covered with pointed scales with 2-4 ribs. The plates are white but usually have brown mineral stains. Length to 3 cm.
Similar species
Leptochiton mesogonus is now considered a junior synonym of *Leptochiton belknapi*.
Distribution
Bering Sea to Chile, 100-3724 m.

Chitons

Deshayesiella spicata (Sponge-eating Chiton)



Description (Sirenko, Clark 2008)
These light brown, medium sized (to 3.5 cm) elongate-oval chitons have rather thick, incompletely keeled (subcarinate), beaked, granular and/or costate valves with straight to slightly convex slopes. The tegmentum is granular and/or costate. The sub-crescent shaped head valve has concentric costae. The intermediate valves are granulose and/or with concentric rows of costae. The dorsal surface is covered with short spicules intermixed with long needle-like spicules.
Similar species
This species is distinguished by the angled shell plates and extruded girdle.
Distribution
British Columbia to the Gulf of California, 18-467 m.

Lepidozona spp. (Scaled Chiton)

Description (Baldwin 2007)
The girdle on the species in this genus does not completely cover the valves and will be covered with overlapping scales. The valves have longitudinal and radial rows of pustules. The color is variable, often white, orange, or brown and with black or brown stains. Length to 6 cm.
Similar species
There are a number of similar species in the region. This species can be distinguished by others in this guide by the angled plates and rows of pustules.
Distribution
Alaska to Mexico, intertidal to 3000 m.

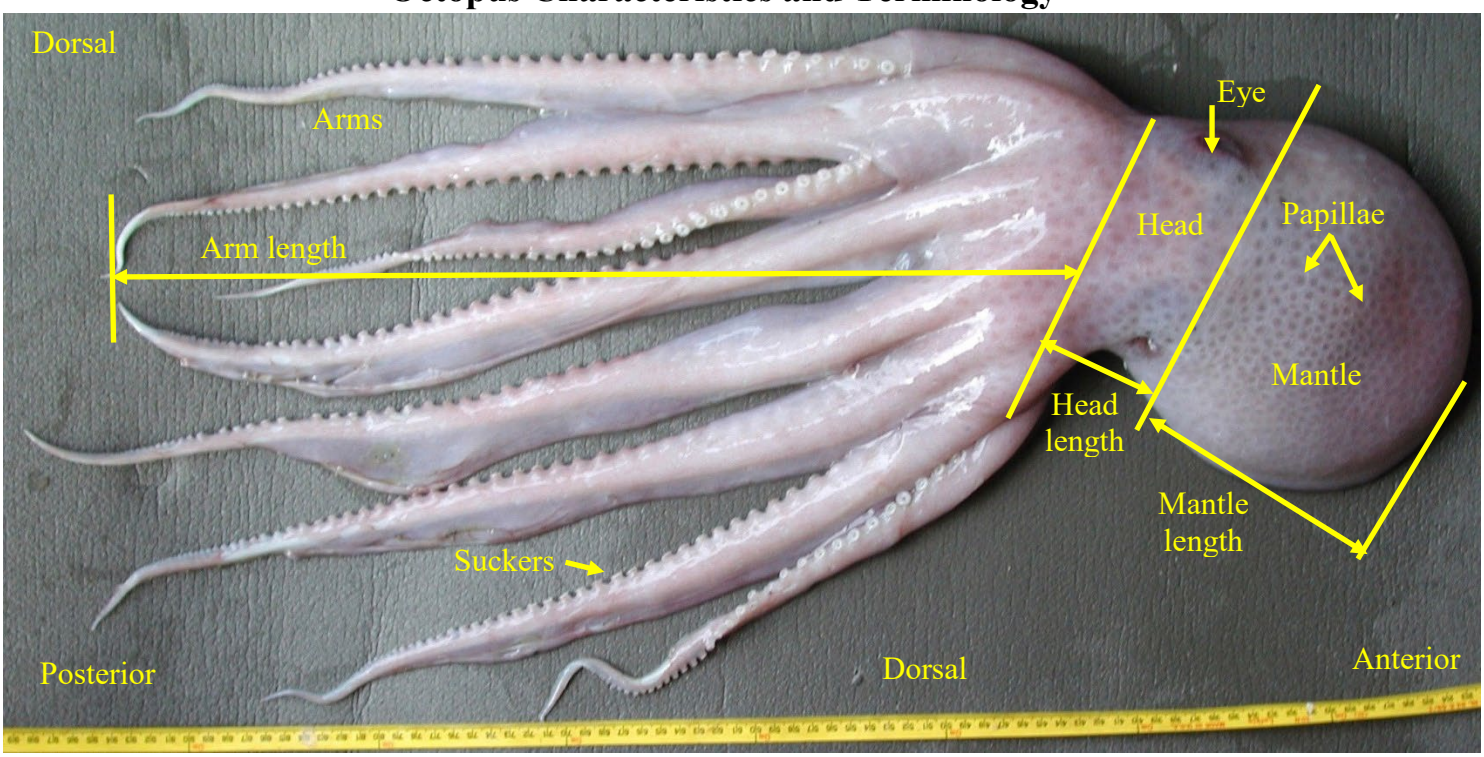
Placiphorella atlantica (White Veiled Chiton)

Description
The valves of this medium sized oval chiton are depressed and subcarinate with straight side slopes. The tegmentum covered with micro-granules and is white in color. The cream to light tan girdle is greatly expanded anteriorly and sparsely covered with spinose setae, which are often missing, except along the margins. Length to 5 cm.
Similar species
Formerly known as *Placiphorella pacifica*.
Distribution
Bering Sea to Chile, 140-2000 m.

Cephalopods Cephalopoda

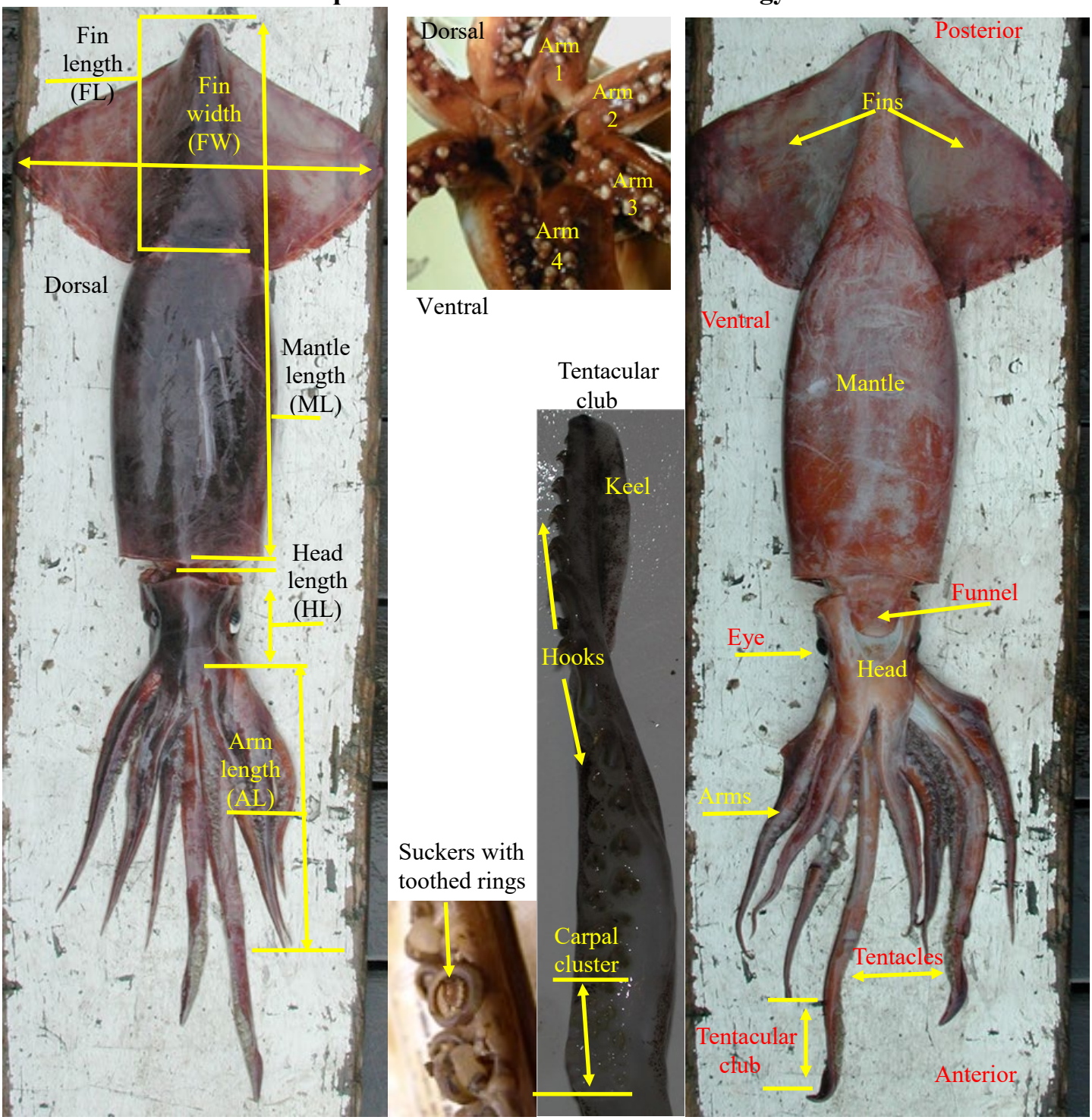
The cephalopods are a group of bilaterally symmetrical molluscs that can be divided into two groups the Tetrabranchiata and Dibranchiata (Flowers, 1961). The tetrabranchiata consist of one living genus *Nautilu*s, and are characterized by having an external chambered shell, eyes without a solid lens, four gills, a four chambered heart and numerous tentacles. Dibranchiata are characterized by having a reduced or modified internal or absent shell, eyes with a solid lens, a two chambered heart, and few tentacles usually 2. Although some cuttlefishes and octopuses have a greatly reduced or absent shell, many have a shell of some type. Cephalopod shells can take many forms, it can be external like the Nautilus, an internal calcareous plate as in the true cuttlefish and Sepiidae, coiled as in the *Spirula*, or a thin transparent horny plate (gladus) typical of some squids. The head houses a large highly developed brain and has well developed eyes that have image forming capabilities. The head is connected to the body either by locking nuchal cartilage or is fused to it. On the ventral side of the head is an anteriorly narrowing tube through which water is expelled for jet propulsion and respiration known as the funnel or siphon. The funnel also acts to expel metabolic waste, eggs and ink. The head also houses the mouth that is equipped with a horny beak, consisting of upper and lower mandibles and inside the mouth is a radula (absent in *Spirula* and finned octopods). The body or mantle is a muscular sack that is the main source of power for fast swimming and encloses the internal organs and gills. Most dibranchiate cephalopods have 8 or 10 appendages. Most squids and cuttlefishes have 10 appendages, 8 arms and 2 tentacles while octopods have only 8 arms. The arms are equipped with suckers. The arms of some squids and cuttlefish can have hooks and/or have suckers armed with hooked rings. The tentacles also contain suckers and or hooks but in most species they are confined to the highly developed distal end of the tentacle known as the tentaclular club. Most squids and cuttlefishes have a set of fins, usually at the posterior end of the mantle that are used for slow locomotion. Most adult octopods lack fins, but they are present on newly hatched juveniles.

Octopus Characteristics and Terminology



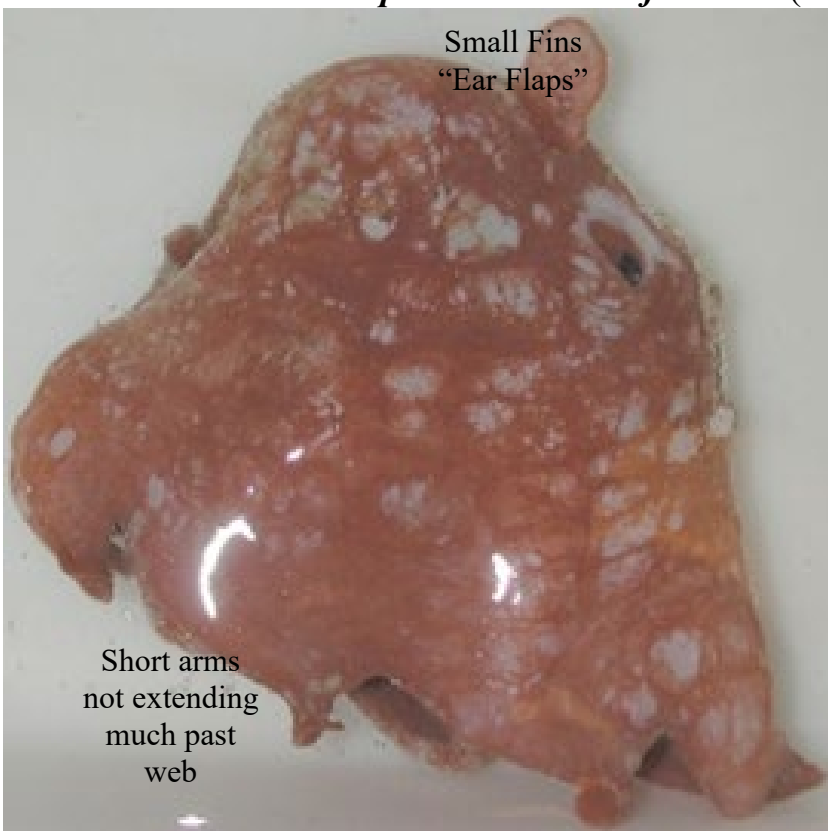
Cephalopods

Squid Characteristics and Terminology



Octopods

Opisthoteuthis californiana (Flapjack Devilfish)

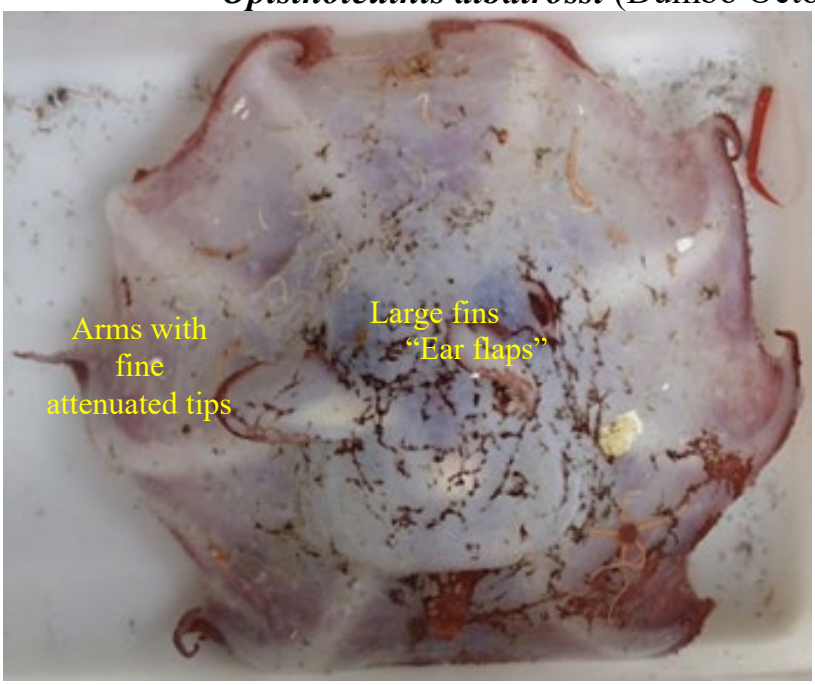


Description
The arms of this gelatinous animal do not extend much past the webbing. The arms have a single median row of suckers and 2 lateral rows of short (less than sucker diameter) cirri. All arms have 5-8 distal suckers and some enlarged basal suckers (usually suckers 3-4 to suckers 11-12). When present the enlarged distal suckers in mature males are only on the end arm pair I. The two small fins (ears) on the visceral hump are supported by a U or V shaped internal shell are used for propulsion. The color ranges from yellowish brown to dark maroon. Diameter to 50 cm.

Similar species
The short cirri and short, blunt arm tips distinguish it from similar species.

Distribution
Bering Sea to southern California, rarely as shallow as 125 m, usually 300-1100 m.

Opisthoteuthis albatrossi (Dumbo Octopus, Albatross's Flapjack)



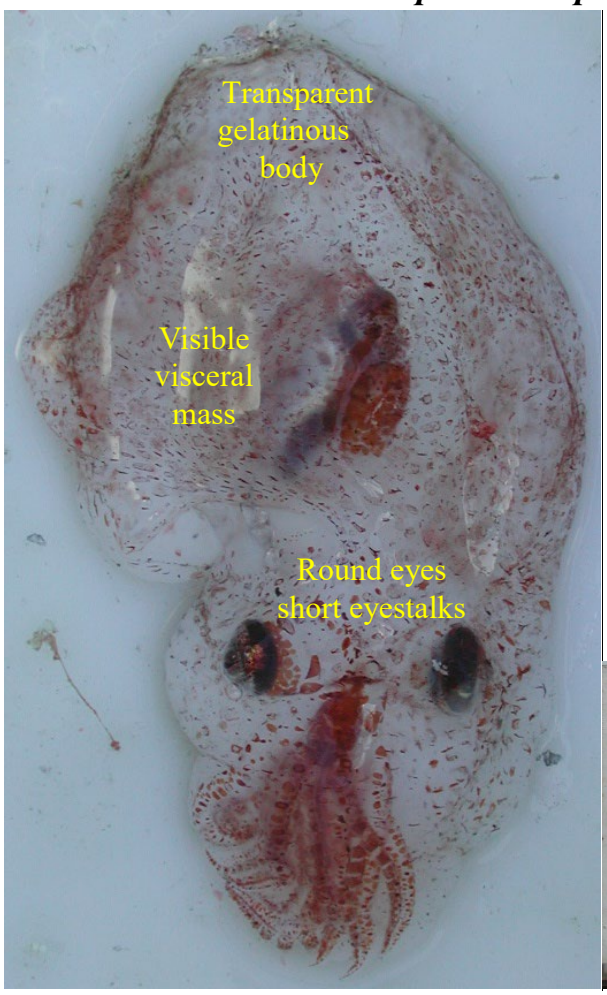
Description
The slender attenuated ends of the arms extend past the webbing of this semi-gelatinous animal. There is a single row of suckers, usually with 2 lateral rows of long (greater than sucker diameter) cirri the distal most almost reaching the ends of the arms. Males have a several enlarged spherical suckers at the distal ends of the dorsal arms. The two large fins (ears) on the visceral hump are supported by a U or V shaped internal shell are used for propulsion. Usually a dark maroon color, damage during capture makes the animal appear white to purplish white with dark mottling. Diameter to 54 cm.

Similar species
Formerly known as *Grimpoteuthis albatrossi* the attenuated arms extending past the webbing distinguish it from similar species.

Distribution
Bering Sea to southern California, 75-1500 m.

Octopods

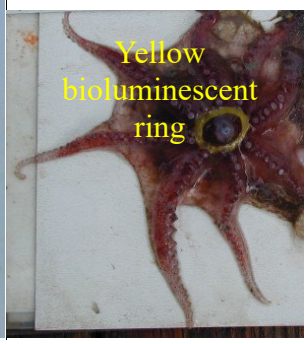
Japetella diaphana (Yellow Ringed Octopus)



Description
This arms of this small gelatinous octopod do not extend much past the web. Each arm has one row of large, close set (inter-sucker distance less than sucker width) suckers that lack a chitonous ring. The relatively large, close set, circular eyes have short eyestalks. The silvery white sheath enclosing the visceral mass is visible through the body. Its chormatophores allow the body color to vary from nearly transparent to a solid copper brown, orange or red. Mature females develop a yellow to yellow/green bioluminescent ring around the mouth. No hectocotylus (arm modified for reproduction) and only a few enlarged median suckers on the right 3rd arm of mature males. Mantle length to 10 cm.

Similar species
The relatively large, close set, round eyes on short eyestalks distinguish it from similar species.

Distribution
The Bering Sea to southern California, 200-1500 m.



Bolitaena pygmaea

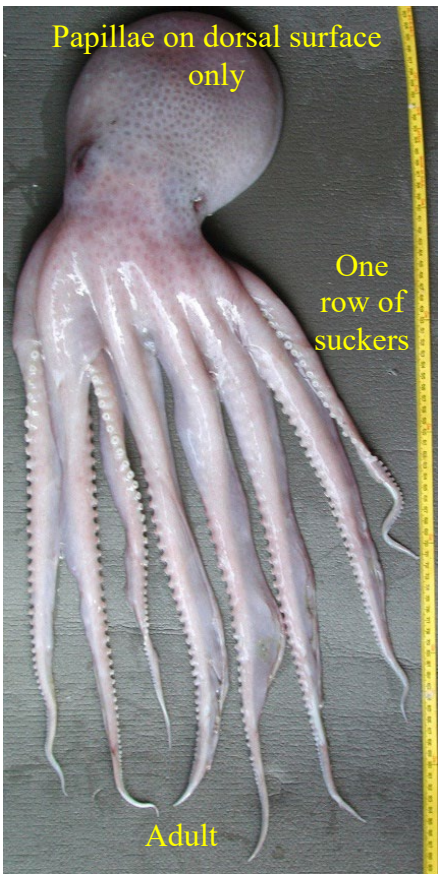
Description
This arms of this small gelatinous octopod do not extend much past the web. There is one row of suckers lacking a chitonous ring on each arm. The spacing of the suckers varies. They are wide spread (inter-sucker distance greater than sucker diameter) inside the webbing and close set (inter-sucker distance less than or equal to the sucker diameter) outside the webbing. The somewhat small, widely spaced, oblong eyes have relatively long eyestalks. The silvery white enclosing the visceral mass is visible through the body. The body is usually light purple on the outside and dark purple on the inside of the web. Mature females develop a yellow to yellow/green bioluminescent ring around the mouth. Mature males develop large suckers on the hectocotylized 3rd right arm. Mantle Length to 20 cm.

Similar species
The relatively small, wide set, oblong eyes with long eyestalks distinguish it from similar species.

Distribution
Cosmopolitan in tropical and subtropical waters adults range from 500-1500 m. In the NE Pacific southern California south and west to Hawaii.

Octopods

Graneledone boreopacifica (Ghost Octopus)

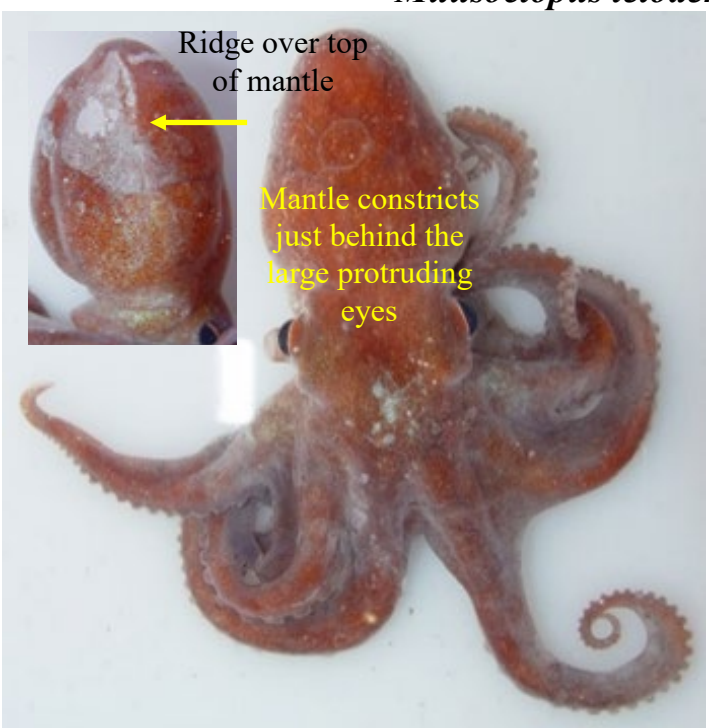


Description
The ovoid mantle of this robust deep-water species becomes more spherical with age. The shallow webbing between the arms extends down the arms as a fleshy keel. The unequal long (2-5 times the mantle length) arms have a single row of suckers and taper to fine attenuated tips. The dorsal surface of the reddish or pale to dark purple mantle, head and often arm pairs 1-3 are covered with cartilaginous papillae which retract upon death. Mantle length to 16 cm total length approximately 1 m.

Similar species
Only deep-water octopod encountered with 1 row of suckers.

Distribution
Japan and Russia to Alaska thru southern California, 715-3000 m.

Muusoctopus leioderma (Smooth Octopus)



Description
This smooth skinned octopus has a keel-like ridge around the edge of the body and across the top of the mantle. This ridge may appear as a blue green line and can fade upon death. The mantle is widest at the posterior end with a constriction just behind the large, well developed, protruding eyes. The arms are 2-3 times the mantle length and contain 80-100 suckers in 2 rows. Common to the genus they lack an ink sac. The color varies from red to pale gray, or blue. Length to 1 m.

Similar species
Formerly *Benthoctopus leioderma*. The transverse line on the mantle distinguishes it from similar species in the area.

Distribution
The Bering Sea to southern California, 100-1400 m.

Octopods

***Muusoctopus* spp.** (*Muusoctopus* Unidentified, Deep-sea Octopus)

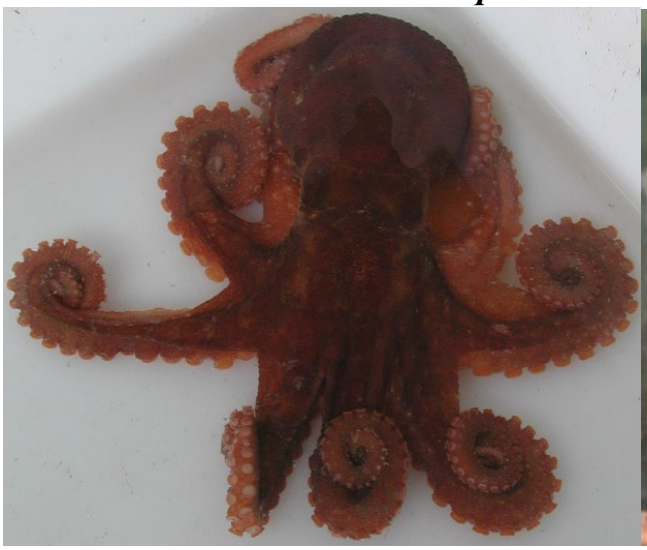
Description
Like other species of *Muusoctopus* this specimen has a smooth mantle with no lateral ridge, no ink sac and the long arms have two rows of suckers. The webbing is shallow between but extends down the arms. The color varies from red, to pale gray, or blue. Length to 1 m.
Similar species
Formerly *Benthoctopus* spp. Many species of *Muusoctopus* occur off the U.S. West Coast that lack the lateral ridge of *Muusoctopus leioderma*. However, differentiation between species requires examination of characteristics beyond the scope of the survey.
Distribution
The complete distribution is unknown.

Enteroctopus dofleini (Giant Pacific Octopus)

Description
The soft, ovate mantle has loose skin covered with flat, paddle-like papillae often connected by ridges. This pattern is more pronounced in juveniles. There are 3-4 cirri over each eye. The depth of the well-developed web is up to a quarter of the arm length then extends down to the arm tips. The long thick arms are nearly equal with arm IV the shortest. There are two rows of suckers that decrease in size distally. The color ranges from orange to brick red but they are capable of extreme color and texture changes. Length to 3 m or more.
Similar species
Octopus rubescens has pointed papillae and three papillae under each eye.
Distribution
North Pacific, 0-200 m.

Octopods

Octopus rubescens (Red Octopus)



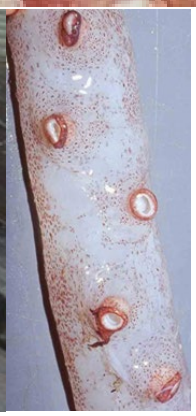
Description
The ability to radically change its color and texture makes the appearance highly variable. The color can vary from deep brick red, to brown, to white or mottled mixtures of any combination of body color. When present the body is covered with cylindrical, pointed papillae and fleshy wrinkles. The webbing is shallow and there are 3 eyelash-like cirri below each eye. Mantle length to 10 cm total length to about 50 cm.
Similar species
Enteroctopus dofleini does not have the 3 cirri below the eye.
Distribution
Southeast Alaska to Baja California, intertidal-200 m.

Octopus californicus (North Pacific Bigeye Octopus)

Description
This small octopus has a bulbous mantle and relatively short arms with two rows of suckers. Color is extremely variable from various shades of orange to red or reddish brown to brown. The mantle, head, and arms have a distinct pattern of stellate papillae. Mantle length to about 10 cm total length to about 45 cm.
Similar species
The distinct stellate pattern on the mantle, head and arms distinguish it from the other octopods in the area.
Distribution
Central California to Baja

Argonautoid Octopods

Haliphron atlanticus (Gelatinous Giant Octopod)



Description

The gelatinous body tissue of this largest of the Argonautoids is densely pigmented. The short, broad mantle has a wide aperture. The head width is equal to or greater than mantle width. The large eyes are up to ⅓ mantle length. The arms are short with arm pair I the longest and each successive pair shorter than the previous. The webbing is deep between each arm and each arm has two rows of small suckers, but may be a single row near mouth. Females are much larger than males with mantle lengths to 69 cm and total length to 4 m males have mantle lengths to 10 cm and total length to 21 cm.

Similar species

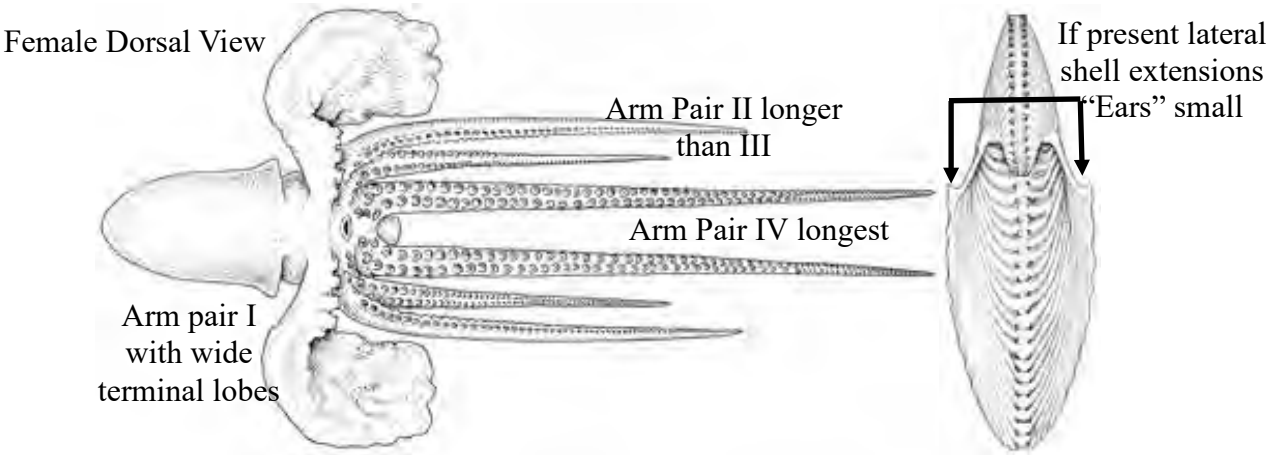
Not likely to be confused with other octopods.

Distribution

Circumglobal in the Atlantic, Indian and Pacific Oceans between 43°N and 45°S, 0-3000 m.

Argonautoid Octopods

Argonauta argo (Greater Argonaut)



Description

The smooth skinned muscular body has no cephalic water pores and a conspicuous "W" shaped funnel. Adult females are large (ML to 10 cm TL to 44 cm) with a slightly conical mantle that is widest anteriorly, flattened laterally and with a sharp upward bend posteriorly. There is a deep crease on the ventral surface of the mantle behind the funnel. The small head is embedded within the mantle. The large protruding eyes are separated by a distinct constriction at the base. The long arms are 2-3.5 times the mantle length. The length of the first arm pair is highly variable due to the constriction of the wide terminal lobes for shell secretion. Arm pair IV is the longest, up to 3 times the ML and 20-30% longer than arm pair II. Arm pair III is the shortest. The body color varies from dark maroon to nearly silver. The large single chambered, laterally compressed thin walled shell is matte to shiny white. The continuous and/or branched smooth lateral ribs radiate from a central axis. The narrow keel width and the shape and size of the keel tubercles are consistent around the shell. If present lateral shell extensions "Ears" are small. The shell-less tiny males (TL 1.5 cm) have a hectocotylized 3rd arm which detaches making them appear to have 7 arms.

Similar species

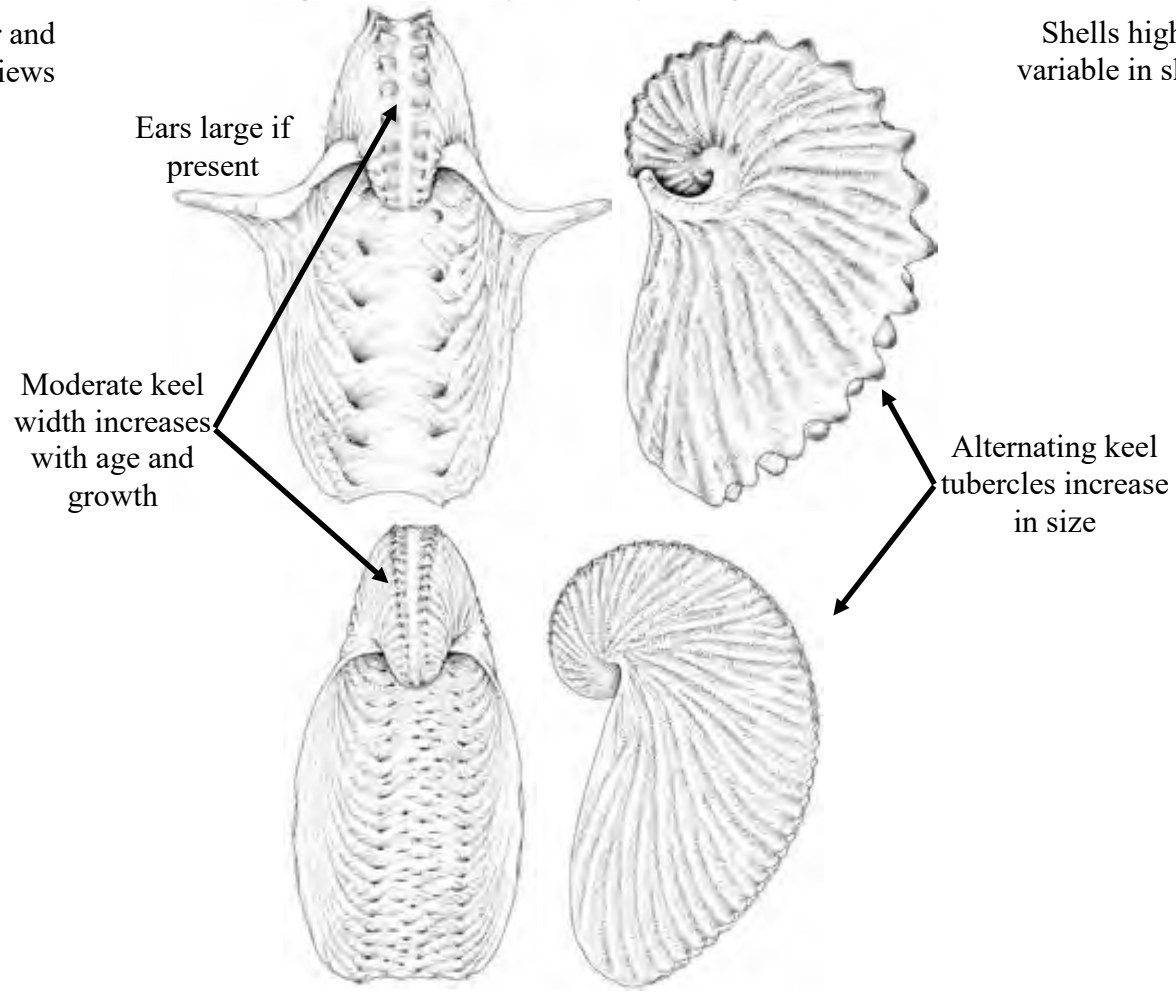
Argonauta pacifica is now considered a synonym of *Argonauta argo*. The consistently narrow keel, uniform keel tubercles and arm pair IV being longer than pair II distinguish *Argonauta argo* from *Argonauta nouryi*.

Distribution

Circumglobal cosmopolitan species between 40°N and 40°S in the Atlantic, Indian and Pacific Ocean. In the NE Pacific from southern California along the west coast of central and south America. The depth range has not been defined.

Argonautoid Octopods

Argonauta nouryi (Noury's Argonaut)



Description

The smooth skinned muscular body has no cephalic water pores and a conspicuous "W" shaped funnel. Adult females are large (ML to 6 cm TL to 18 cm) with a slightly conical mantle that is widest anteriorly, flattened laterally and has a sharp upward bend posteriorly. There is a deep crease on the ventral surface of the mantle behind the funnel. The small head is embedded within the mantle. The large protruding eyes are separated by a distinct constriction at the base. The moderate arms are up to 2.4 times the ML. The length of the first arm pair is highly variable due to the constriction of the wide terminal lobes for shell secretion. Arm pair II is the longest 1.2-2.4 times the ML. Arm pair IV is the shortest, about 1-1.5 times the ML and 60-90% shorter than arm pair III. The body color varies from dark maroon to nearly silver. The shape of the large matte to shiny white, single chambered, laterally compressed thin walled shell is highly variable. The continuous and/or branched smooth lateral ribs radiate from a central axis. The width of the moderate keel increases with growth and inter-keel tubercles may or may not be present. The keel tubercles alternate and get larger around the shell circumference. If present lateral extensions of the shell "Ears" can be large. Male characteristics unknown.

Similar species

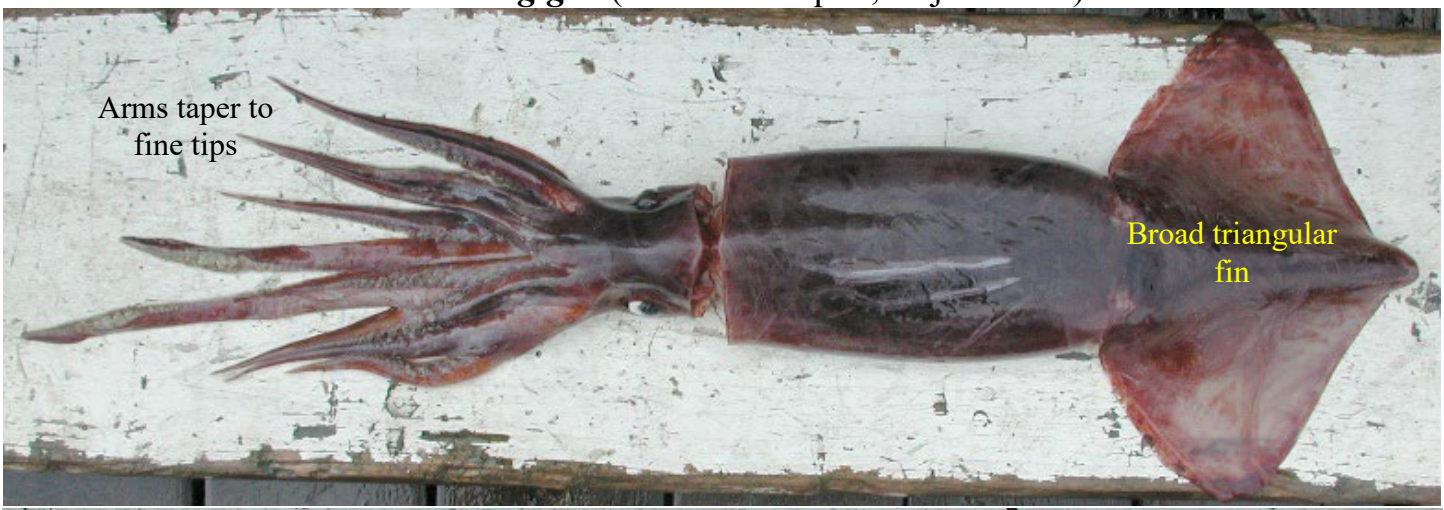
The moderately wide keel, alternating keel tubercles that increase in size, large ears if present, and arm pair II longer than pair IV distinguish *Argonauta nouryi* from *Argonauta argo.*

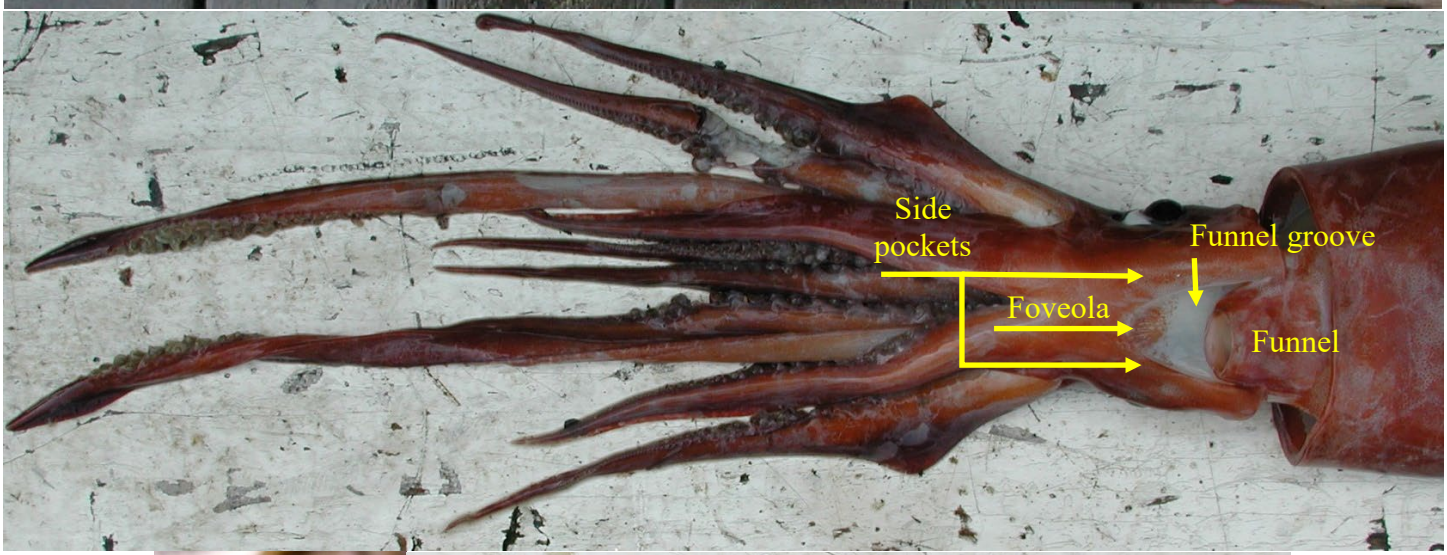
Distribution

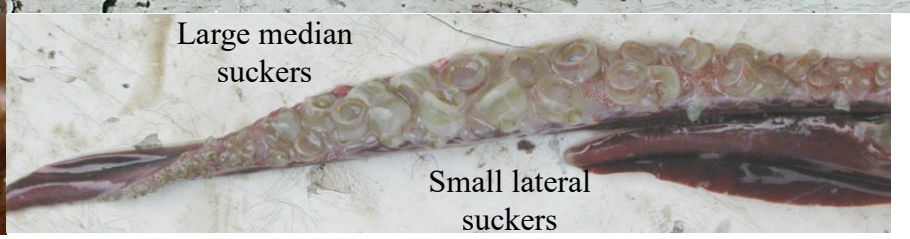
Restricted to the eastern Pacific from the Marquesas Islands in the west to the west coasts of North and South America from southern California to Peru. The depth range has not been defined.

Squids

Dosidicus gigas (Humboldt Squid, Rojo Diablo)







Description

This large, smooth, light to dark reddish purple, to purple squid has a thick muscular mantle and broad triangular fins. The webbing is shallow but continues down the triangular arms which taper to fine attenuated tips. The large funnel rests in a funnel groove with distinct foveola (transverse skin folds that form a pocket at the anterior end of the funnel groove and side pockets). The arms have 2 rows of toothed suckers except at the tips where there are numerous densely packed tiny suckers. There are 4 rows of suckers on the tentacular club. However, the median rows are larger than the lateral rows making it appear that there are only 2 rows. Mantle length to 150 cm and TL to 400 cm but smaller in the North Pacific.

Similar species

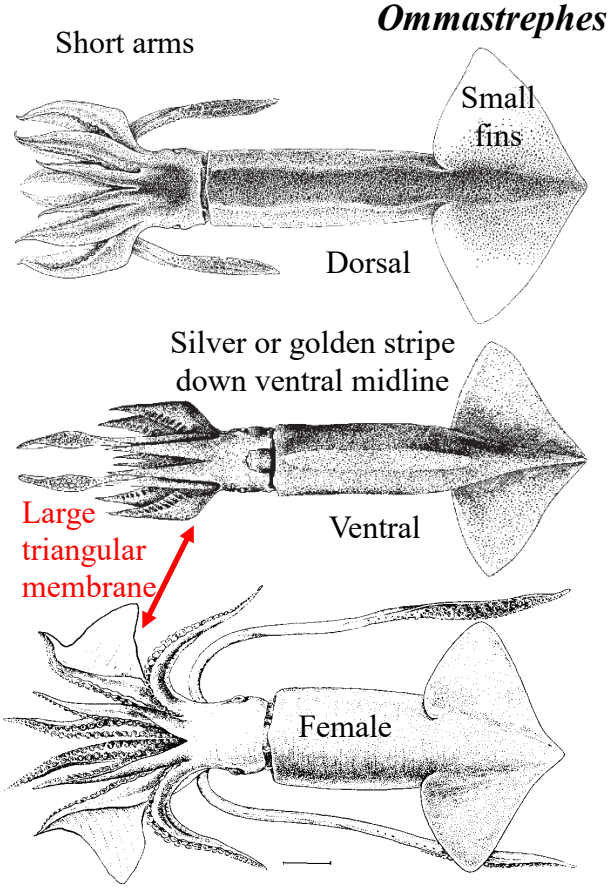
Ommastrephes bartrami has smaller fins and the short arms are not attenuated.

Distribution

Southeast Alaska to Chile, 0-1200 m.

Squids

Ommastrephes bartrami (Neon Flying Squid)



Description
This silver to maroon, moderately sized squid has rhomboidal fins. The short arms are not attenuated. The funnel rests in the funnel groove with 5-8 occasionally 9 foveola and 2-5 (usually 3-4) side pockets. The arms do not possess lateral membranes and have 2 rows of suckers. There are 4 rows of suckers on the tentacular club. However, the median rows are larger than the lateral rows. Arm pair III has wide protective membranes which are much wider than the arms. This membrane becomes an exaggerated triangular lobe in mature females. Although no large dorsal photophore is present, on fresh specimens there is distinct, long, wide silvery or golden opalescent strip extending along the ventral midline and the ventral side of the head and the ventral arms. To 102 cm ML but usually much smaller.

Similar species
Dosidicus gigas has large triangular fins and long attenuated arms.

Distribution
In the NE Pacific from 50°N to 20°S, 0-1500 m.

Onykia robusta (Robust Clubhook Squid)

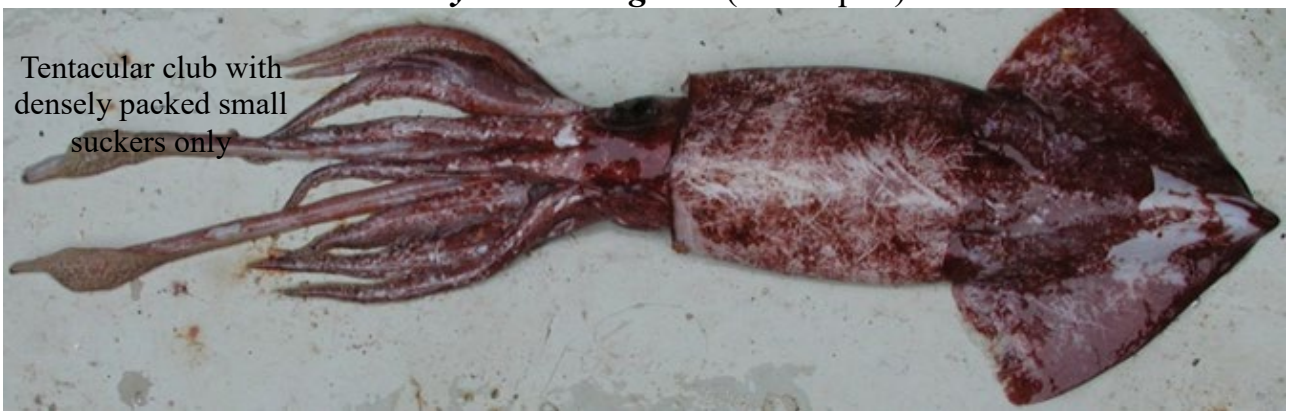
Description
This very large, elongate red to brown squid, has a wrinkled mantle, arms and tentacles that are somewhat triangular in cross section and short, narrow fins. There are 2 rows of hooks on the tentacle clubs. Length to 7 m or more.

Similar species
Previously known as *Moroteuthis robusta*, the large, elongate, wrinkled body, narrow fins, triangular arms and tentacles distinguish this squid.

Distribution
Bering Sea to California, 200-800 m.

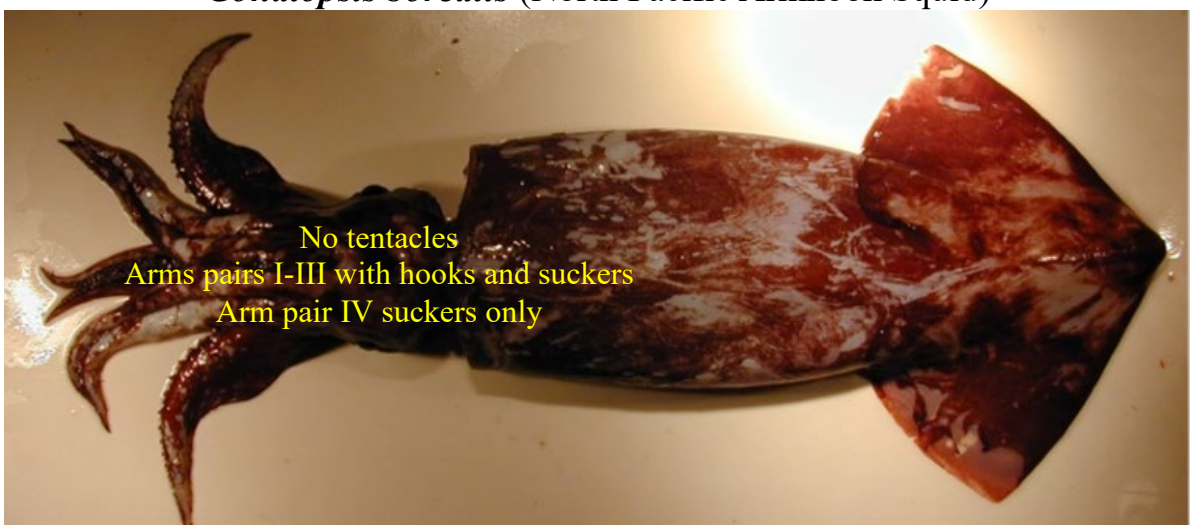
Squids

Berryteuthis magister (Red Squid)



Description
This red to brown squid has a large, robust but soft mantle. The large thick fins are relatively long (length to 55% of the ML) and very broad (width to 70% ML). The expanded tentacular clubs have no hooks but densely packed small suckers (up to 20 suckers in transverse rows) with the median suckers larger than the lateral suckers. Mantle length to 34 cm, TL to 78 cm.
Similar species
Gonatus borealis lacks tentacles. *Dosidicus gigas* has broader, shorter fins and two rows of large suckers on the tentacle cubs. *Onychoteuthis borealijaponicus* has multiple long hooks on tentaclular clubs.
Distribution
Bering Sea to California, 0-1000 m.

Gonatopsis borealis (North Pacific Armhook Squid)



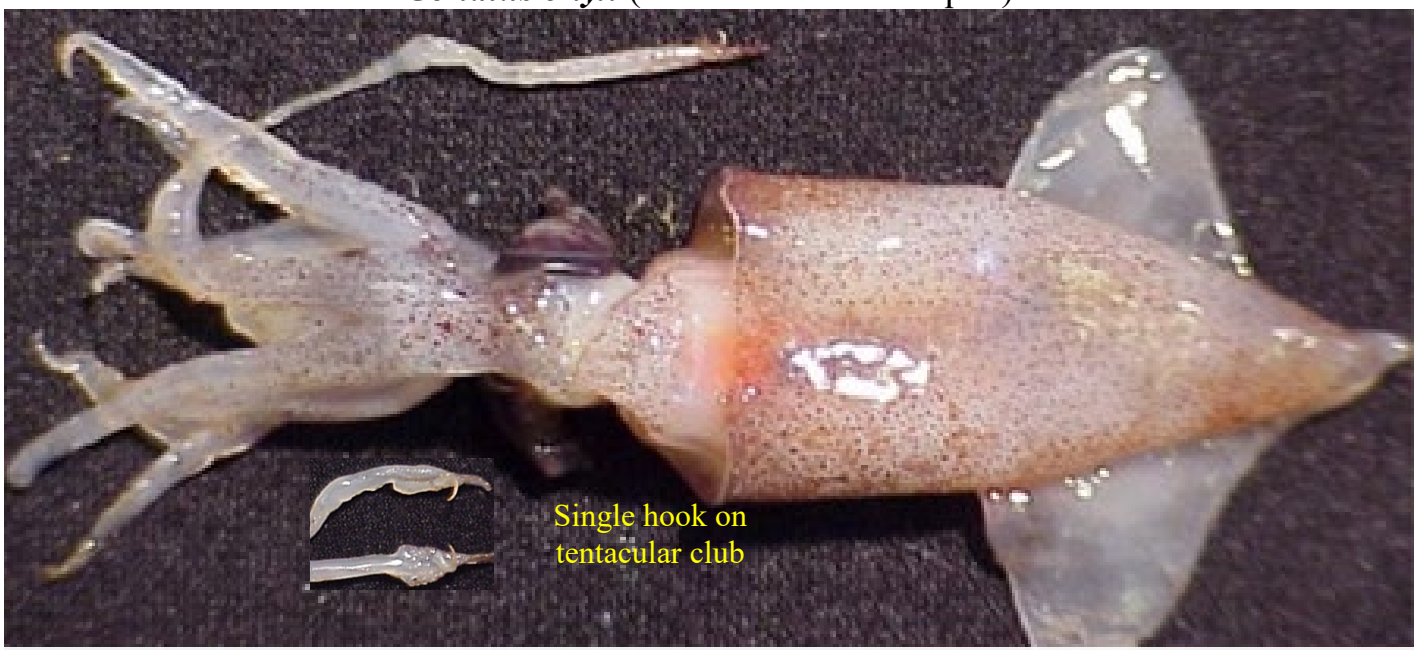
Description
This dark red to brown robust squid has a thick, stout mantle. The muscular fins are relatively short (to 45% ML) and broad (to 70% ML). Adult squid lack tentacles. Arm pairs I-III have 2 median rows of hooks and 2 marginal rows of suckers (4 total suckers). Arm pair IV has 4 rows of suckers no hooks. Mantle length to 30 cm.
Similar species
This squid is distinguishable by the lack of tentacles.
Distribution
Bering Sea to California, 100-1000 m.

Squids

Doryteuthis opalescens (California Market Squid)

Description
This squid has a slender head and mantle. The short compact arms have 4 rows of suckers. The narrow tentacular clubs are unexpanded. A tab-like extension of the anterior mantle edge is over the dorsal side of the head. The body color is highly variable. Mantle length to 19 cm TL to 30 cm.
Similar species
Formally known as *Loligo opalescens* is now invalid. Only squid with a mantle protrusion over the head.
Distribution
Gulf of Alaska to Mexico, 0-500 m.

Gonatus onyx (Clawed Armhook Squid)



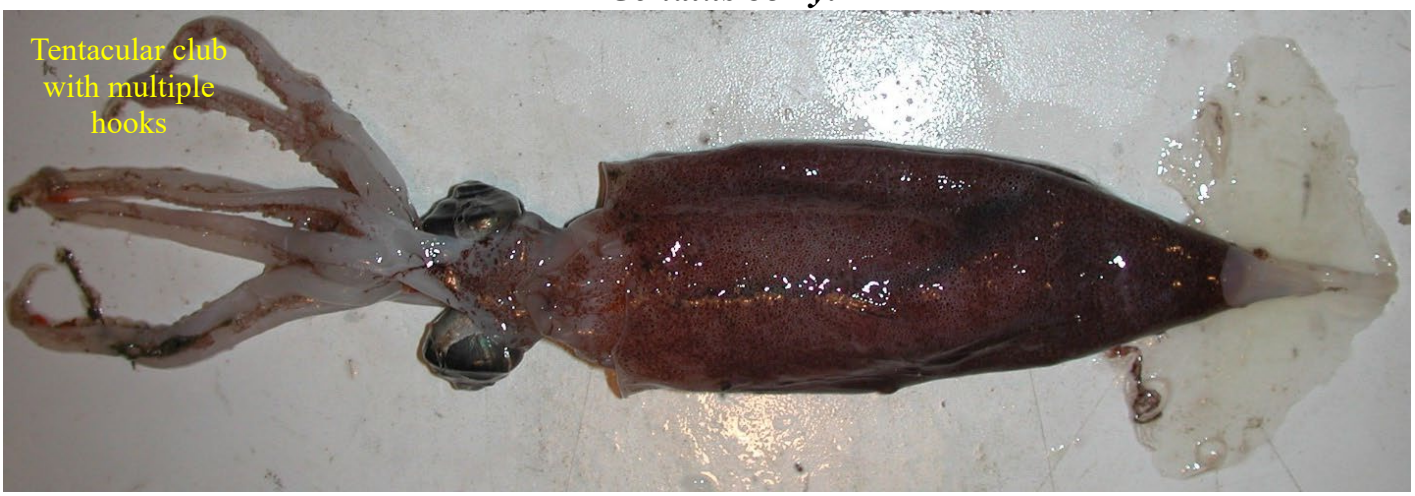
Description
This small pale to dark purple squid may have red to brown speckles. Arm pairs I-III have 2 lateral rows of suckers and 2 median rows of hooks. The tentacular club has a single large primary hook only with no secondary or proximal hooks. A small squid to 13.5 cm ML.
Similar species
Only *Gonatus* species with a single hook on the tentacular clubs.
Distribution
The Bering Sea and Aleutian Islands to Baja California, 0-1500 m.

Squids

Gonatus pyros

Description
This small pale to dark purple squid has a ventral ocular photophore on each eye. Arm pairs I-III have 2 rows of stalked suckers laterally and 2 rows of hooks medially. Arm pair IV has 4 suckers per row and no hooks. The tentaclular clubs are broad at the base and have one large primary hook, one medium distal secondary hook and a series of four small proximal hooks. Mantle length to 12.5 cm.
Similar species
The only species of *Gonatus* with ocular photophores.
Distribution
The Aleutian Islands to southern California, 0-750 m.

Gonatus berryi



Description
This pale to dark purple squid has 2 lateral rows of stalked suckers and 2 median rows of hooks on arms I-III, and 4 suckers per row on arm IV. The tentacular club has a single large primary hook, a small distal secondary hook and a series of 4 small proximal hooks. Mantle length to 19 cm.
Similar species
Very similar to and easily confused with other *Gonatus spp*.
Distribution
The Aleutian Islands to southern California, 0-750 m.

Gonatus madokai

Description
This long arms of this fragile, weakly muscled, pale to dark purple squid are nearly equal to the mantle length. Arm pairs I-III have 2 rows of stalked suckers laterally and 2 rows of hooks medially. Arm pair IV has 4 suckers per row. The tentaclular clubs have a single large primary hook, a medium distal secondary hook, and a series of 5 small proximal hooks. Mantle length to 39 cm.
Similar species
Very similar to and easily confused with other *Gonatus spp*. However, the long arms that are nearly equal to the mantle length make identification possible.
Distribution
The Bering Sea and Aleutian Islands to northern California, 0-750 m.

Squids

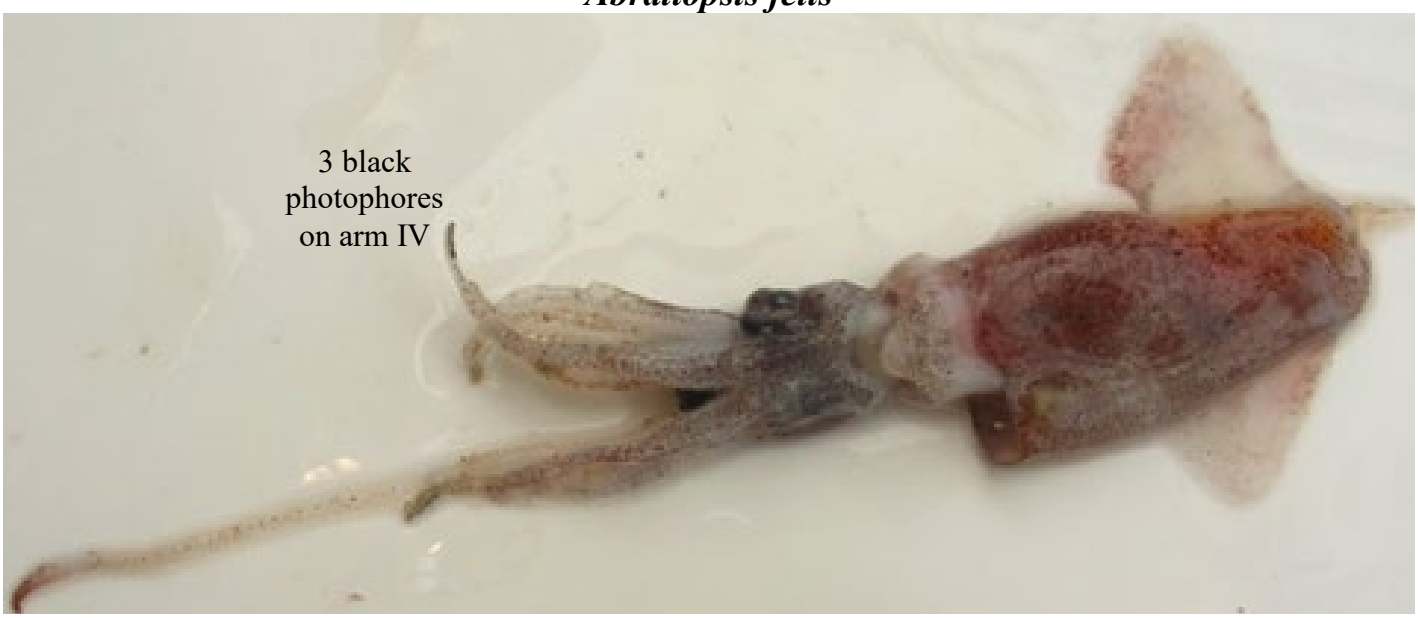
Gonatus californiensis

Description
This pale purple to dark red squid has a very narrow mantle. Arm pairs I-III have 2 lateral rows of stalked suckers and 2 median rows of hooks. Arm pair IV has 4 suckers per row. The tentacular club has a large primary hook, a medium distal secondary hook, and a series of 3 small proximal hooks. Mantle length to 11 cm.

Similar species
Very similar to and easily confused with other *Gonatus spp*. The very narrow mantle small fins and 3 small proximal hooks on the tentacular club separate *Gonatus californiensis* from the other *Gonatus spp*.

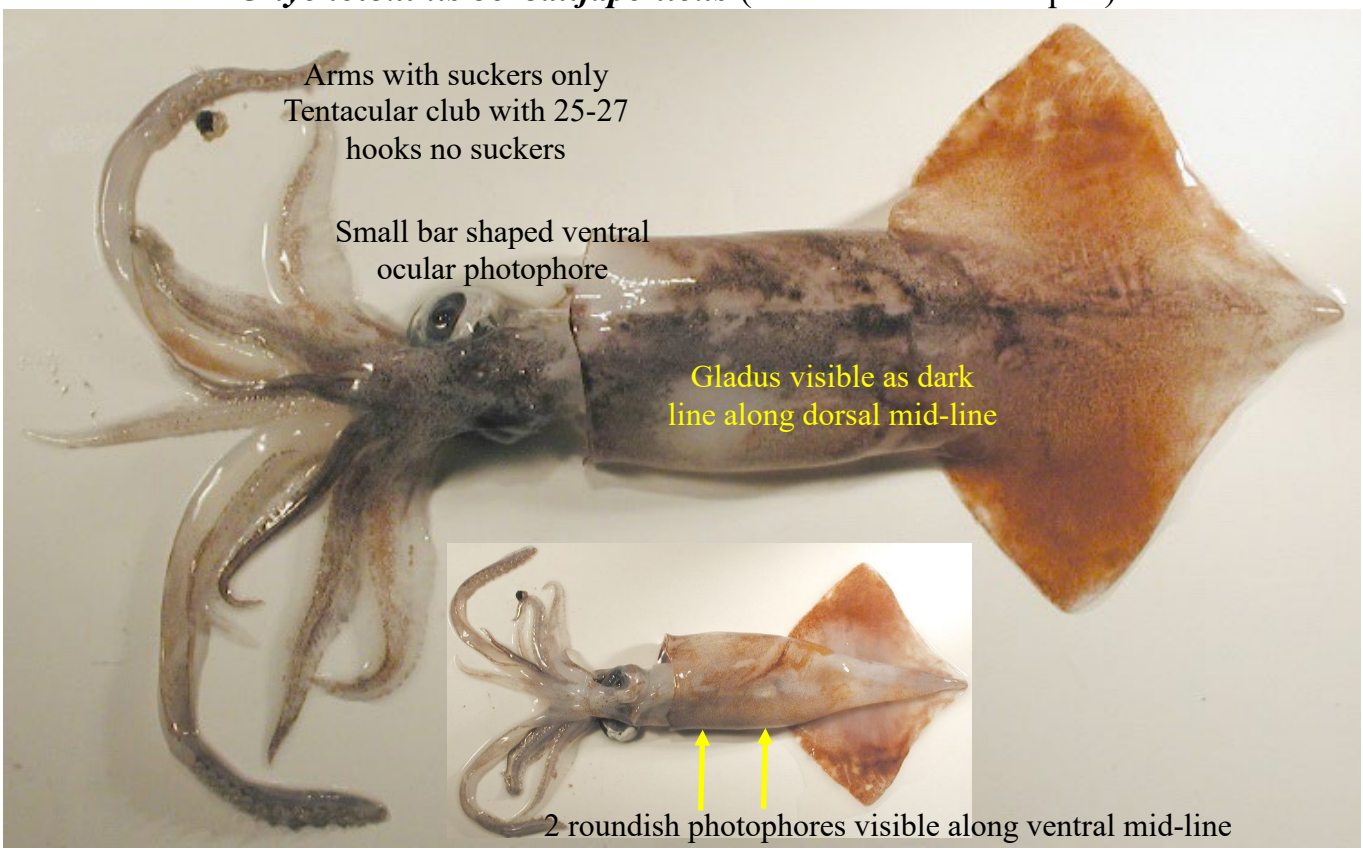
Distribution
The range for this pelagic squid has not been fully defined. Currently Washington State to Baja California, outside 250 m.

Abraliopsis felis



Description
The arms of this small transparent to dark red squid have 2 hooks per row, except at the tips where there are only suckers. The tentacular club has 3 rows of bi-serial hooks and rows of 4 suckers. Photophores cover the ventral side of the mantle, the head and arms. The tips of arm pair IV have 3 prominent black photophores. The black coloration is due to pigment in the skin covering the photophores.
Similar species
The black photophores on the tips of arm pair IV make this sole representative of the Family Enoploteuthidae easily recognizable.
Distribution
Washington State to southern California, 0-200 m.

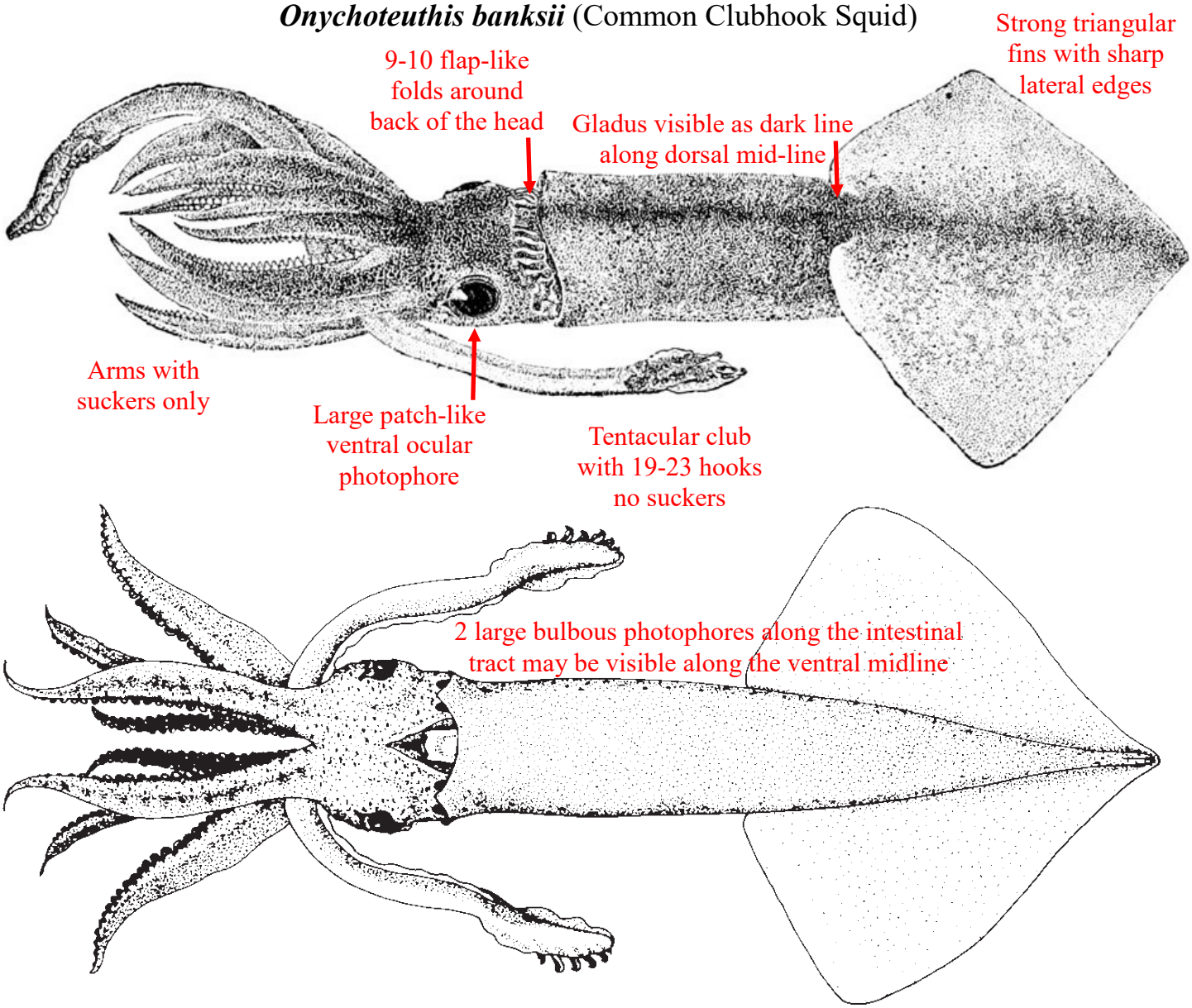
Onychoteuthis borealijaponicus (Boreal Clubhook Squid)



Description
This large, muscular red, reddish brown to brown squid has large, broad, triangular fins (at least 50% of ML). The arms have two series of suckers and no hooks. The 25-27 hooks on the tentacular club are arranged in rows of 2. The gladus (internal shell) may or may not be visible as a dark line along the dorsal mid-line. There is a small bar shaped ventral ocular photophore in each eye, and 2 small roundish photophores along the intestinal tract that may or may not be visible along the ventral mid-line. Mantle length to 39 cm.
Similar species
The 2 rows of suckers and no hooks on the arms, 2 rows of hooks (25-27 total) on the tentacular club and small bar shaped ventral ocular photophore distinguish *Onychoteuthis borealijaponicus* from similar species.
Distribution
The Aleutian Islands and Gulf of Alaska to Baja California, 0-600m. Common in the north portion of its range becoming increasingly less common as one goes farther south.

Squids

Onychoteuthis banksii (Common Clubhook Squid)



Description

This large, muscular red, reddish brown to brown squid has 9-10 flap-like folds around the posterior dorso-lateral surface of the head. The large, strong triangular fins are up to 60% of mantle length have sharp lateral edges and form a pointed tail. The arms have only two series of suckers and no hooks. The 19-23 hooks on the tentacular club are arranged in rows of 2. The gladus (internal shell) may or may not be visible as a dark line along the dorsal mid-line. There is a large patch-like ventral ocular photophore in each eye and 2 large round bulbous photophores along the intestinal tract visible along the ventral mid-line. Mantle length to 30 cm.

Similar species

Onychoteuthis banksii is distinguished by the folds around the back of the head, large patch-like ventral ocular photophore, globular intestinal photophores, and fewer (19-23) hooks on the tentacular club.

Distribution

Worldwide in warm and temperate seas, replacing *Onychoteuthis borealijaponicus* in the southern portion of that species range. In the NE Pacific, California to Baja and the Gulf of California and south along the Pacific coasts of Central and South America, 0-800 m but most common above 150 m.

Squids

Histioteuthis hoylei (Long armed or Flower Vase Jewel Squid)

Description

This pale to dark purple squid has a short moderately stout thick walled conical mantle and medium sized (length to 40% ML), wide (width to 70% ML) round fins. The body is covered with dark, thickly spaced, low fleshy papillae giving it a rough textured appearance. The web between the long arms (to 250% ML) is indistinct. The ventral and lateral surfaces of the mantle, head and arms are covered with elongate photophores. There are about 6 rows of widely spaced ventral photophores on the mantle and 17 photophores ring the right eye. Known as "Cockeyed Squid" due to the asymmetrical eyes, the left eye is much larger than the right and the left eye being directed upward when in its normal position. Mantel length to 24 cm, TL to 84 cm.

Similar species

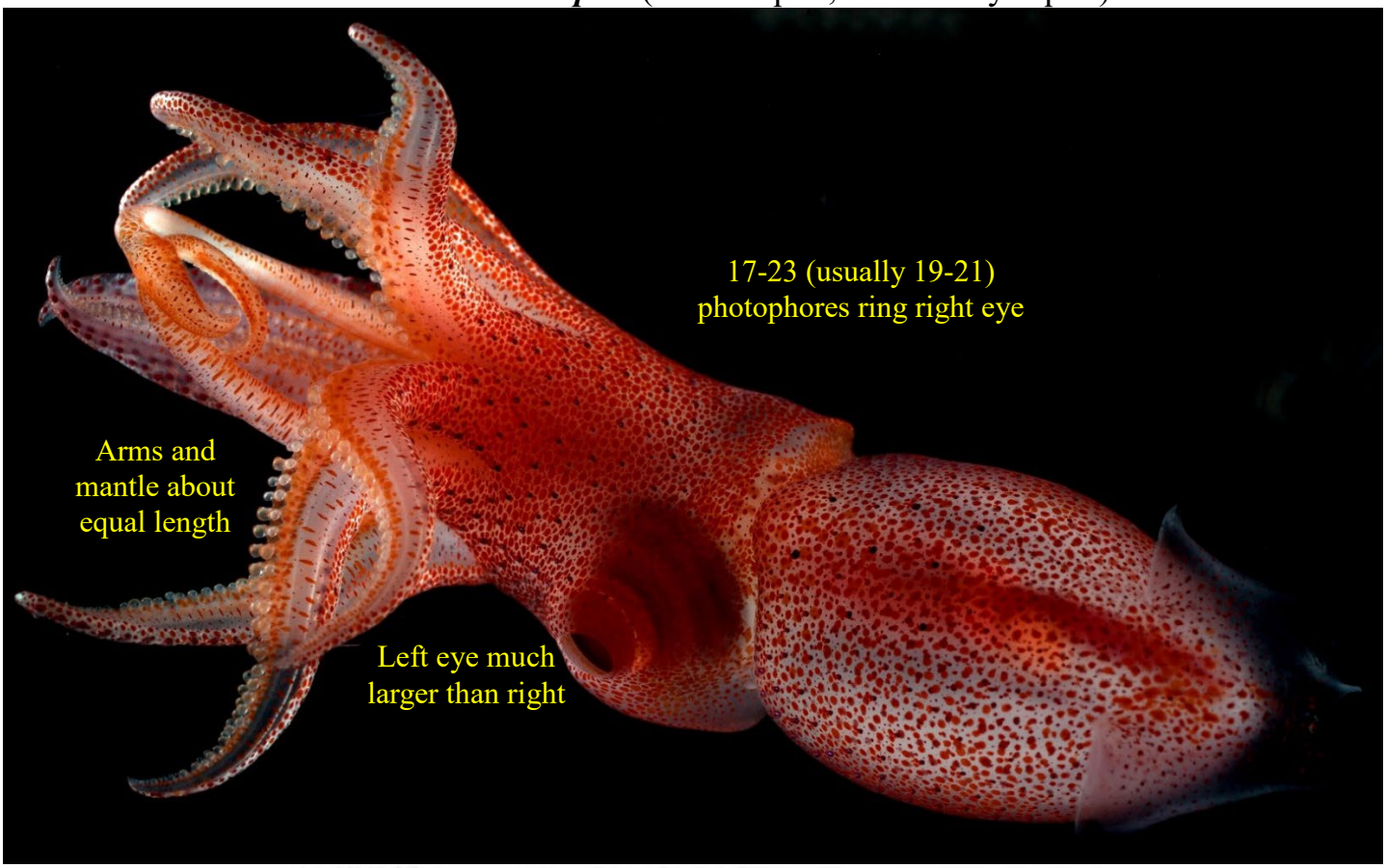
Also known as *Histioteuthis dofleini*, *Stigmatoteuthis chuni* and *Stigmatoteuthis dofleini*.

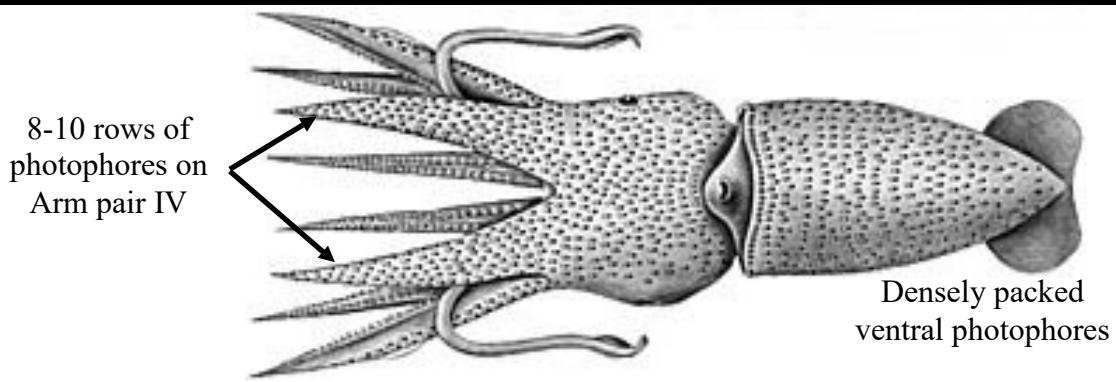
Distribution

From the Aleutian Islands south but most widely distributed between 45°N and 45°S, 100-1500 m.

Squids

Histioteuthis heteropsis (Jewel Squid, Strawberry Squid)





Description

This light to dark purple or maroon squid has a conical mantle that is about the same length as the arms and a small rounded fin. The ventral and lateral surfaces of the mantle, head and arm pairs I-III are covered with small densely packed photophores. There are 8-10 rows of photophores on arm pair IV and a ring of 17-23 (usually 19-21) photophores around the right eye. Known as "Cockeyed Squid" due to the asymmetrical eyes, the left eye is much larger than the right and the left eye being directed upward when in its normal position. Mantle length to 13 cm.

Similar species

The asymmetrical eyes, densely packed small ventral photophores, and arms about equal to the mantle distinguish *Histioteuthis heteropsis* from similar species.

Distribution

Washington State to Mexico, makes diel migrations from the surface at night to over 800 m during daylight.

Squids

Taonius pavo (Peacock Cranch Squid)

Description

The smooth, thin, elongate and highly tapered mantle has long lanceolate fins that extend nearly half the ML. The small head has large bulbous eyes that have rectangular ocular photophores. The short arms have 2 rows of suckers while the tentacular club has 4 rows of toothed suckers. The median suckers have 1-2 large teeth only. Color is variable. Mantle length to 66 cm.

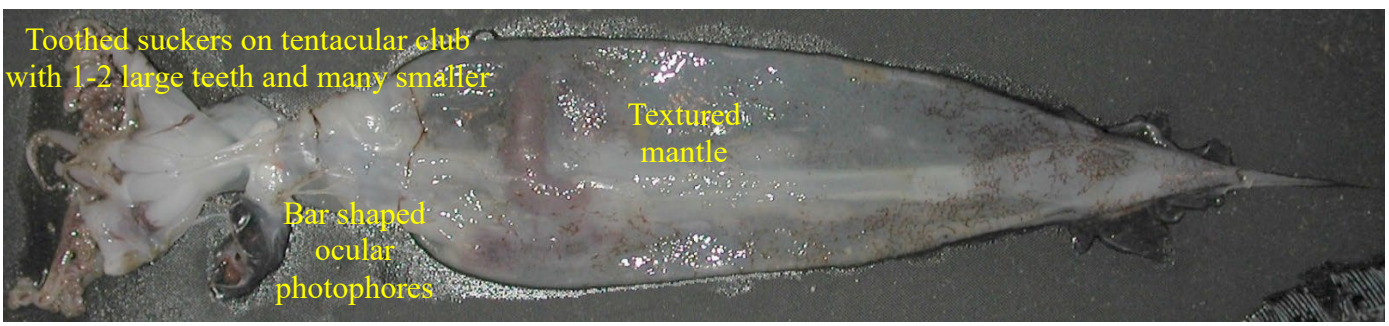
Similar species

The rectangular ocular photophores, smooth mantle and lanceolate fins distinguish *Taonius pavo* from similar species.

Distribution

In the NE Pacific southern California to the Southern Subtropical Convergence, 200-2000 m.

Belonella borealis



Description

Small bumps give the thin, elongate and tapered mantle a textured appearance. The fins are somewhat elongate. The small head has large bulbous eyes with crescent shaped ocular photophores. The short arms have 2 rows of suckers while the tentacular club has 4 rows of toothed suckers. The median suckers have 1-2 large teeth and several small cusps. Color is variable. Mantle length to 50 cm.

Similar species

Also known as *Taonius borealis*. The crescent shaped ocular photophores and textured mantle distinguish *Belonella borealis* from similar species.

Distribution

The Bering Sea to southern California, 200-2000 m.

Squids

Galiteuthis phyllura (Cockatoo or Arrow Squid)

Description

The slender spindle shaped mantle is broadest anteriorly tapering to a long slender pointed tip with long, broad leaf shaped fins. The head is small with large laterally directed eyes. The eyes have 2 prominent 2 bar shaped photophores. The first extends from the posterior margin of the eye along the medial edge to the anterior margin. The second smaller lateral photophore lies close to the lens. The lateral edge of the mantle is fused to the nuchal region and the lateral edges of the funnel by 2-4 small conical tubercles at the mantle-funnel fusion but no others in the mantle-locking area. The arms have 2 rows of suckers and the tentacular club has 2 rows of strong hooks. Mantle length to 76 cm possible TL to 2.7m.

Similar species

The broad leaf-like fins, bar shaped ocular photophores and tentacular clubs with 2 rows of hooks only distinguish *Galiteuthis phyllura* from similar species.

Distribution

The Bering Sea to 25°N, 100-1200 m.

Galiteuthis pacifica

Description

The very thin but muscular mantle has a spindle shape that is broadest anteriorly and tapers to a long slender pointed tip. The small lanceolate fins are about 25% of the ML long and 20% of the ML wide. The lateral edge of the mantle is fused to the nuchal region and the lateral edges of the funnel, but there are no cartilaginous tubercles at these points in the mantle-locking area. The short head has relatively small eyes extending out at a 45° angle to the body axis. Each eye has a "U" shaped ventral photophore that extends from the posterior margin along the medial edge to the anterior margin. This photophore also contains and medially restricts a crescent shaped patch of tissue that is completely different in appearance. There is also a circular 2-part distal photophore consisting of a short distal bar and proximal oval patch. Arm pair IV is the longest of short arms with each preceding pair smaller than the next. Low protective membranes are present on all arms. Shallow webbing is present between arms I and II. Low gelatinous keels exist on the distal portions of arms I-III and lateral keels are present on arm IV. There are biserial rows of suckers on each arm with the largest mid-arm. The short tentacles have 2 rows of strong hooks on the tentacular club. Mantle length to 20 cm.

Similar species

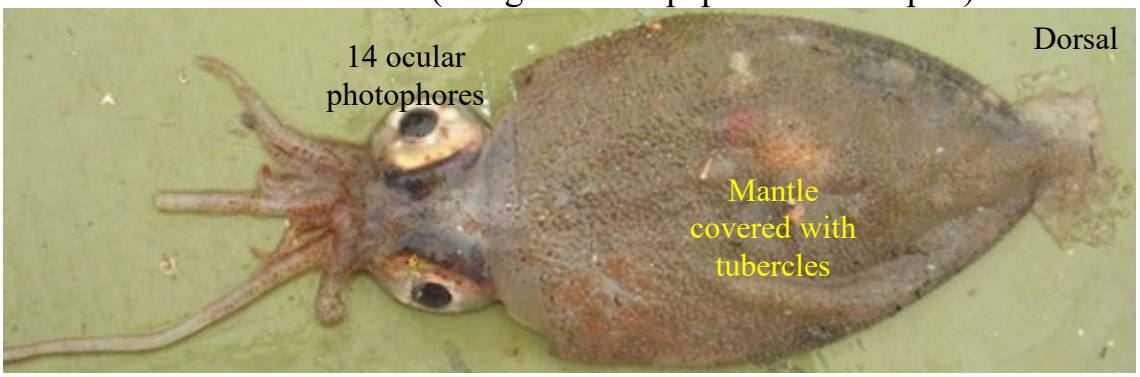
The small lanceolate fins and "U" shaped ocular photophores distinguish this rare poorly described squid from similar species.

Distribution

Widely distributed in the tropical Indo-Pacific. Southern California, 0-2000 m.

Squids

Cranchia scabra (Rough or Sandpaper Cranch Squid)



Description

The pale yellow, lemon-shaped mantle of this small squid is covered with variously sized complex cartilaginous tubercles that have small spiny tops. The oval fins have a free posterior lobe. The mantle is fused to the lateral sides of the funnel and the dorsal mid-line of the head. The short arms have 2 suckers per row and the tentacular club has 4 rows of suckers. Each eye has a series of 14 ventral photophores. Females have a photophore at the tip of each arm. Mantle length to 15 cm.

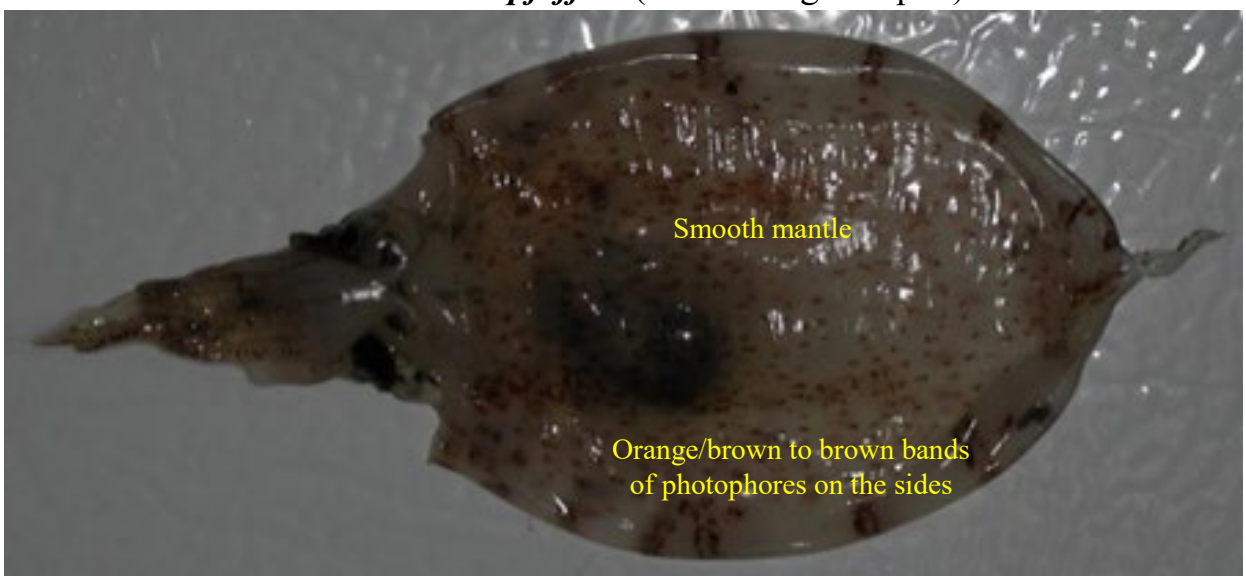
Similar species

The tuberculate mantle distinguishes *Cranchia scabra* from similar species

Distribution

Circumglobal in tropical to subtropical waters, 200-1500 m.

Helicocrachia pfefferi (Banded Piglet Squid)



Description

The cylindrical mantle is widest in the mid-portion that tapers to a blunt tip not supported by the glandius. The smooth mantle has bands of orange/brown to brown photophores on the sides. The small sub-terminal, paddle-like fins are fused distally. Mantle length to 10 cm.

Similar species

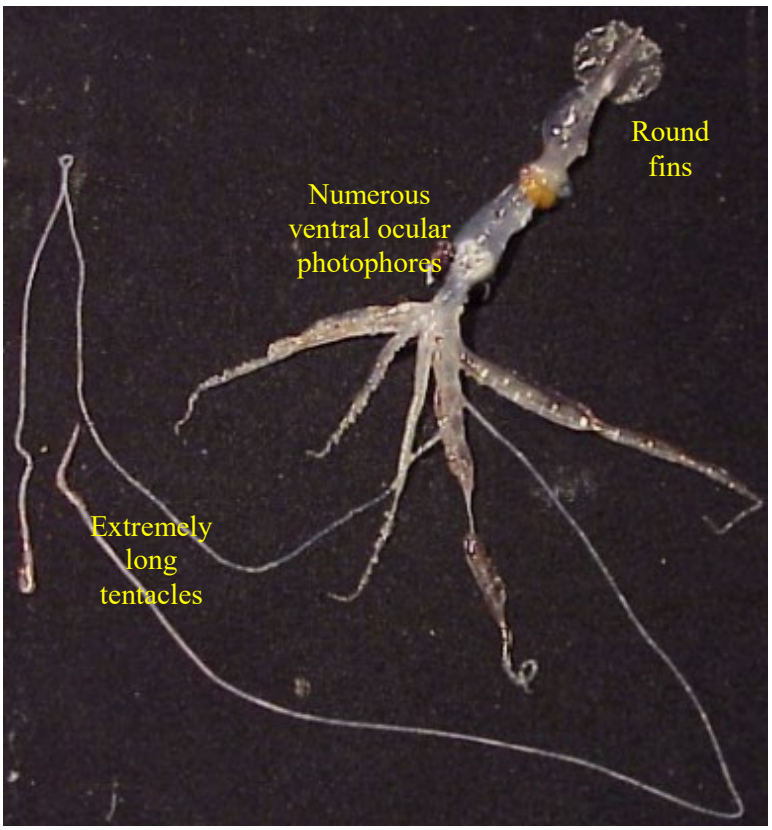
The bands of photophores and lack of tubercles on the mantle distinguish it from similar species.

Distribution

The complete distribution pattern has not been defined.

Squids

Chiroteuthis calyx



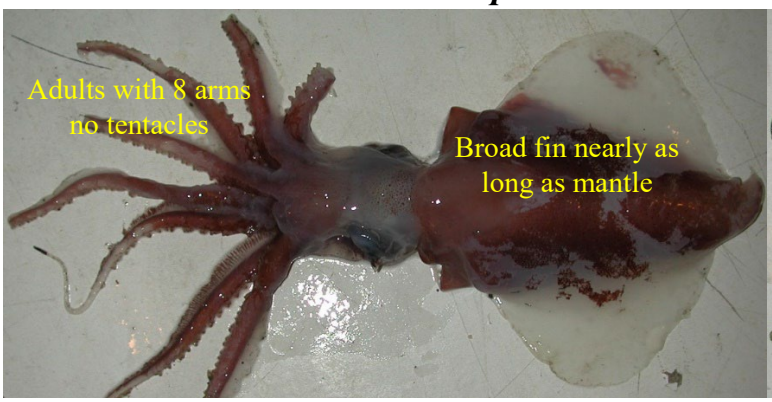
Description
The mantle of this transparent to dark purple squid is short and conical. The oval funnel locking cartilage has 2 knobs (tragus and antitragus). The fins together are circular without posterior lobes. The arm pairs get wider and thicker with each successive pair with arm pair. Arm pair IV is the longest. Arm pair IV has a series of photophores. The arms have 4 rows of suckers. The extremely long, thin tentacles have a series of photophores on the area just posterior to the tentacular club (stalk). The tentacular club has 4 rows of suckers the entire length. The eyes have numerous ventral photophores. Mantle length to 24 cm.
Similar species
Not likely to be confused with other species
Distribution
Bering Sea to southern California, 100-1200 m.

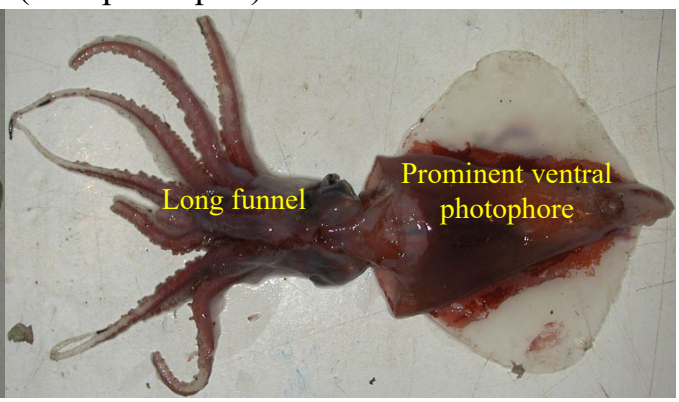
Vampyroteuthis infernalis Vampire Squid

Description
This gelatinous small to medium black animal is easily damaged during capture. The mantle has 2 pairs of fins when young and 1 pair as adults. The deep webbing extends nearly to the tips of the arms. The 8 arms have a single row of stalked suckers beginning about ½ way down the arm and continue to the tips flanked on each side by a row of long thin cirri. There is a pit in the webbing at the bases of arms I and II that contains a long thread-like filament. Adults have a pair of light organs at the base of the fins that can be masked by black tissue. Total length to about 30 cm.
Similar species
Not likely to be confused with other species
Distribution
Tropical and temperate seas worldwide, 75-3000 m.

Squids

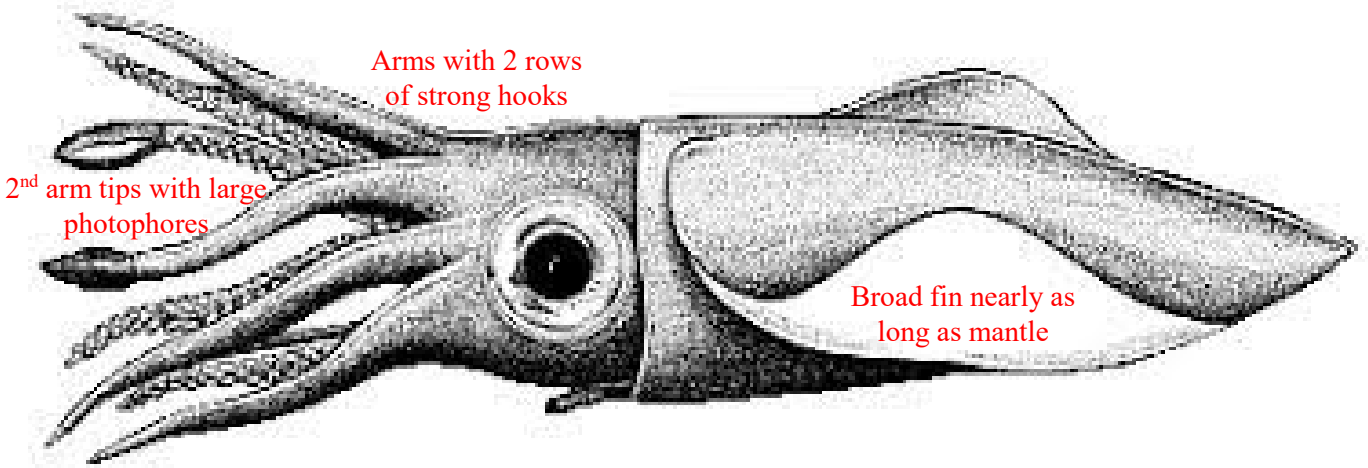
Octopoteuthis deletron (Octopus Squid)





Description
The broad fin of this squid is nearly as long as the soft conical mantle. When intact the 8 arms have 2 rows of hooks and a small terminal black spindle shaped photophore. Tentacles are present in juveniles but absent in adults. There is a prominent ventral photophore near the tip of the mantle.
Mantle length to 17 cm TL to 40 cm.
Similar species
Not likely to be confused with other species
Distribution
The Gulf of Alaska to Baja California, 0-700 m.

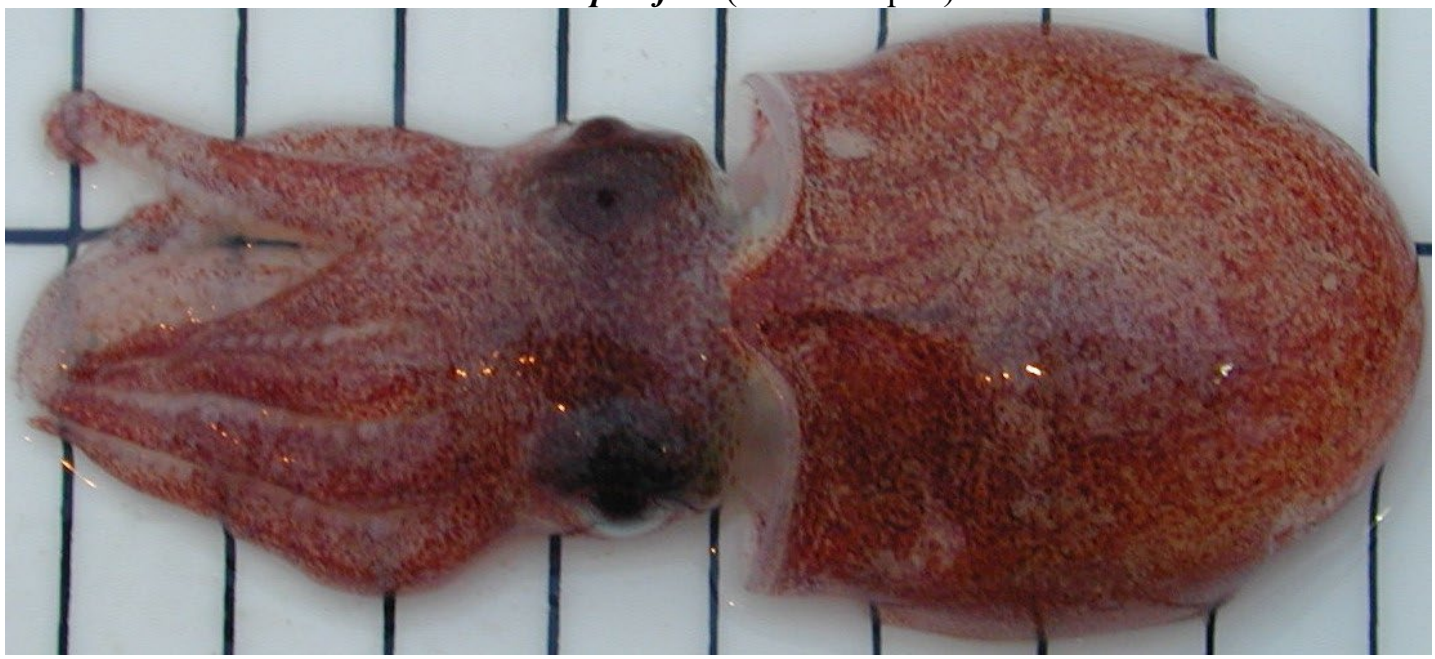
Taningia danae (Dana Octopus Squid)



Description
The large, robust, muscular mantle is dark maroon. The large broad fin is nearly as long as the mantle and is up to 130% of the ML wide. The short arms have 2 rows of strong hooks to the tips. The tips of arm pair II has a large lemon shaped photophore that can be exposed when the black eyelid-like skin folds are retracted. Arm pairs I-II & IV have no photophores. The tentacles cease to develop and are lost. Mantle length to 1.7 m
Similar species
Not likely to be confused with other species
Distribution
Circumglobal between about 55°N to about 45°S, 500-1500 m.

Cuttlefishes

Rossia pacifica (Bobtail Squid)



Description

The smooth, soft, dome-shaped mantle has ear shaped fins and is not fused to the dorsal side of the head. The sucker arrangement has 2 basal rows and 4 median and distal rows for both female and non-hectocotylized arms of the males, basally and 4 rows medially and distally. Males have enlarged suckers on arm pairs II-IV. The tentacular club is expanded and has a flattened sucker bearing face, with 6-8 suckers in transverse rows proximally and 4 rows distally. The color is highly variable light to dark red, maroon or brown often with gold and/or green highlights. Mantle length to 10 cm.

Similar species

Not likely to be confused with other species.

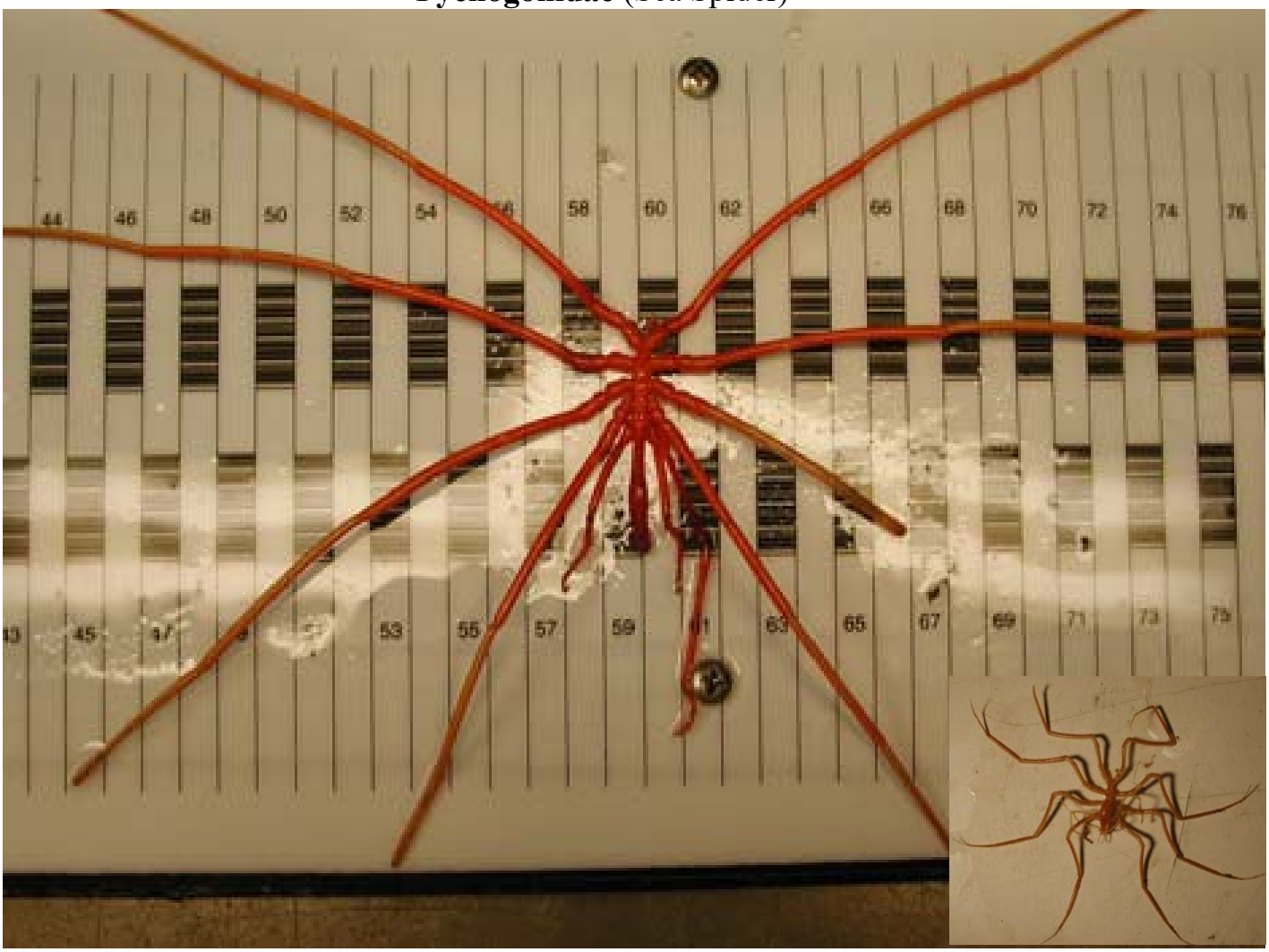
Distribution

The Bering Sea and Aleutian Islands to Baja California, 5-1000 m.

Sea Spiders Pycnogonidae

Pycnogonids are similar to land spiders in the lack of antennae and chelicerae (clawed appendages on the second anterior segment used for grasping and tearing food). The mouth is at the end of a sucking proboscis, and because of small body size, the gonads and digestive system extend into the legs. In some species, the chelicerae are absent and the proboscis enlarged. These animals are common on pilings or rocks or in deep water. Most are free-living but some are parasitic, primarily on molluscs.

Pycnogonidae (Sea Spider)



Identification

Seas spiders have 4-6 (usually 4) pairs of walking legs, a small body consisting of a cephalothorax, a much smaller unsegmented abdomen and 0-2 pairs of dorsally located simple eyes. The proboscis at the anterior region of the body region has limited movement and is used to ingest nutrients. Body color varies from red to tan. To 40 cm.

Similar species

Field identification beyond Pycnogonidae is problematic

Distribution

Worldwide in marine and estuarine waters, 0-7000 m.

Isopoda

Isopods do not have a carapace, and the first thoracic segment is fused with the head. The body is dorsoventrally compressed and the telson segments are fused together and with the last abdominal segment. Most isopods seen on the NMFS groundfish trawl survey are parasitic.

Isopod Unidentified

Description
There are many unidentified isopods seen in the trawl surveys. The one pictured here is olive, tan, or brown. The internal organs can be seen through the thorax. To about 3.5 cm.
Similar Species
There are many unidentified isopods seen in the trawl surveys. Similarities across genera and species make field identification problematic.
Distribution
North Pacific, all depths.

Anuropsus bathypelagica (Giant Isopod)

Description
This large dark pink to red isopod has an inflated thorax. To about 10 cm.
Similar species
The inflated thorax, size and color distinguish this isopod from other related species.
Distribution
Bering Sea to Oregon, 600 m and below.

Amphipoda

Amphipods can have a variety of body forms. They are usually laterally compressed and have morphologies similar to shrimp or euphausiids. They lack a carapace, and the head is fused with the first thoracic segment. The anterior most pereiopods are maxillipeds and the next several pairs of pereiopods are chelate (gnathopods), all of which are used with the antennae in feeding. The posterior pereiopods and uropods are used for locomotion. The many different body forms are indicators of habitat and behavior. Hyperiid amphipods are pelagic and most live commensally with gelatinous animals, such as salps, for at least part of their lives. These often have large heads and the eyes may be difficult to see. Gammarid amphipods are primarily benthic and generally have small heads and the most shrimp-like bodies. Caprellid amphipods have elongated bodies that are modified for living in tubes or crawling.

Cystisoma fabricii (Giant Salp-dwelling Amphipod)

Description

The body and enlarged compound eyes are transparent. Commensal with salps for part of their life cycle, they also use the three posterior most pereiopods for swimming. To about 10 cm.

Similar species

There are many different species of amphipods, although most are too small to identify at sea.

Distribution

North Pacific, 100-500 m.

Euphausiids

Euphausiids are a major food source for many marine mammals, birds, fish and larger invertebrates. Although similar in appearance to shrimp, they differ in that the gills are exposed (not covered by the carapace) and they lack maxillipeds and the modified feeding pereiopods found in shrimps. There are approximately 86 species in 10 genera worldwide but rarely seen in the groundfish survey due to their small size. Identification in the field beyond Euphausiid is problematic due to size and similarity between multiple genera and species. The two most commonly found during processing are pictured below.

Euphausia pacifica

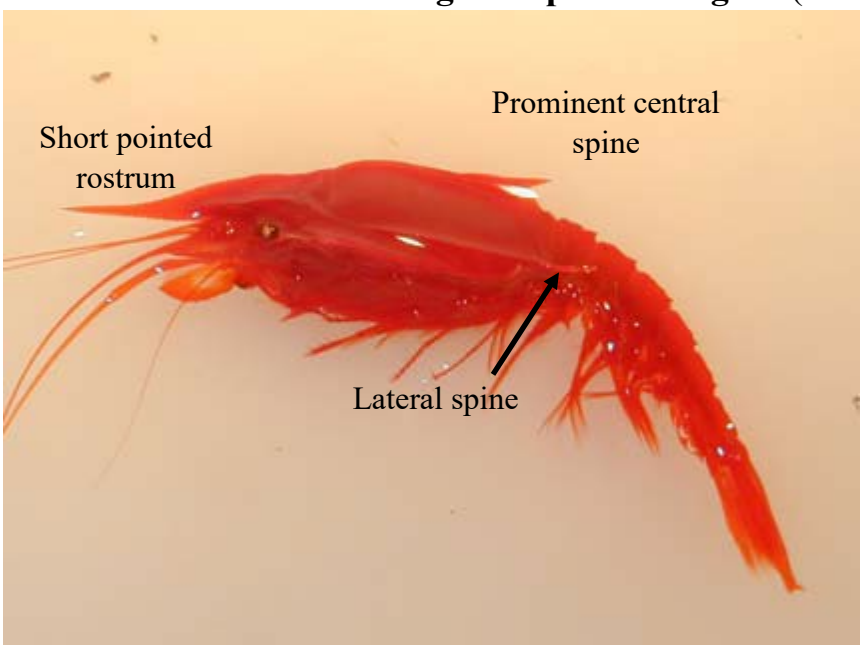
Thysanoessas pinifera

Opossum Shrimp

Opossum shrimp, members of the orders Lophogastrida and Mysida derive their name from the presence of a marsupium or brood pouch in the females where the larvae are reared. Although similar in appearance, the Lophogastrida can be separated from the Mysida by having visible gill filaments on some of the thoracic appendages. There are over 1000 recognized species of opossum shrimp distributed worldwide mainly in marine habitats but also in brackish and freshwater. Although some species can reach 35 cm, most are small 1-3 cm. Many closely related species occur within the boundaries of the Groundfish Survey, the majority take microscopic examination to determine identification making field identification problematic.

Lophogastrida

Neognathophausia ingens (Giant Red Mysid)



Description
A large dark red shrimp with a short pointed rostrum, a prominent central anterior spine and one lateral spine on each side of the posterior edge of the carapace. The central telson (tail) scale has two prominent, longitudinal ribs. Length to 35 cm.

Similar species
Neognathophausia gigas has a longer rostrum, a third central rib on the telson, and a small central anterior spine.

Distribution
Worldwide but mainly from 40°N to 40°S at 500-4000 m.

Neognathophausia gigas

Description
This large red shrimp has a long, sharply pointed rostrum, a small anterior spine and a larger lateral spine on each side of the posterior edge of the carapace. The central telson scale has two prominent lateral and a single smaller medial rib. Length to 35 cm.

Similar species
Neognathophausia ingens has a shorter rostrum, a large anterior spine, and lacks the central telson rib.

Distribution
Worldwide from 60°N to 69°S at 600-4400 m.

Opossum Shrimp Lophogastrida

Neognathophausia sp. A

Description

This red, laterally compressed shrimp has a long, serrated rostrum. There is a prominent central spine and single lateral spine on each side of on posterior margin of the carapace and a prominent spine on the posterior margins of each abdominal segment. Length to about 8 cm.

Similar species

Neognathophausia ingens and *N. gigas* lack the highly serrated rostrum and spines on the abdominal segments.

Distribution

This specimen was captured below 600 m off California.

Lophogastridae sp. A

Description

This large laterally compressed red shrimp has a short serrated rostrum with a rounded crest at the base. There is a prominent ridge on the posterior half of the carapace and prominent spines on the posterior margins of the abdominal segments. Length to 10 cm.

Similar species

Many species are difficult to distinguish in the field.

Distribution

This specimen was captured in deep water off central California.

Opossum Shrimp Mysida

Mysid Unidentified

Description

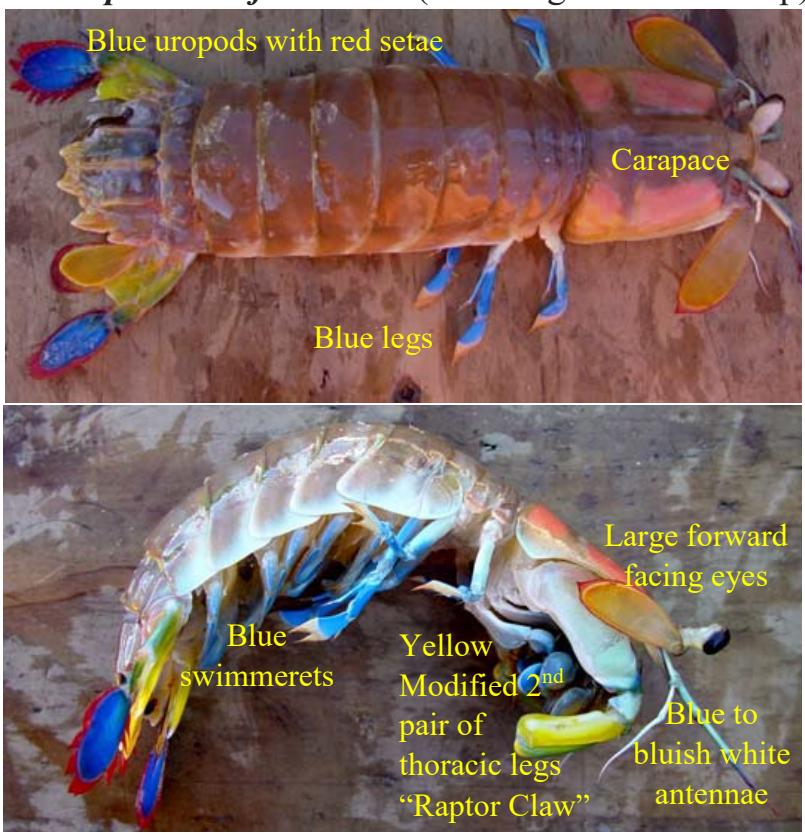
Most mysids are nearly transparent to brown or bright red/orange, small and rarely captured in survey trawls. Generally mysids have 2 pairs of antennae and a pair of large, stalked eyes. The head and first segment or up to the first 3 segments of the thorax are fused forming the cephalothorax. The carapace is attached to the first 3 thoracic segments but covers the first 8. The first 2 thoracic segments have maxillipeds for filtering feeding. The other 6 pairs or pereiopods are biramous (branched) and used for swimming and fanning water to the maxillipeds. Females have a pouch or marsupium under the thorax where the eggs hatch and the larvae develop. There are six abdominal segments with pleopods on the first five, but may be undeveloped or absent in females. The male's fourth pleopod is longer than the others and is used in reproduction.

Mantis Shrimps Stomatopoda

With colloquial names such as Sea Locust, Prawn Killer and Thumb Splitter the stomatopoda consist of approximately 450 species of carnivorous marine crustaceans that mainly inhabit tropical and subtropical waters of the Indian and Pacific Oceans although a few species can be found in temperate waters. Most species are small (10 cm or less), a few species can exceed 30 cm. A short carapace covers the rear of the head and the first 4 thoracic segments. The tri-lobed eyes are mounted on stalks and can move independently of each other. Possessing 12-16 types of photoreceptor cells, each compound eye is made up of thousands of ommatidia (ommatidium the optical unit that make up a compound eye). Each eye consists of 2 flattened hemispheres, separated by 2-6 parallel rows of specialized ommatidia called the midband. This divides the eye into 3 regions giving the animal tri-ocular vision. The mantis shrimp's second pair of thoracic appendages (Raptor Claw) are highly modified and the differences divide stomatopods into different groups based on the type of claw they possess. Most species fall into the groups known as smashers and spearers. A few rarely encountered smaller groups exist the Hatchet and Spike Smashers. **Smashers** have a well-developed club with a more rudimentary spear. The club is used to bludgeon and smash their prey. The inner edge of the terminal end of the claw can have a sharp edge for cutting prey. **Spearers** have appendages with numerous barbed spines for stabbing and grasping. **Hatchet** have a small claw with 5 or more teeth on the dactylus (movable finger on the claw). **Spike Smashers** (Hammers or primitive Smashers) have a claw that is intermediate in development between the smashers and spearers.

Mantis Shrimps Stomatopoda

Hemisquilla californiensis (Blue Leg Mantis Shrimp)



Description

The flattened body and carapace are translucent orange/brown to brown with blue walking legs and antennae. Adults especially males may have yellow, blue, and red highlights. The raptor claw is yellow. The broad uropods are bright blue with red setae. The large upright and forward looking eyes are mounted on mobile stalks and can move independently of each other. Length to 32 cm one of the largest of the smashers.

Similar species

The large size and unique color pattern distinguish it from the other stomatopods in the area

Distribution

Southern California to Peru, 0-90 m.

Pseudosquillopsis marmorata

Description

The color of the flattened body and carapace varies from a mottled brown to orange brown with distinctive red, pink or purple uropods, exopods, and setae and white antennae. The raptor claw's broad pale yellow propodus has a hatchet shaped heel. The white dactyl has 3 spines. The telson is carinate with a series of spines along the posterior margin the longest being the first spines flanking the central carinae. The strongly bi-lobed brown eyes have 3 rows in the mid-band and flank a long pointed rostral plate. Length to 15.5 cm.

Similar species

Formerly known as *Pseudosquilla marmorata* the distinctly red, pink, or purple uropods and strongly bi-lobed eyes with only 3 rows of ommatidia in the midband distinguish it from the other stomatopods in the area.

Distribution

Southern California to Ecuador, 0-100 m most common 0-30 m.

Mantis Shrimps Stomatopoda

Schmittius politus (Polished Mantis Shrimp)

Description

The overall color of flattened body and carapace is usually a light golden brown to green/brown with scattered dark brown pigments throughout. The long, light colored antennae have short antennal scales. The dactylus of raptor claw has 4 teeth. The long, thin uropods extend past the telson. The telson has long cerate spines (teeth) on the posterior margin. The bi-lobed eyes have 2 rows of ommatidia in the midband and flank a somewhat broad rounded triangular rostrum. Length to 6 cm.

Similar species

The uniform color, 4 dactyl teeth, and uropods extending past the long spined telson distinguish it from the other stomatopods in the area.

Distribution

Monterey Bay to Punta Abreojos, Mexico, 12-185 m

Nannosquilla anomala

Description

The flattened body and carapace are covered with dark chormatophores sometimes aggregated along the central midline. The eyestalks have large black chormatophores. Each gastric groove has a dark spot near the anterior margin of the carapace. The anterior portion of the carapace and the anterior appendages are darker than the dorsal surface. The lateral margin of the sixth somite, margin of the uropod, and all except the median of the telson are black. The small sub-globular eyes do not extend past the antennular peduncle, have 6 rows of ommatidia in the midband, and the cornea is set obliquely on the eyestalk. The rostrum is broadly rectangular (wider than long) with a slightly rounded anterior angles (corners) and either a straight anterior margin or there may be a small rounded anterior facing point. The raptor claw has 10-14 spines (including the distal spine) on the inner margin. Length to just over 4 cm.

Similar species

Extremely rare however, the mostly uniform dark coloration, 14 spines on the dactyl, the obliquely set eye with 6 rows in the midband distinguish it from the other stomatopods in the area.

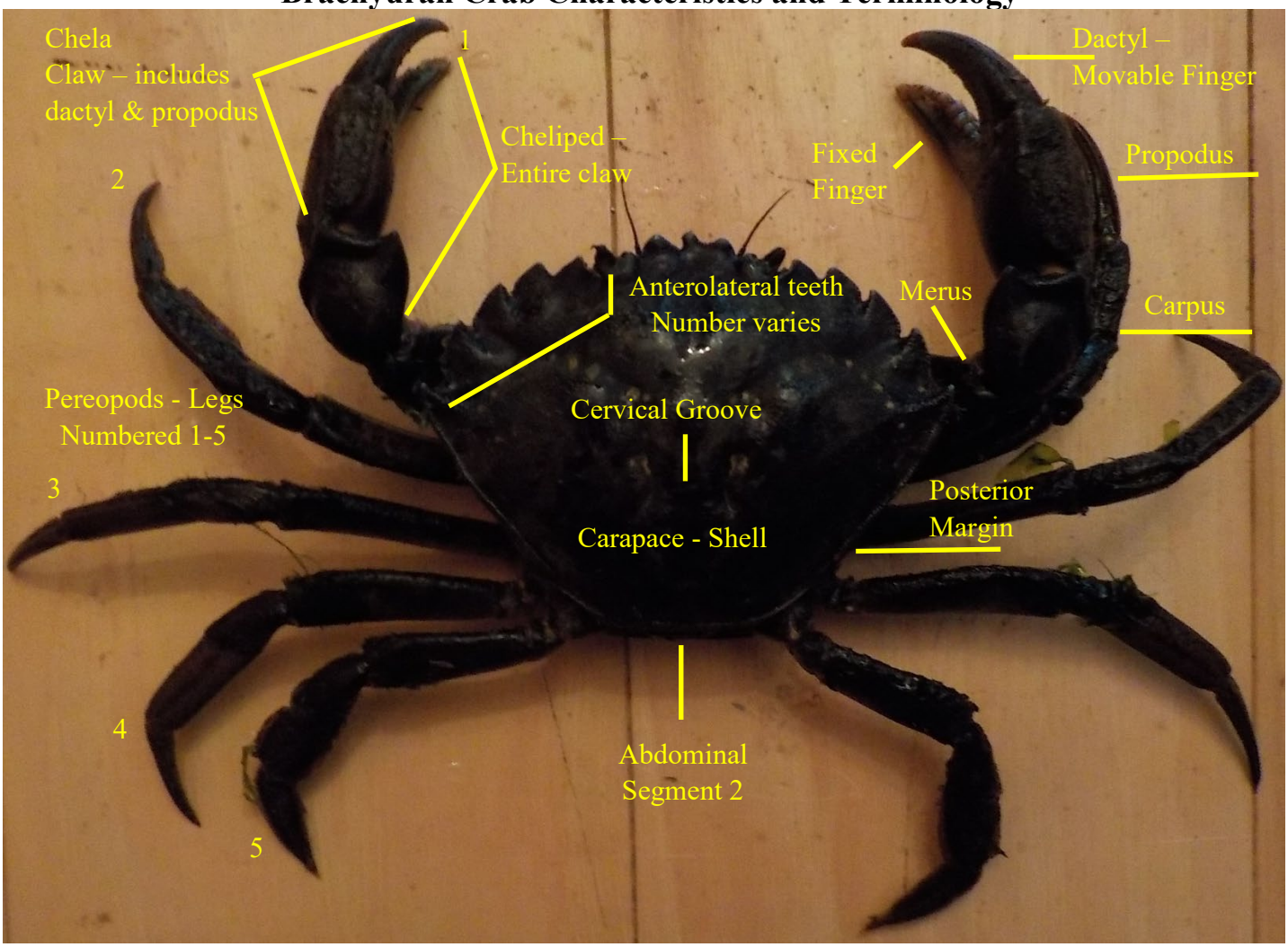
Distribution

The ranges have not been defined currently San Clemente and the Channel Islands, 5-23 m.

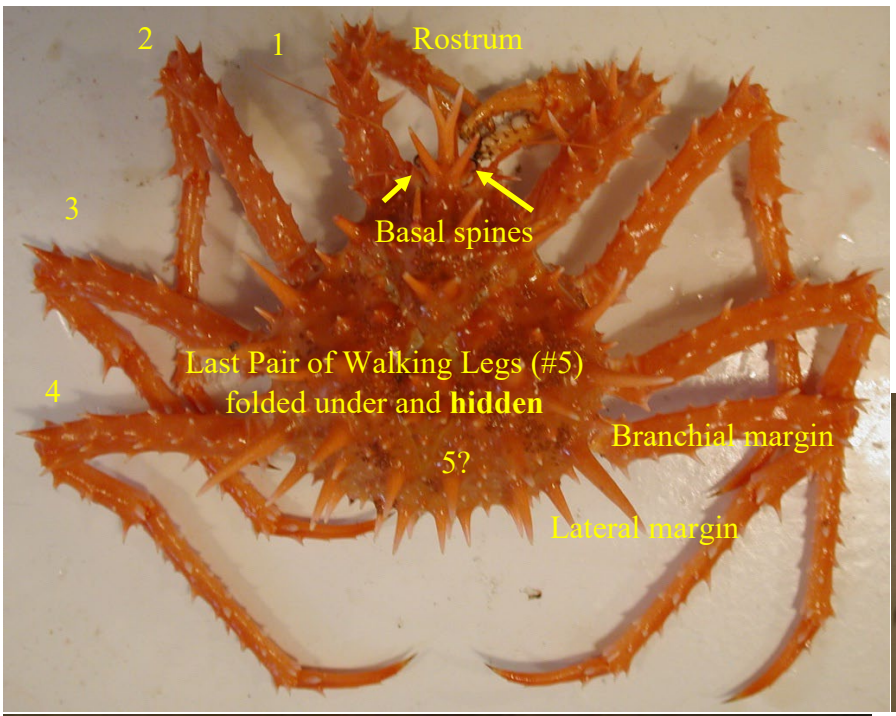
Arthropods Arthropoda
Decapods Decapoda

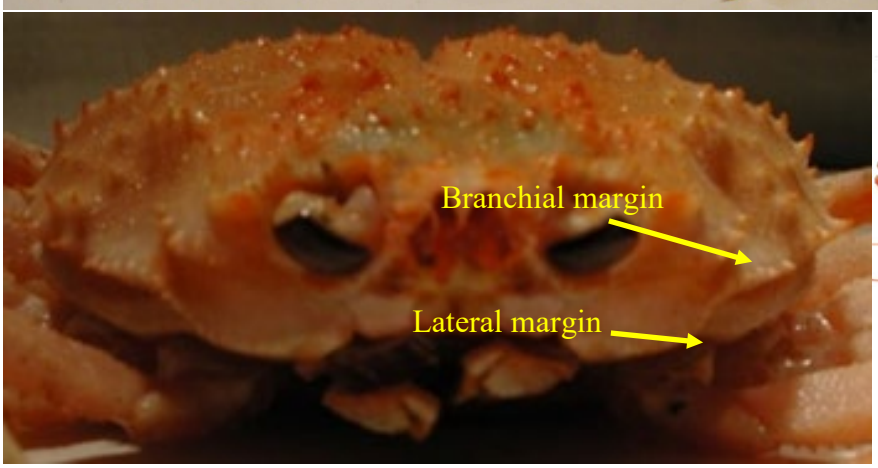
The first 3 pairs of appendages (maxillipeds) in decapods or crabs, are modified for feeding. The next 5 pairs of appendages (Pereopods) are the walking legs. The anterior end of the first pereopod has been modified into a claw (Cheliped) used for grabbing and holding prey or in defense. The last pair of legs in Portunid crabs is modified for swimming. The two infraorders represented here, the Brachyurans, or 'true crabs' have a reduced abdomen tucked under the thorax, a flat, broad body for crawling, and all antennae are between the eyes. And the Anomurans that vary in anatomy. The abdomen may be asymmetrical, as in hermit crabs, or beneath the thorax. Life history is variable, some depending on discarded shells or burrowing for protection. For many crabs the shape of the rostrum and characteristics of chelipeds are distinguishing.

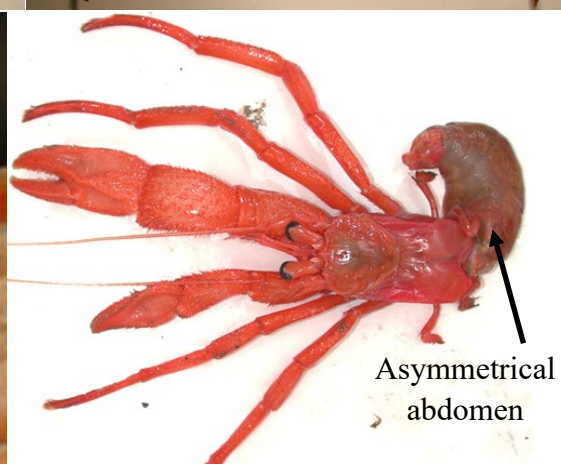
Brachyuran Crab Characteristics and Terminology



Arthropods Arthropoda
Decapods Decapoda
Anomuran Crab Characteristics and Terminology





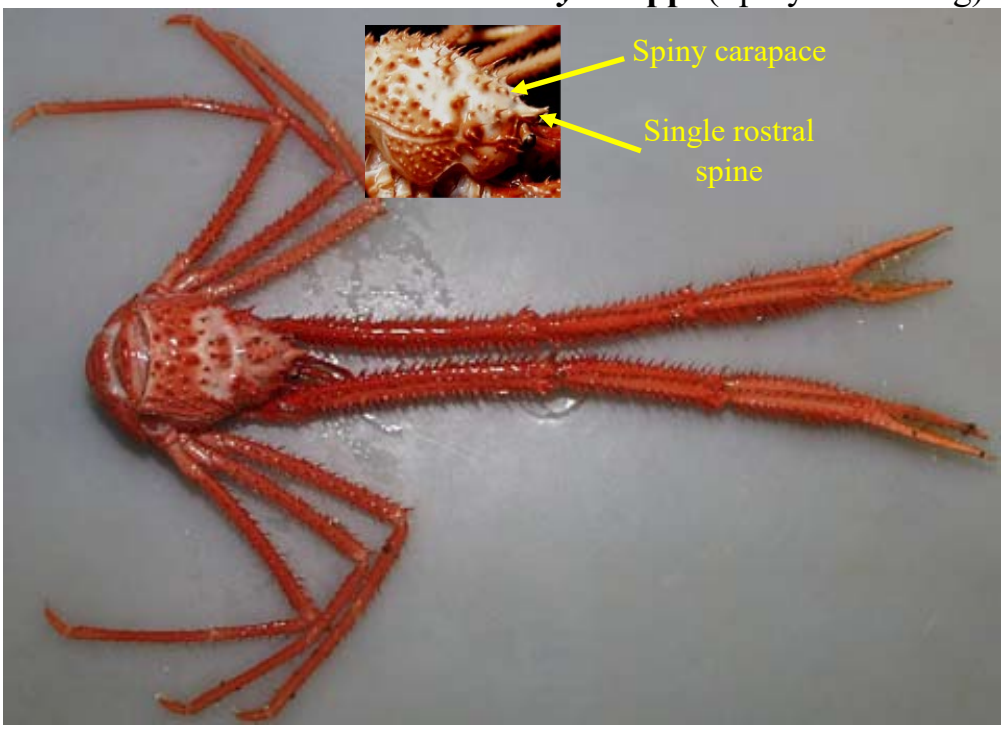


Squat Lobsters

Recent investigations into the phylogeny (history of the evolution of a species or group) of the infraorder Anomura has shown the Galatheoidea (Galatheid Crabs) to be polyphyletic (derived from more than one common evolutionary ancestor and thus not suitable for placement in the same taxon). Which warrants the removal of the Chirostylidae and Kiwaidae into a separate superfamily, Chirostyloidea.
Squat lobsters (Chirostyloidea and Galatheoidea) are abundant, with approximately 1000 recognized species distributed worldwide in all marine habitats, from intertidal to over 5400 m, including anchialine caves and hydrothermal vents. Several closely related species are known to occur within the range of the FRAM West Coast Surveys making field identification to the species level problematic.

Squat Lobsters Chirostyloidea

***Chirostylus* spp.** (Spiny Pinch Bug)



Description
Chirostylus is orange to red with extremely long spiny arms and a small spiny body. The arms and carapace are highly spinose. There is a single rostral spine with smaller spines posterior to the base. Carapace to 2.5 cm.
Similar species
The thorn-like spines on the carapace and extremely long spinose arms distinguish this genus from the other squat lobsters in this guide.
Distribution
Gulf of Alaska to Oregon, 1000 m and below.

Galatheoidea

Janetogalathea californiensis (California Pinch Bug)

Description
California Pinch Bugs have medium-length chelipeds, spiny arms and claws. The broad, flattened rostrum has five forward pointing spines. The orange carapace is white between the ridges. Some of the arm spines white tips. Carapace to about 2.5 cm.
Similar species
Pleuroncodes planipes has a single rostral spine and shorter arms. *Munida* spp. have longer arms and distinguishing rostra.
Distribution
Southern California to Baja California, 300 m and below.

Squat Lobsters Munididae

Pleuroncodes planipes (Pelagic Red Crab)

Description
Pelagic red crabs can be orange to red, have very short chelipeds and the arms are covered with hairs and tubercles. The rostrum is a single slender spine. Carapace length to 2.5 cm.
Similar species
Janetogalathea californiensis arms are very spiny and there is a flat, five-pronged rostrum. *Munida* spp. have longer arms and different rostral spine configurations.
Distribution
Southern California to Baja California, 0-700 m.

Munida quadrispina (Pinch Bug)

Description
Pinch bugs are red to orange and have distinct transverse ridges on the carapace. The chelipeds and chelae are long. There rostrum has three forward pointing spines with only the central spine extending to the front of or past the eyes. Carapace length to 2.5 cm.
Similar species
Munida hispida has a long, three-pronged rostrum and a more limited geographic range. *Janetogalathea californiensis* and *Pleuroncodes planipes* have relatively shorter arms and different rostra.
Distribution
Bering Sea to Baja California, 20-650 m.

Squat Lobsters Munididae

Munida hispida

Description

Munida hispida are red to orange with distinct transverse ridges on the carapace. The chelipeds and chelae are long and the rostrum has a central rostral spine with a single basal spine angling outward on each side all rostral spines extend past the eyes. Carapace length to 2.5 cm.

Similar species

Munida quadrispina has 3 forward-pointing rostral spines and the basal spines don't extend past the eyes. *Janetogalathea californiensis* and *Pleuroncodes planipes* have shorter arms and different rostra.

Distribution

Southern California to Baja California, 600 m and below.

Munidopsidae

Unlike the other families in this guide the Munidopsidae have unfacetted and unpigmented eyes.

Munidopsis hystrix

Description

Munidopsis hystrix has a single rostral spine with 1-3 lateral spines on each side. The spiny orange carapace lacks the transverse ridges of other species. Carapace length to 2.5 cm.

Similar species

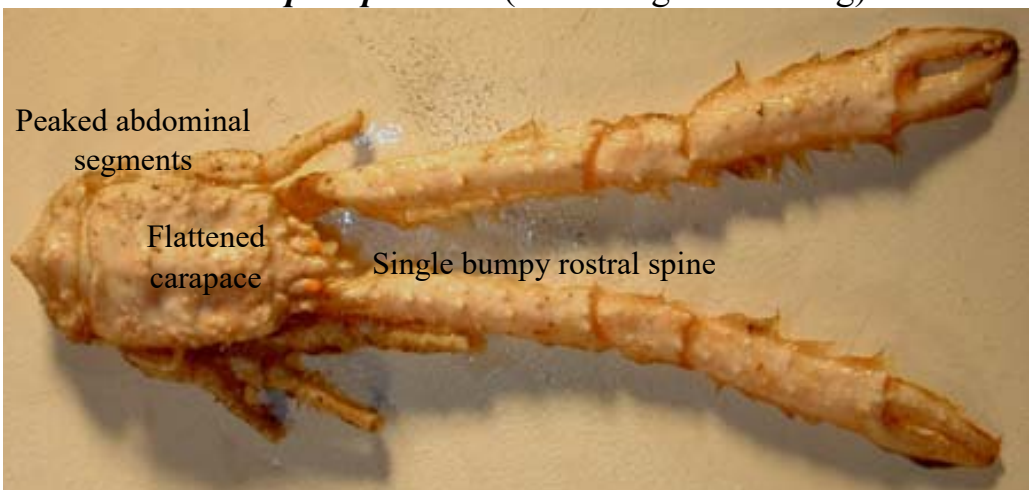
The distinct rostrum distinguishes *Munidopsis hystrix* from other species in this guide.

Distribution

Southern California to Baja California, 600 m and below.

Squat Lobsters Munidopsidae

Munidopsis quadrata (Pale Rough Pinch Bug)



Description

The flattened, pale pink to white carapace and the claws are tuberculate. The abdominal segments have a pronounced sharp peak. The rostrum is a single bumpy spine. Carapace length to 1 cm.

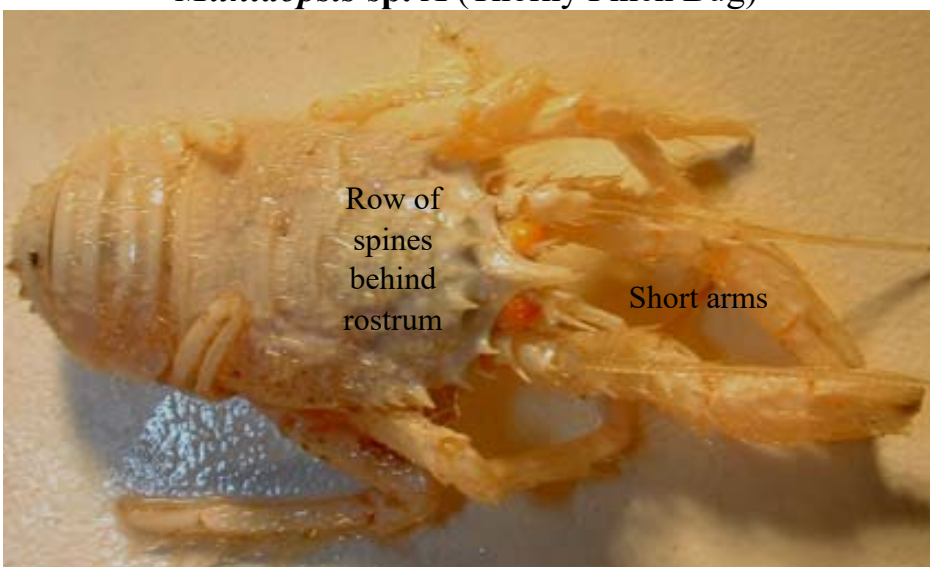
Similar species

The sharply peaked abdominal segments and single, bumpy rostrum distinguish this species from the others in this guide.

Distribution

Southeast Alaska to Mexico, 500 m and below.

***Munidopsis* sp. A** (Thorny Pinch Bug)



Description

Thorny pinch bugs are pale pink to white. There are small tubercles and spines on the rounded carapace and abdominal segments. The chelipeds are short, and there is a row of spines just posterior to the single smooth rostral spine. There are a series of small spines directly posterior of the rostrum. Carapace length to 1 cm.

Similar species

The smooth rostral spine, spiny carapace, and short arms distinguish this species from others in this guide.

Distribution

Unknown, taken off Oregon, below 1000 m.

Stone and King Crabs Hapalogastridae

Acantholithodes hispidus (Fuzzy Crab)

Description

The thick, soft, spinose abdomen is calcified only at the base, not held tight to the thorax. The flat, heart or pear shaped carapace and legs have stout spines and hairs. The rostrum has stout spines along its length. The body and legs are mottled brown, red, and white. The claws are reddish-orange with white teeth. Carapace width to 7.5 cm.

Similar species

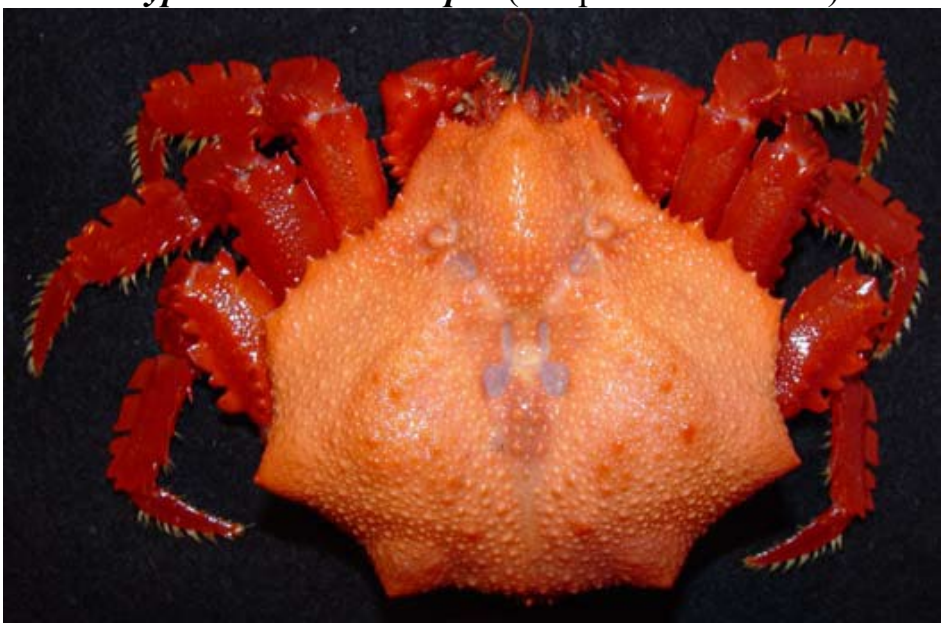
The spiny soft abdomen and spiny rostrum distinguish *Acantholithodes hispidus* from similar species.

Distribution

Bering Sea to California, 30-300 m.

Lithodidae

Glyptolithodes cristatipes (Deep-sea Rock Crab)



Description

The tuberculate sub-triangular carapace has 5 antereolateral teeth, raised and conical gastric areas, crescent shaped branchial ridges and deep central fossa (pits or grooves). The lateral margins of the flattened walking legs and basal portions of the cheliped have setae and blade-like spines. The rostrum is straight and triangular. Color varies from dark orange to red. Width to 10 cm.

Similar species

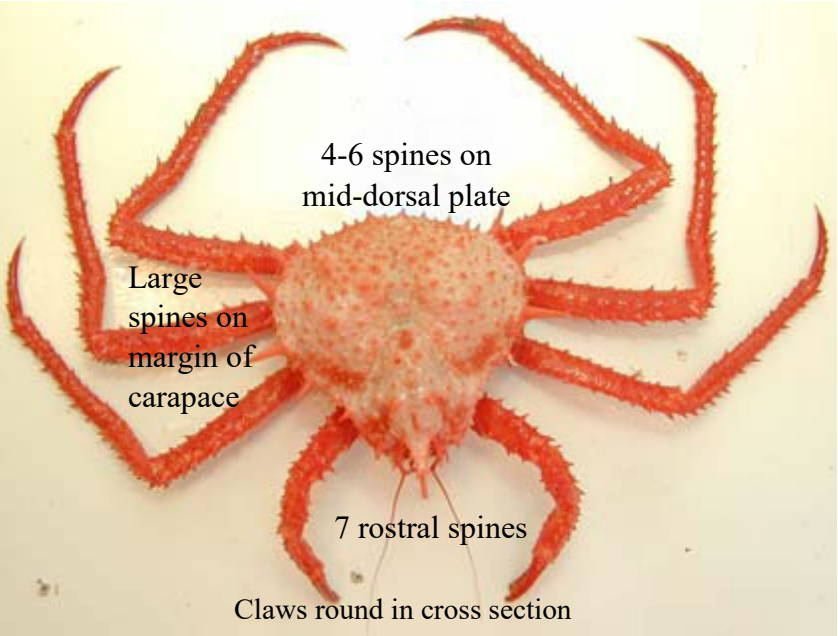
Paralomis verrilli has long legs, regular spines, and a three-pronged rostrum.

Distribution

Southern California to Chile, 180-800 m.

Stone and King Crabs Lithodidae

Lithodes couesii (Scarlet King Crab)



Description

Scarlet king crabs vary in color from dark red to pink. The spines on the lateral margin of the carapace are much longer than those on the dorsal surface. The rostrum has 7 spines and 4-6 spines on the mid-dorsal plate. The claws have pebble-like teeth and are round in cross section. Carapace width to 15 cm.

Similar species

Neolithodes diomedeae has 3 rostral spines long carapace spines and triangular claws.

Distribution

Bering Sea to Baja California, 800 m and below.

Lithodes aequispinus (Golden King Crab)

Description

Golden king crabs are brown to brownish yellow with some yellow highlights. The lateral margin spines are about equal to, to slightly longer than the dorsal spines. There are 5-9 mid-dorsal plate spines and 9-10 rostral spines. Carapace length to 17 cm or more.

Similar species

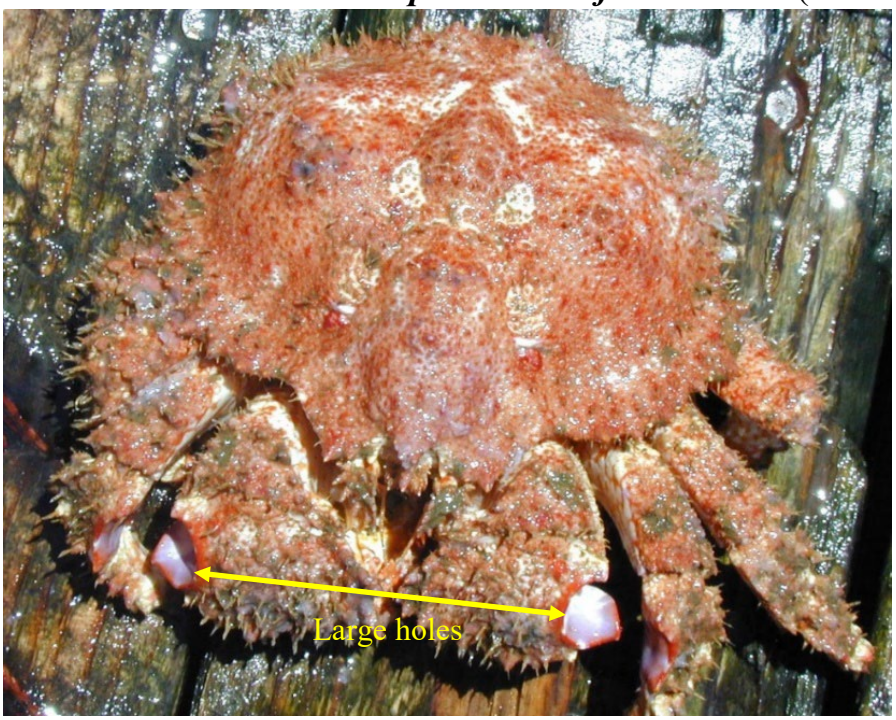
Scarlet king crabs are red to pink, have 7 rostral spines, 4-6 mid-dorsal plate spines, spines on lateral margin longer than the dorsal spines.

Distribution

Bering Sea to Baja California, 800 m and below.

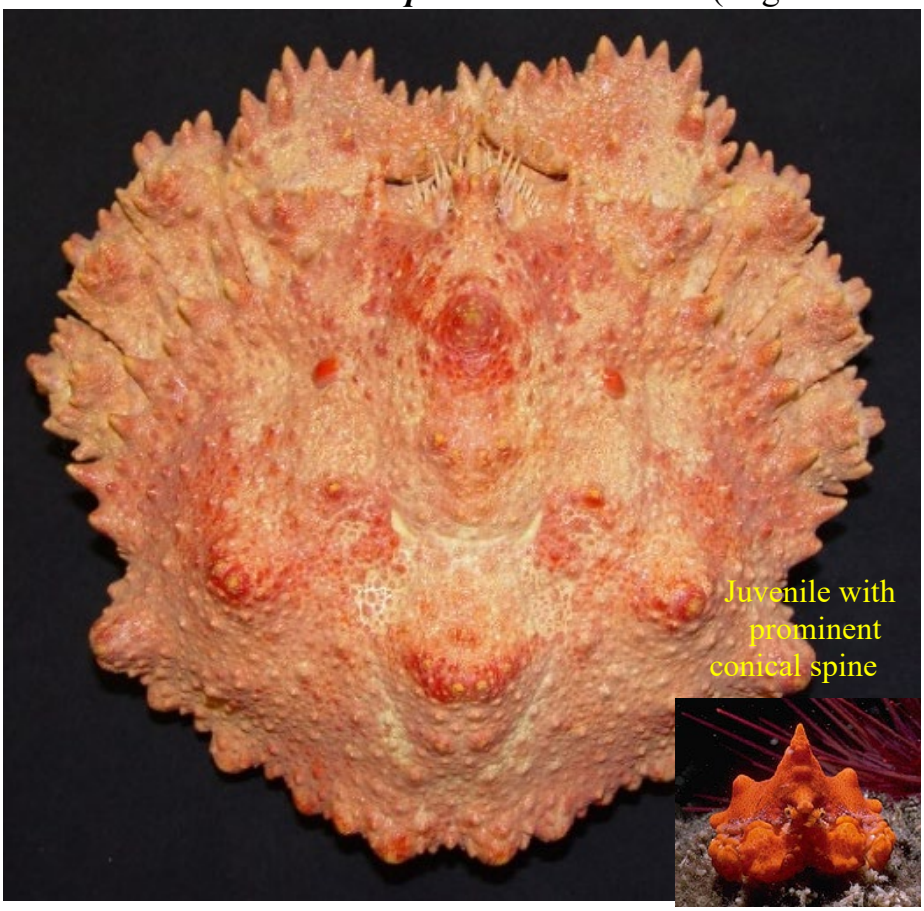
Stone and King Crabs Lithodidae

Lopholithodes foraminatus (Brown Box Crab)



Description
Brown box crabs are brown with red/brown mottling. The legs and chelipeds have hairs or setae and spine-like tubercles. When folded against the body, the chelae and first walking leg form a large hole. Width to 15 cm.
Similar species: *Lopholithodes mandtii* has blunt rounded spines and lacks the hole
Distribution: Gulf of Alaska to California, 0-300 m.

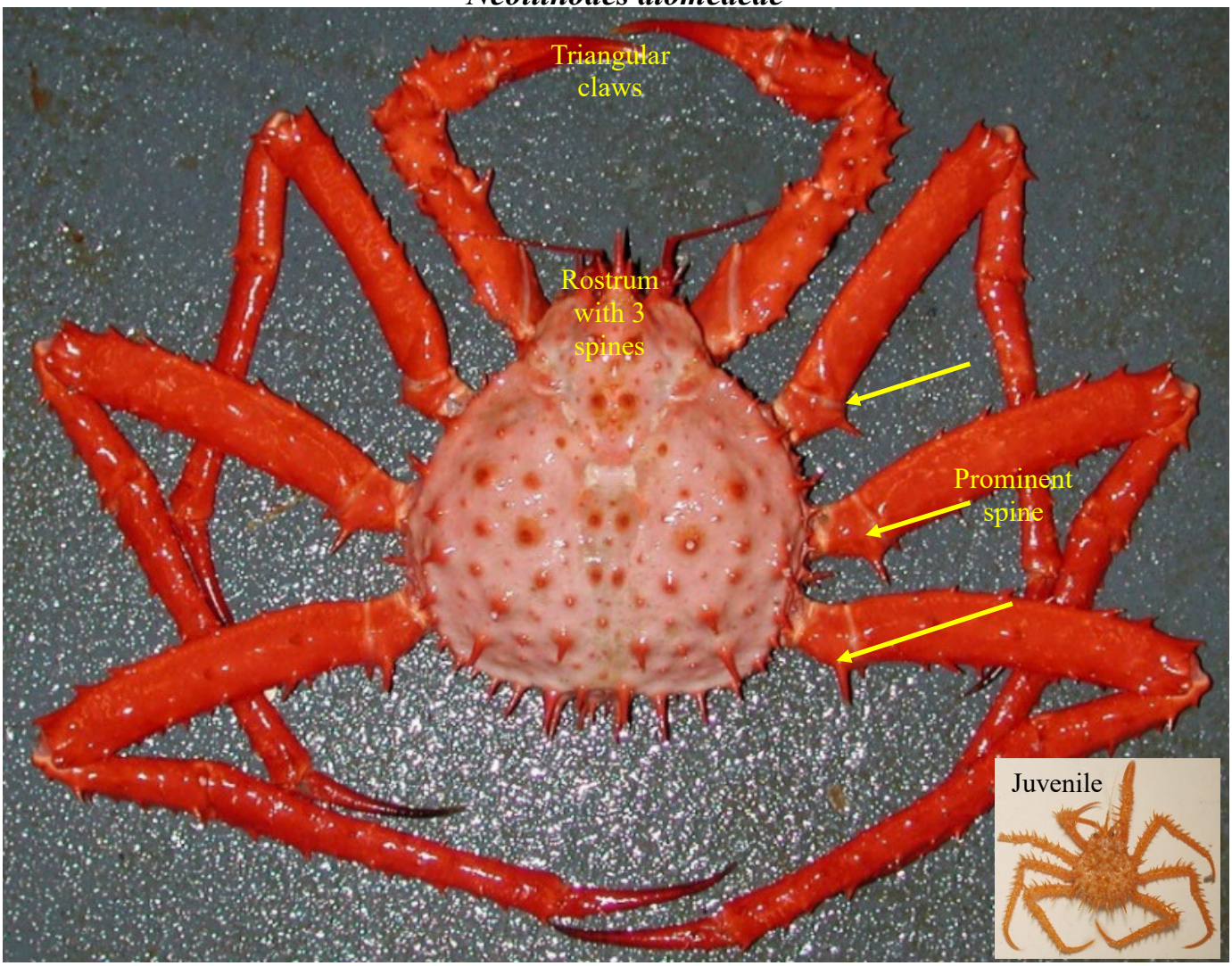
Lopholithodes mandtii (Puget Sound King Crab)



Description
Puget Sound king crab are brown mottled with red, orange, blue and purple. The carapace, chelae and legs are covered with blunt tubercles. And when folded against the body, there is no distinct hole. Juveniles tend to be mostly orange and have a distinct large conical spire on the carapace. Width to 30 cm.
Similar species
Lopholithodes foraminatus are drab in color, has spine-like tubercles on the legs and when folded against the body the chelae and first walking legs form a distinct hole.
Distribution
Gulf of Alaska to Monterey Bay, California, 2-140 m.

Stone and King Crabs Lithodidae

Neolithodes diomedeae



Description

The spines on the carapace, walking legs and chelae of juveniles are long, sharp and numerous. The spines decrease in number and size with growth. Adults have prominent spines on the lateral margins of the carapace and short conical spines on the dorsal surface. The spines become reduced on the flattened legs remaining strongest on the anterior and posterior edges with a single strong spine sometimes with a smaller secondary spine on the posterior margin of the first segment. The rostrum consists of a single rostral spine flanked on each side by a single basal spine for a total of 3 spines. The claws become very attenuated and triangular in cross section. The color can be uniform or a combination of various shades of red with orange or pink. Width to about 15 cm.

Similar species

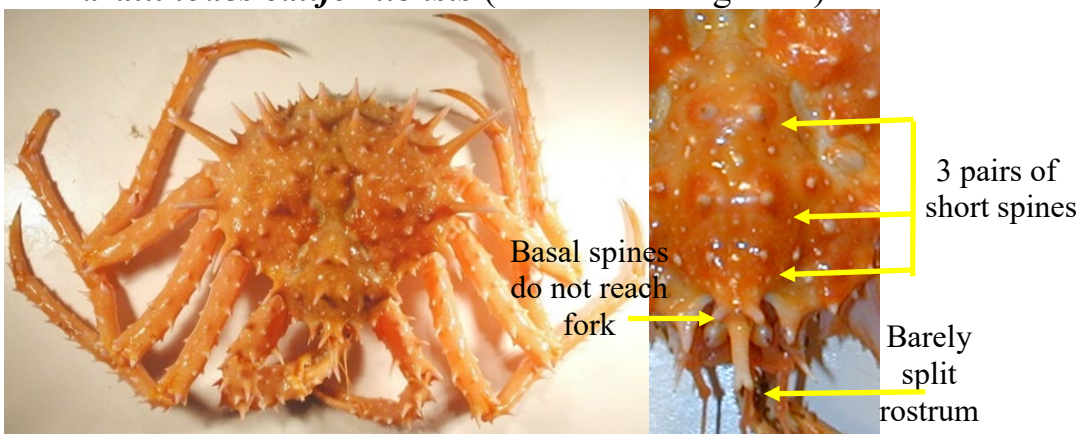
Lithodes couesii has 7 rostral spines, stout claws round in cross section, round spiny legs without the prominent spine on the 1st segment.

Distribution

The eastern Pacific, southwest Atlantic and portions of the Southern Ocean from approximately 37°N to 73°S, 200-2454 m.

Stone and King Crabs Lithodidae

Paralithodes californiensis (California King Crab)



Description

California king crabs are pale to dark orange the distal portions of the spines can lighten and become white to bluish white. The carapace has long spines along the margin and shorter spines on the dorsal surface. The rostrum is short with a small split at the tip, the basal spines are short, not extending to the base of the split, and the first 2-3 pairs of spines just posterior to the rostrum are short. Width to about 10 cm.

Similar species

Paralithodes rathbuni has a long deeply forked rostrum. The basal spines reach the fork and the first 2 pairs of spines posterior to the rostrum are long.

Distribution

San Francisco Bay to Baja California, 100-600 m.

Paralithodes rathbuni (Forknose or Spiny King Crab)

Description

Spiny king crabs are pale to dark orange. The spines are usually uniform in color but can have white tips. The margin and dorsal surface of the carapace have long spines. The basal spines of the long, deeply forked rostrum extend to, or slightly beyond the split, and the first 2 pairs of spines posterior to the rostrum are long. Width to about 8 cm.

Similar species

Paralithodes californiensis has a short barely split rostrum and short basal spines not reaching the split and short spines behind the rostrum.

Distribution

Southern California to Baja California, 100-800 m

Stone and King Crabs Lithodidae

Paralomis multispina (Hair Crab)

Description

The color varies from light pinkish white to dark red. The carapace about as long as wide and along with the rounded walking legs and chelipeds, are covered with small sharp spines and setae. The single rostral spine has a single basal spine on each side. Width to 10 cm.

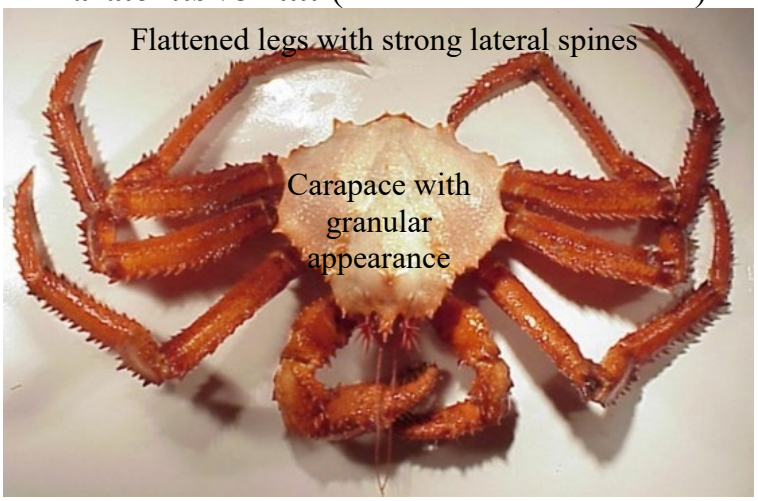
Similar species

Paralomis manningi has a forked rostrum and flattened legs with strong marginal spines and small spines on the dorsal surface.

Distribution

Bering Sea to Baja and the Gulf of California, 800-1577 m.

Paralomis verrilli (Red or Vermillion Crab)



Description

The carapace varies from red to pale reddish tan, and the appendages are a uniform dark red. The carapace is slightly longer than wide with spines on the margins and elevated areas. Flat tubercles give the carapace a granular appearance. The flattened walking legs have strong spines on the lateral margins and small spines on the dorsal surface. The small bifid rostrum has a strong sub-rostral spine. Width to 10 cm.

Similar species

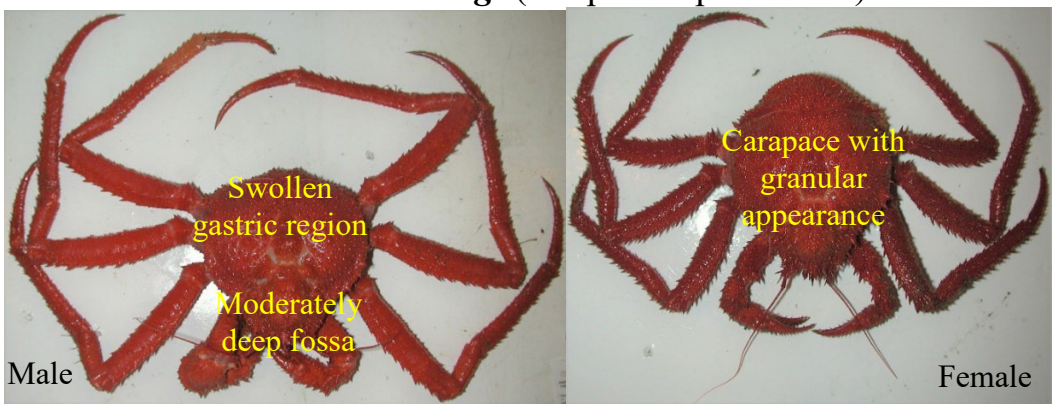
Glyptolithodes cristatipes has flattened spines on the legs, a single rostrum spine, and large cone-like projections on the carapace.

Distribution

Bering Sea to Baja California, 1000-2400 m.

Stone and King Crabs Lithodidae

Paralomis manningi (Deep-sea Spider Crab)



Description

The carapace is somewhat longer than wide and covered with small, variously sized granules, small spines, and setae with a granular crest and slightly larger spines on the lateral margin. The convex gastric region is more prominently swollen than the other regions. There are moderately deep central fossa. The flattened legs have small variously sized granules on the dorsal surface, a strongly serrated anterior margin and a reduced serrated posterior margin. The asymmetrical claws taper to attenuated points and the whole cheliped is armed with small spines and setae. The rostrum consists of a nearly horizontal central spine and two dorsal spines that point slightly up and out. Width to 10 cm.

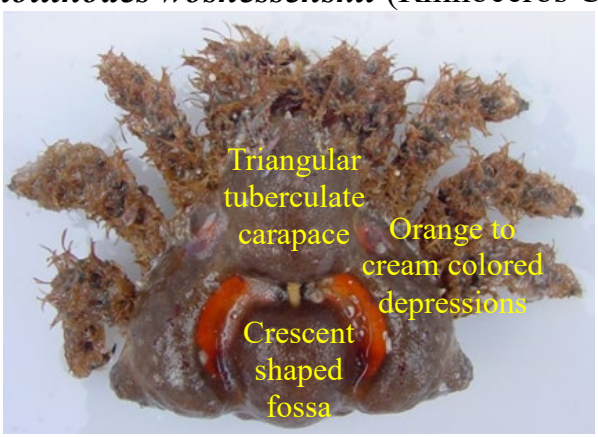
Similar species

The fork of *Paralomis multispina* rostrum originates at the rostrum base.

Distribution

The complete distribution pattern has not been defined, apparently deep water from 1500-2500 m.

Rhinolithodes wosnessenskii (Rhinoceros Crab)



Description

The triangular, tuberculate, yellowish to grayish brown carapace has deep crescent shaped fossa with orange to cream colored depressions. The rostrum tapers abruptly to a median spine. The walking legs and chelipeds are armed with short spines and long curved bristle-like setae. The chelipeds are white with orange, maroon, and reddish brown patches and grey-green spines covered with dark red fading to light brown hairs or setae. Carapace width to about 6 cm.

Similar species

Not likely to be confused with other species.

Distribution

Aleutian Islands to northern California, 5-80 m.

Right-handed Hermit Crabs Paguridae

Right chelae (claw) usually larger than left chelae (claw)

Pagurus tanneri (Longhand Hermit Crab)

Description
This relatively large red to orange hermit crab has a distinct triangular knob on the larger right chelae (claw). Carapace length to 3 cm.
Similar species
Pagurus aleuticus lacks the triangular knob on the right chelae and is orange in color.
Distribution
Bering Sea to California, 90-1400 m.

Pagurus aleuticus (Aleutian Hermit Crab)

Description
The larger right chelae (claw) of this relatively large orange hermit crab is covered with numerous tubercles varying in size and spacing. Carapace length to 4 cm.
Similar species
Pagurus tanneri has a triangular knob on right chelae and is red or orange in color.
Distribution
Bering Sea to northern California, 15-450 m.

Right-handed Hermit Crabs Paguridae

Right chelae (claw) usually larger than left chelae (claw)

Pagurus ochotensis (Okhotsk Hermit Crab)

Description

This hermit crab is right-handed, and the chelipeds are very broad and blunt. The body and arms are tan or light brown with orange spines. Carapace length to 2.5 cm.

Similar species

The orange spines should distinguish this species from others in this guide.

Distribution

Bering Sea to northern California, 1-400 m.

Pagurus setosus (Setose Hermit Crab)

Description

This is a relatively small, fuzzy hermit crab. The right chelae is much larger than left, and the chelae are covered with fine hairs. The body and arms are colored cream to tan. Carapace length to 1.5 cm.

Similar species

The hairs on the chelae and depth range distinguish this species from others in this guide.

Distribution

Alaska to Panama, 400-2200 m.

Equal or Either-handed Hermit Crabs Parapaguridae

Right and left chelae (claw) about equal or one chelae (claw) slightly larger than the other.

Parapagurus pilosimanus benedicti (Fuzzy Hermit Crab)

Description
This small, hairy hermit crab has claws equal in size bearing short brown hairs. The body and arms are tan or pink. Carapace length to about 1.5 cm.
Similar species
Paguristes turgidus has spines or tubercles on the chelae.
Distribution
Gulf of Alaska to southern California, 10-500 m.

Left-handed Hermit Crabs Diogenidae

Left chelae (claw) usually larger than to about equal to right chelae (claw).

Paguristes turgidus

Description
This is a small, hairy hermit crab. The claws are broad and equal in size, both bearing numerous tubercles and short brown hairs. The body and arms are light orange, yellow, or tan. Carapace length to about 2.5 cm.
Similar species
Pagurus setosus is similar, but lacks spines or tubercles on the chelae.
Distribution
Arctic Ocean to southern California, 5-500 m.

Box Crabs Calappidae

Platymera gaudichaudii (Armored Box Crab)

Description

Armored box crabs are orange to orange/brown. The oval carapace has 2 strong lateral spines and small teeth along the anterior margin. The legs and chelae are flattened. The chelae have white fingers and teeth. Width (minus spines) to 9 cm.

Similar species

The fourth pair of legs of the Portunid crabs are modified for swimming. Cancridae lack the large lateral spines, compressed chelae and have strong serrations or teeth on the anterior margin of the carapace.

Distribution

Southern British Columbia to Chile, most common in southern California, 40-400 m.

Cancer Crabs Cancridae

Cancer productus (Red Rock Crab)

Description

Red rock crabs are various shades of red but can have small yellow or orange mottling. The anterior edge of the carapace has strong anterolateral teeth. The chelipeds are mostly red with the anterior ends of both fingers and the first sets of teeth black. Carapace to 20 cm.

Similar species

Metacarcinus anthonyi has a smoother carapace, teeth are not as indented, and only upper tip and inner serrated margin of chelae are black. *Romaleon antennarium* has strong teeth, hairy legs, a light ventral side with red spots, and is usually found intertidal – 30 m.

Distribution

Alaska to southern California, 1-300 m.

Cancer Crabs Cancridae

Glebocarcinus oregonensis (Pygmy Rock Crab)

Description

Pygmy rock crabs are usually dull red dorsally and white ventrally. The claws have dark tips. The dorsal side of the circular carapace is covered with low tubercles. The anterior segments of the chelipeds have prominent tubercles but no spiny ridges. The dark somewhat flat walking legs are covered with long stiff setae. Carapace to 5 cm.

Similar species

Formerly known as *Cancer oregonensis*. The circular carapace and distinct dorsal/ventral color pattern distinguish Pygmy rock crabs from related species.

Distribution

Pribilof Islands to southern California, 0-436 m, uncommon south of Pt. Arena and outside intertidal zone.

Glebocarcinus amphioetus (Japanese Rock Crab)

Description

The convex carapace is about 1.5 times broader than long and has 9 broad triangular teeth along the anterior edge, the last tooth with an acute (sharp) point. The yellowish green dorsal surface of the carapace and chelipeds (claws) have numerous, scattered dark red and violet spots and blotches that are somewhat more concentrated on the anterior portion. The somewhat smooth and flattened walking legs are yellowish with dark red and violet spots and bands and fringed with long stiff setae. The ventral side is light yellowish tan. The fixed finger tapers sharply distally, and the movable finger curves and tapers to a sharp hooked point. Both are dark brown. Carapace to 5 cm.

Similar species

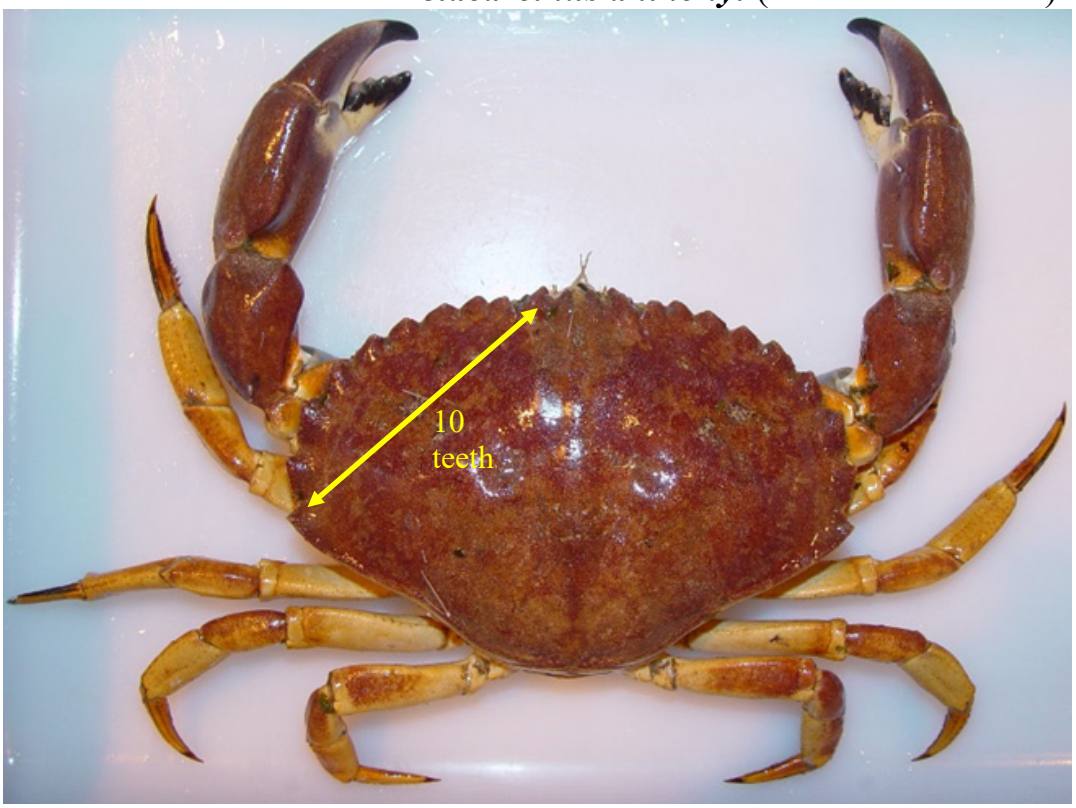
Formerly known as *Cancer amphioetus*.

Distribution

Found from Peter the Great Gulf (Sea of Japan) to Rokotan (Yellow Sea) and Hokkaido to Nagasaki. The range in the eastern Pacific has not been totally defined, currently California, 0-400 m.

Cancer Crabs Cancridae

Metacarcinus anthonyi (Yellow Rock Crab)



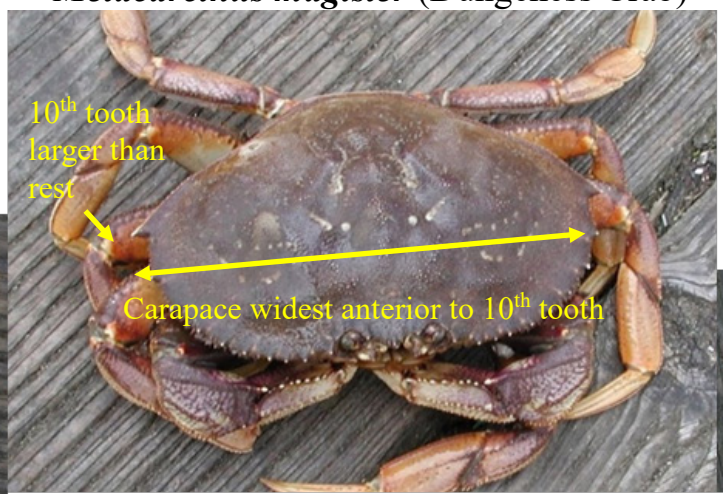
Description
Yellow rock crabs are yellow to brown. The anterior margin of the carapace has 10 forward curving anterolateral teeth. The tips of the claws and teeth are black. Carapace width to 16.5 cm.

Similar species
Formerly known as *Cancer anthonyi*. *Romaleon antennarium* has strong teeth, hairy legs, and red spots on the ventral side.

Distribution
Northern California to Baja California, 0-135

Metacarcinus magister (Dungeness Crab)

Female claws with distinct white tips and teeth



Male with light claws

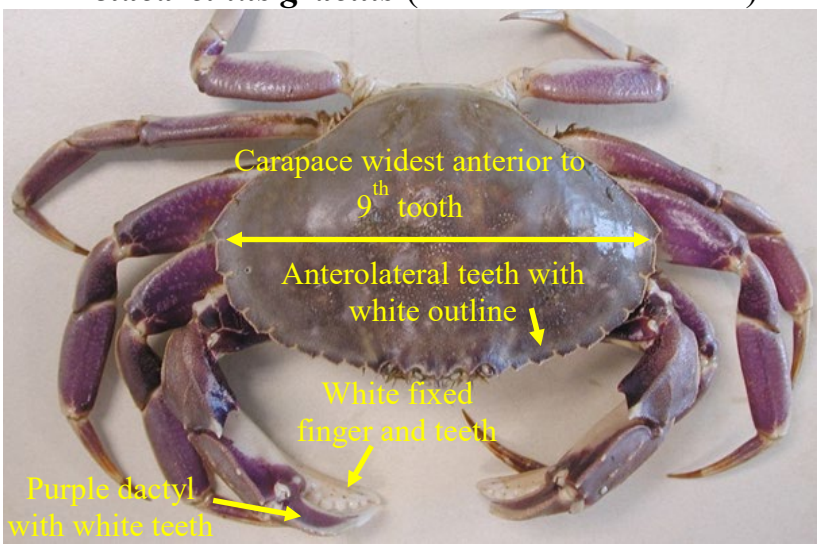
Description
Dungeness crabs are purplish brown to tan. The anterior margin of the carapace has 10 teeth the most posterior being the largest. The legs are tannish brown often with purple highlights. Males tend to have light claws females tend to have white tips and teeth. Width to 22 cm.

Similar species
Formerly known as *Cancer magister*. *Metacarcinus gracilis* is smaller, has more slender legs, smoother chelae and purple legs and carapace.

Distribution
Aleutian Islands to Baja California, 1-300 m.

Cancer Crabs Cancridae

Metacarcinus gracilis (Graceful Cancer Crab)



Description

The carapace is purple to purplish brown. The dorsal surface of the legs is purple. Anterior margin of the carapace with 10 teeth and 5 teeth between the eyes. The anterolateral teeth have a white edge. The dactyl is purple with a white tip and teeth. The fixed finger is white with white teeth. Width to 12 cm.

Similar species

Formerly known as *Cancer gracilis*. *Metacarcinus magister* are not purple and the anterolateral teeth without white edge.

Distribution

Aleutian Islands to Baja California, 1-300 m.

Romaleon antennarius (Brown Rock Crab)

Description

The carapace is purplish brown to purplish red on the dorsal surface, the ventral surface is pale yellow to whitish with red to rust colored spots. The claws have black tips and teeth. The carapace is smooth to slightly rough but does not have any rough tubercles or setae. The ventral side has setae. There are 11 strong anterolateral teeth and the carapace is widest at the eighth tooth.

Similar species

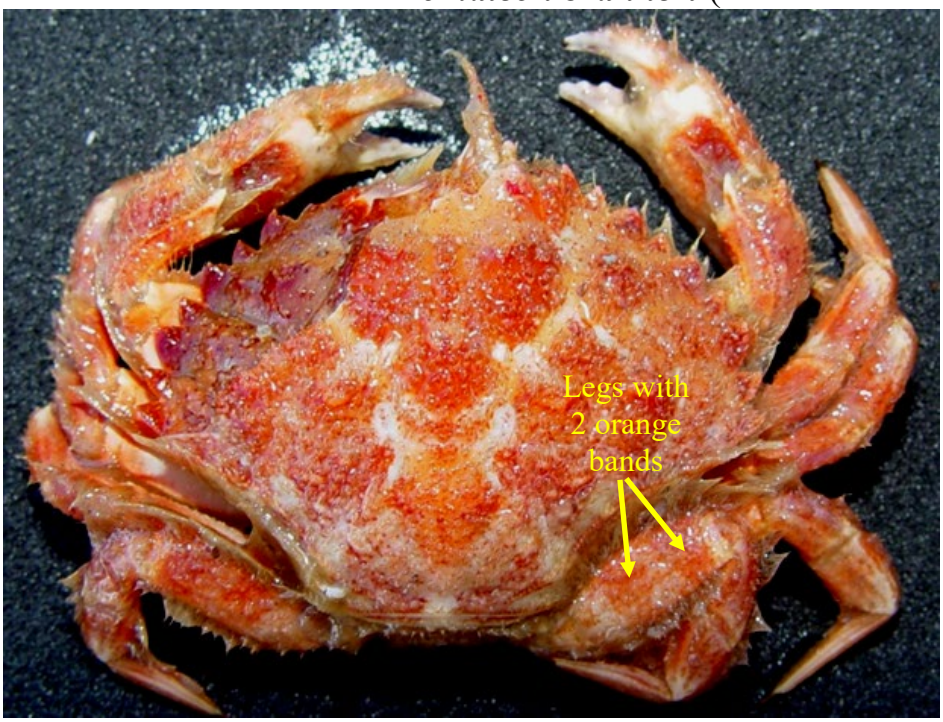
Formerly known as *Cancer antennarius*. The distinctive spotting on the ventral surface distinguishes Brown rock crabs from the other black clawed species.

Distribution

British Columbia to Mexico, intertidal to 91 m usually less than 45 m.

Cancer Crabs Cancridae

Romaleon branneri (Furrowed Rock Crab)



Description
Color is highly variable. The uneven, granular and setose carapace is various combinations of yellow, tan, dark red, violet, grey, black, white and various symmetrical patterns dorsally and white ventrally. The white and tan chelipeds have bands. The claws are yellow. The red walking legs have lighter areas and 2 orange bands. Width to 4 cm.
Similar species
Formerly known as *Cancer branneri*. Not likely to be confused with other species in this guide.
Distribution
Alaska to Mexico, 1-180 m.

Helmet Crabs Cheiragonidae

Telmessus cheiragonus (Helmet Crab)

Description
Helmet crabs are usually greenish to brownish yellow and may have a red or orange carapace margin and spots. The marginal teeth on the 5 sided carapace have several short spines. The setae are stiff and club shaped. The chelipeds are short, shorter than the walking legs and the right is usually larger than the left. Width to 11 cm.
Similar species
Not easily confused with other species.
Distribution
Bering Sea to California, 0-110 m.

Purse Crabs Leucosiidae

Randallia ornata (Purple Globe Crab)

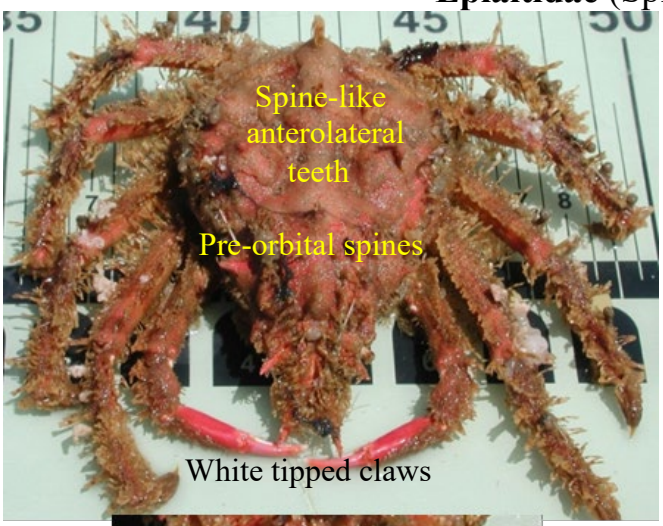
Description
Globe crabs have a distinct body shape with up to 6 knob-like teeth on the posterolateral margin of the carapace. The carapace is white or tan with purple to purplish red mottling. Carapace to 5 cm in diameter.

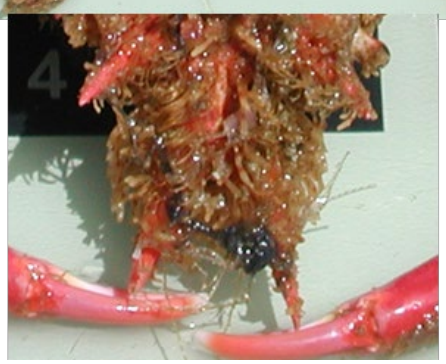
Similar Species
Not likely to be confused with other species.

Distribution
Monterey Bay, California to Baja California, intertidal to about 50 m.

Spider Crabs Epialtidae

Epialtidae (Spider Crab Unidentified)





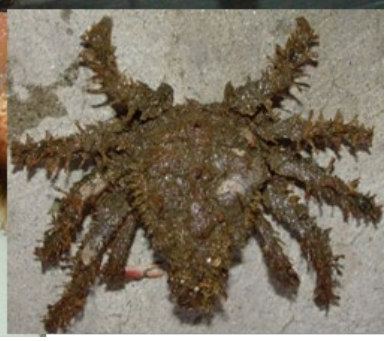
Description
This decorator crab has a pear shaped convex carapace covered with variously sized tubercles with a distinct row of large tubercles mid-carapace and spine-like anterolateral teeth. There is a pair of long pre-orbital spines. The true rostrum not very prominent. The long horizontal pseudo-rostral horns are divergent. The long chelipeds are pinkish red. The upper finger of the long slender claw is pinkish red with a white tip. The lower finger is white along the upper margin and has a white tip. The legs, posterior portion of the chelipeds and carapace margin setose. Carapace width to 4.5 cm.

Similar species
Loxorhynchus crispatus has tubercles on the carapace and has short pre-orbital spines.

Distribution
Southern California

Spider Crabs Epialtidae

Loxorhynchus crispatus (Masking Crab)



Description
This decorator crab has pear shaped carapace with several large, blunt tubercles. The rostrum has one pair of short, narrow divergent, downward pointing spines. The carapace is pink, tan, or brown and usually covered with sponge, algae, and bryozoans. Carapace width to 12 cm.

Similar species
Scyra acutifrons has flat pre-orbital spines and a flat, forked rostrum. *Loxorhynchus grandis* has rostral spines that curve or bend downward and large tubercles on the carapace.

Distribution
Northern California to Baja California, intertidal to 200 m.

Loxorhynchus grandis (Sheep Crab)

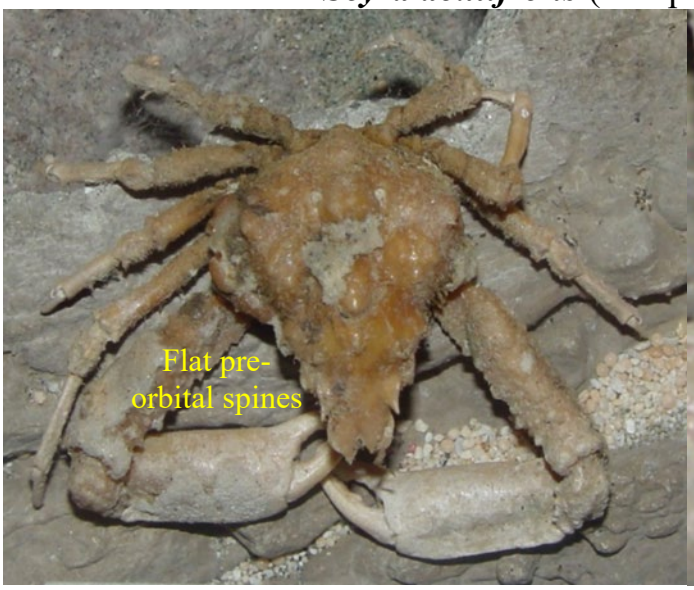
Description
Sheep crab are dirty tan to gray. The pear shaped convex carapace covered with numerous small tubercles and spines. The rostral horns curve downward. Carapace width to 16 cm.

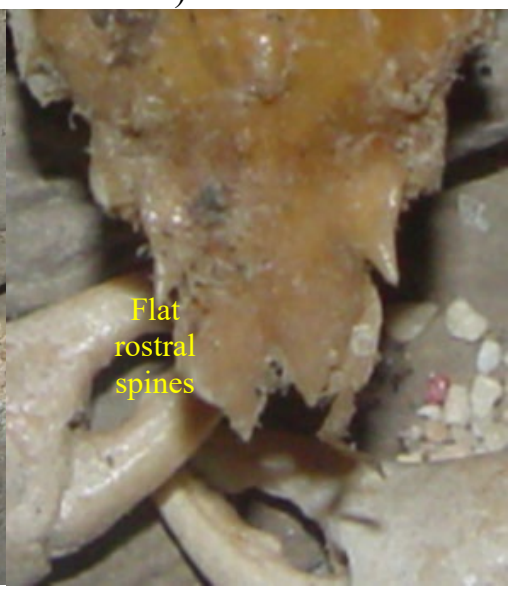
Similar species
Loxorhynchus crispatus has a few tubercles on the carapace, a spiny, forked rostrum, and is covered in sponge.

Distribution
Central California to Baja California, 0-124 m.

Spider Crabs Epialtidae

Scyra acutifrons (Sharp Nose Crab)





Description
This decorator crab has a distinctly forked, broad, leaf-like rostrum with flat pre-orbital spines. The carapace is mottled brown, tan, white and red. Carapace width to 4.5 cm.
Similar species
The flat rostrum and spines distinguish this species.
Distribution
Gulf of Alaska to Mexico, intertidal to 220 m.

Chorilia longipes (Long-horned Decorator Crab)

Description
This triangular decorator crab does not decorate. The textured carapace is tan with areas of pink and/or white. The 2 long rostral spines diverge at the base. Carapace to 5 cm.
Similar species
The long, forked rostrum is a distinguishing characteristic.
Distribution
Aleutian Islands to Mexico, 10-1200 m.

Spider Crabs Oregoniidae

Oregonia gracilis (Graceful Decorator Crab)

Description

This gray, tan or brown triangular decorator crab has variously sized tubercles on the convex carapace, with the larger tubercles having curled setae. The vertical true rostrum is not prominent. The long horizontal and parallel pseudo-rostral horns are continuous with divergent tips. The chelipeds are longer than the legs. The anterior portion of the chelipeds are covered with tubercles. The distal half of the claw has a gap and the movable finger has a tooth near the base. The abdomen of both sexes has 7 distinct segments. Width to 4 cm.

Similar species

Chorilia longipes has a distinct forked rostrum. *Loxorhynchus crispatus* have long chelae and forked rostrums.

Distribution

Bering Sea to Monterey Bay, California, 0-450 m.

Macroregonia macrochira **(**Long-armed Spider Crab)

Description

This crab has a spiny carapace and very long legs and chelae (claws). The carapace and legs are orange or pink. Carapace width to 10 cm.

Similar species

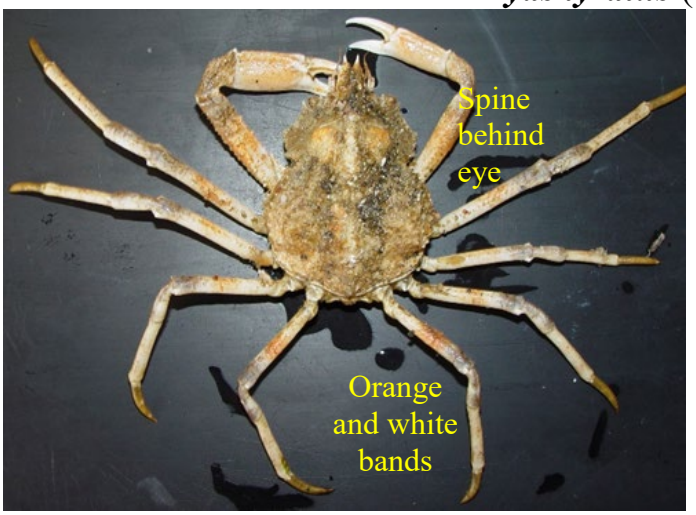
Chorilia longipes has shorter legs and chelae, a long, forked rostrum, and is found in shallower water.

Distribution

Gulf of Alaska to California, 1030-3400 m.

Spider Crabs Oregoniidae

Hyas lyratus (Pacific Lyre Crab)

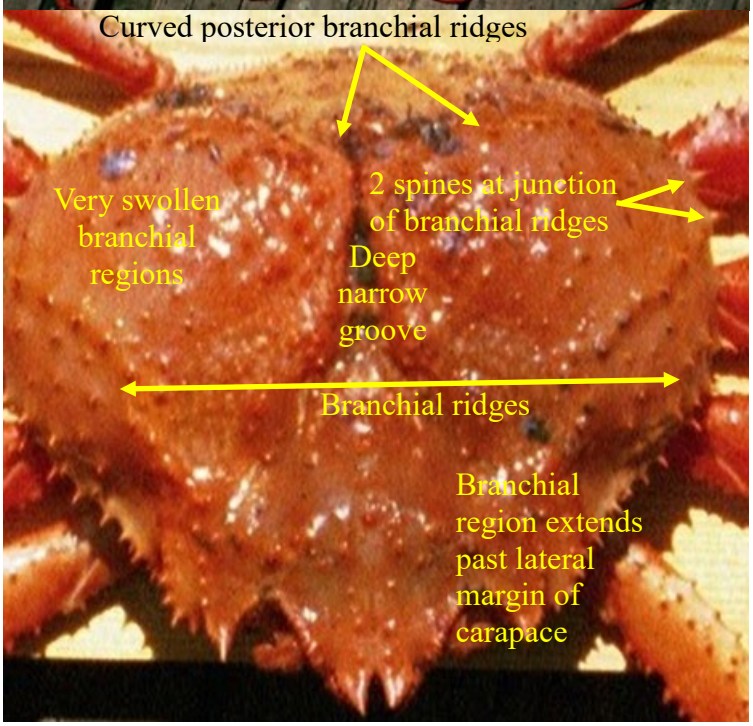


Description
Pacific Lyre crabs have a distinctive shape, flat spine behind each eye on the edge of the carapace. The carapace is white or tan, often covered with bryozoans. The legs are banded white and orange. Carapace width to 7 cm.

Similar Species
Distinguished from the other spider crabs in the region by the distinctive body shape, banded legs, and flat spines behind the eyes.

Distribution
Bering Sea to Washington, 30-2000 m.

Chionoecetes tanneri (Grooved Tanner Crab)



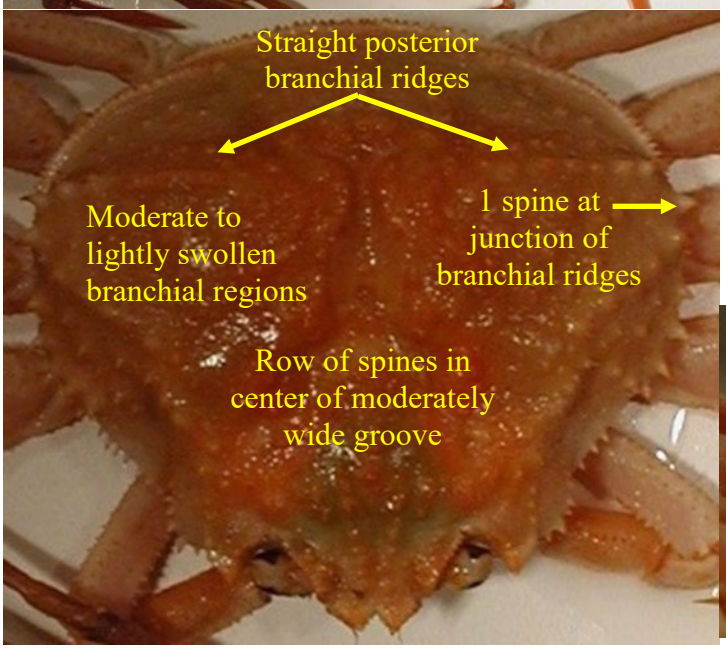
Description
Grooved tanner crabs are orange to red. The spiny carapace has very swollen branchial regions with a deep narrow groove between. The posterior branchial ridge is curved and there are usually 2 spines at the junction of the branchial ridges. Visible in the front view the branchial margin extends past the lateral margin of the carapace. Carapace width to 160 cm.

Similar species
Chionoecetes angulatus has 1 spine at the junction of the branchial ridges, straight posterior branchial ridges, and a row of spines between the branchial regions.

Distribution
Bering Sea to Baja California, 30-2000 m.

Spider Crabs Oregoniidae

Chionoecetes angulatus (Triangle Tanner Crab)



Description
Triangle tanner crabs are orange to red. The spiny carapace has moderately swollen branchial regions with a wide groove between. The row of spines down the center of the groove is variable and may consist of a single spine at the anterior end. The posterior branchial ridges are straight and there is 1 spine at the junction of the branchial ridges. Visible in the front view the branchial margin extends past the lateral margin of the carapace. Width to 13 cm.

Similar species
Chionoecetes tanneri has swollen branchial regions, a deep narrow groove, curved posterior branchial ridges, and 2 spines at the branchial ridge junction

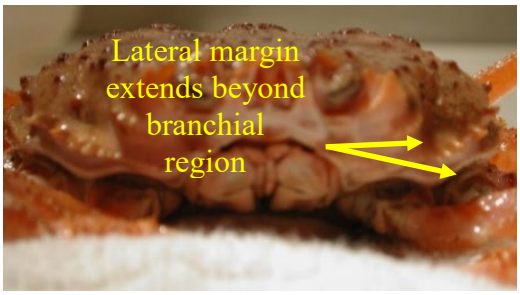
Distribution
Bering Sea to Oregon, 1200-3000 m.

Chionoecetes bairdi (Tanner Crab)

Description
Tanner crabs are orange to red sometimes with orange/brown on the dorsal surface of the carapace. The eyes are red. The carapace is crab is broad, textured and relatively flat without swollen branchial regions. The lateral margin extends beyond the branchial margin. Carapace to 15 cm.

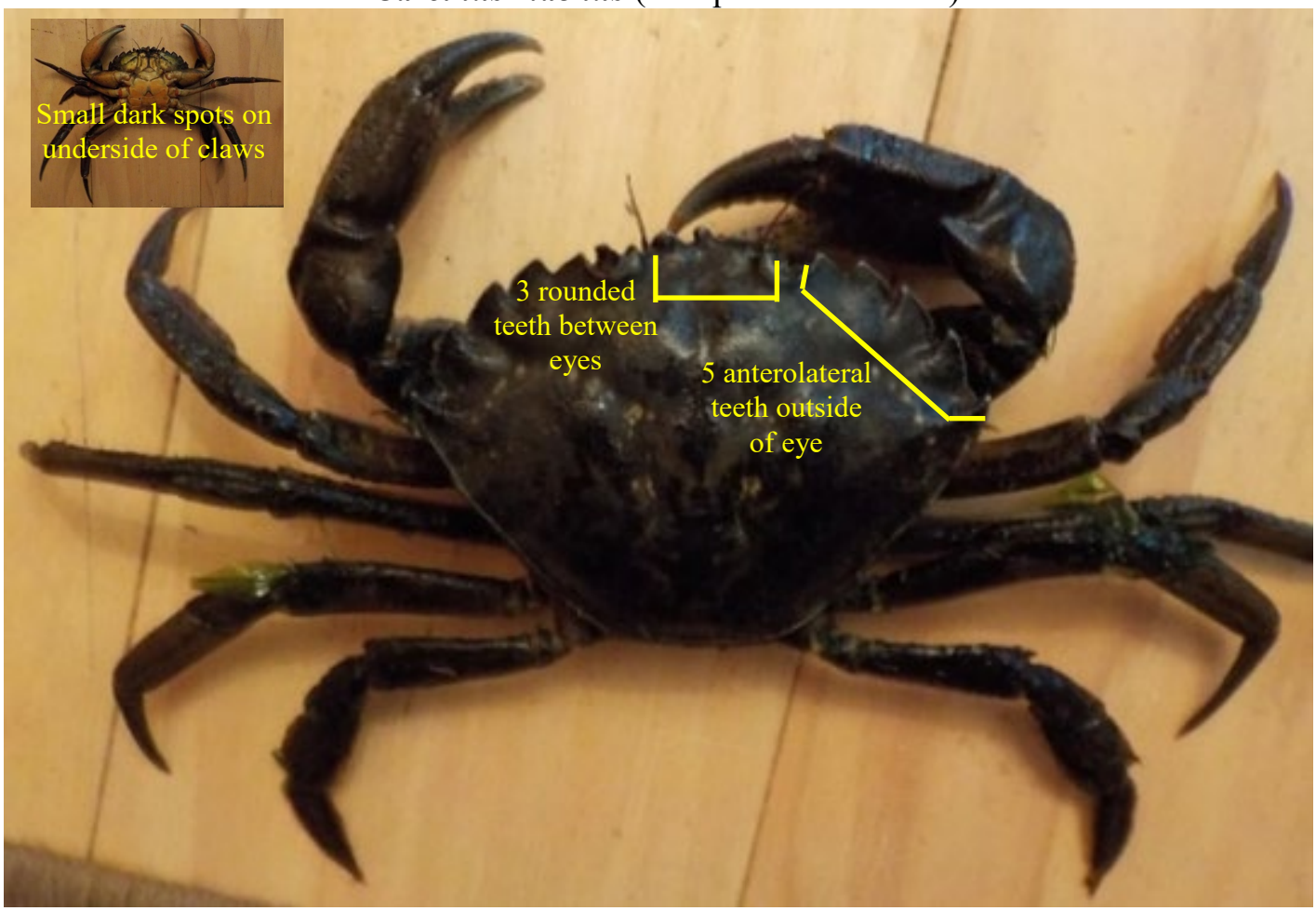
Similar species
The round flat carapace and lateral margin extending past the branchial distinguish *Chionoecetes bairdi* from other related

Distribution
Bering Sea to Oregon, 5-500 m.



Swimming Crabs Portunidae

Carcinus maenus (European Green Crab)



Description

Depending life cycle stage and/or environment, the color can be highly variable. Individual dorsal coloration is typically mottled and varies from light green/yellow to bright or dark green, olive–brown, or red, with lighter and more mottled coloration typical in small specimens. Ventral surface (including the legs) color varies from yellow to orange or red usually with small dark spots on the ventral surface of the chelipeds. The carapace has 5 strong teeth on the outside of each eye and 3 rounded teeth between the eyes. The fifth pair of legs is flattened. Carapace to 9 cm.

Similar species

The only west coast crab with 5 teeth outside the eyes and 3 between the eyes.

Distribution

British Columbia to California, 0-60m

Swimming Crabs Portunidae

Callinectes arcuatus (Arched Swimming Crab)

Description

In life Arched swimming crabs are blue-green with blue legs. The carapace is twice as wide as long, and has prominent, pointed teeth on the anterior margin. There is a long spine on the lateral edge of the carapace. The chelae are long and slender. The fifth pair of legs are modified for swimming. Width to 14 cm.

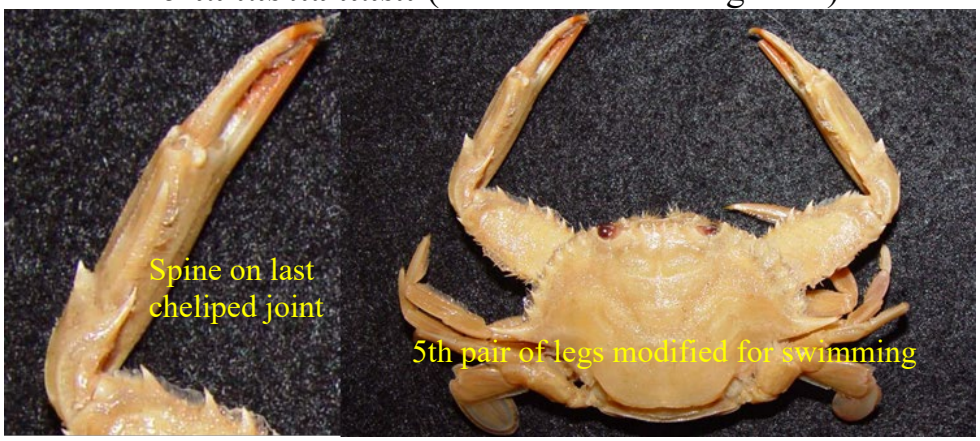
Similar species

Portunus xantusii has a spine near on the inner side of the last cheliped joint. *Platymera gaudichaudii* lacks anterior teeth and modified swimming legs.

Distribution

Southern California to Peru, 0-50 m.

Portunus xantusii (Xantus's Swimming Crab)



Description

In life the carapace and setose legs are green and brown. The carapace is approximately as long as wide, and has pointed teeth on the highly setose anterior margin. There is a long spine on the lateral edge of the carapace. There is a distinguishing inner spine on the last joint of the cheliped. The fifth pair of legs are modified for swimming. Carapace width to about 7 cm.

Similar species

Callinectes arcuatus lacks the spine on last cheliped joint and carapace is much wider than long. *Platymera gaudichaudii* lacks anterior teeth and modified swimming legs.

Distribution

Southern California to Mexico, 0-150 m.

Elbow Crabs Parthenopidae

Latolambrus occidentalis (Sandflat Elbow Crab)

Description

This is a small crab with a wide, wing-shaped carapace and very long arms with small chelae. The carapace and arms are brown, edged with purple, and the ventral surface is white. Carapace width to 5 cm.

Similar Species

Formerly known as *Heterocrypta occidentalis*. Not likely to be confused with other species.

Distribution

Central California to Baja California, intertidal to 50 m.

Carrier or Porter Crabs Holomidae

Moloha faxoni (Pacific Carrier Crab)

Description

Pacific carrier crabs are orange to red sometimes with faint light patches on the legs. The rectangular carapace has multiple spines, the legs are highly setose. Carapace to 7 cm.

Similar species

Not likely to be confused with other species.

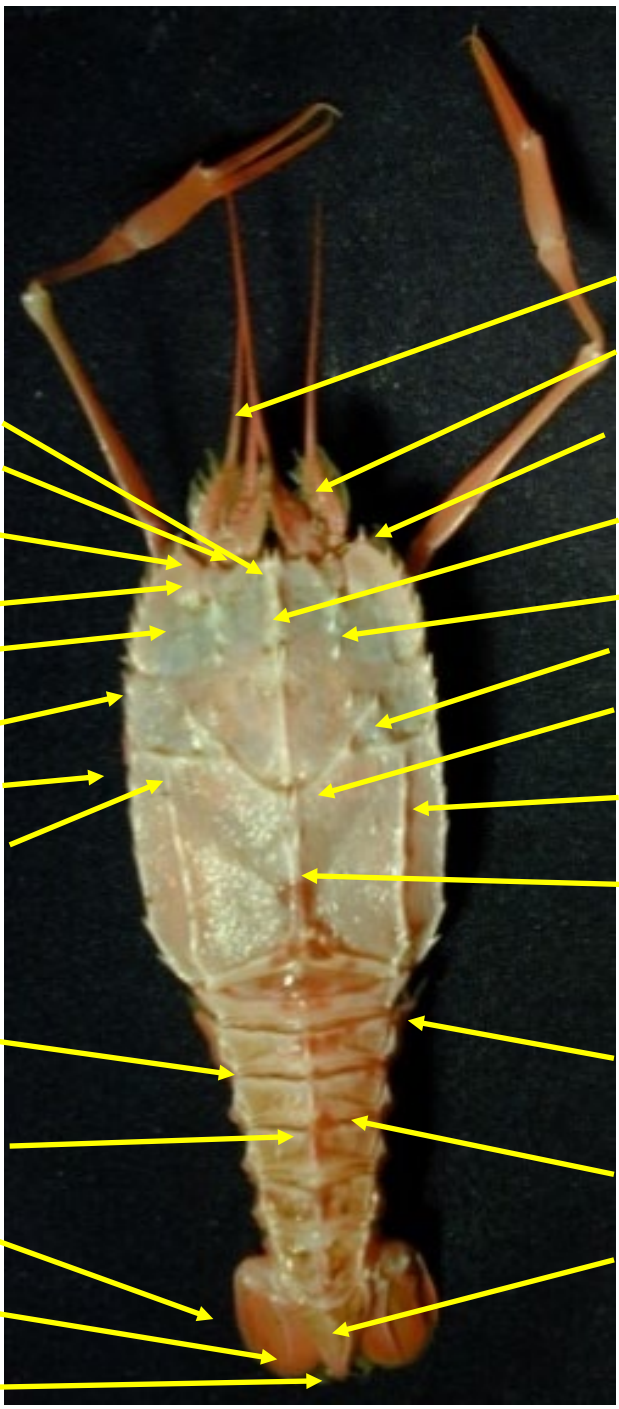
Distribution

Southern California to Baja California, 180-450 m.

Lobsters
Deep-sea or Blind Lobsters Polychelidae

The Polychelidae are a group consisting of 91 species in 6 genera. They are easily distinguished from the other decapods in this guide by the eyes being greatly reduced or absent, and the presence of claws (chelae) on walking legs 1-4, and in some species 1-5. However, due to the close relationships between species and genera, the small body size, and many of the characteristics differentiating species being subtle, field identification beyond the family level is problematic.

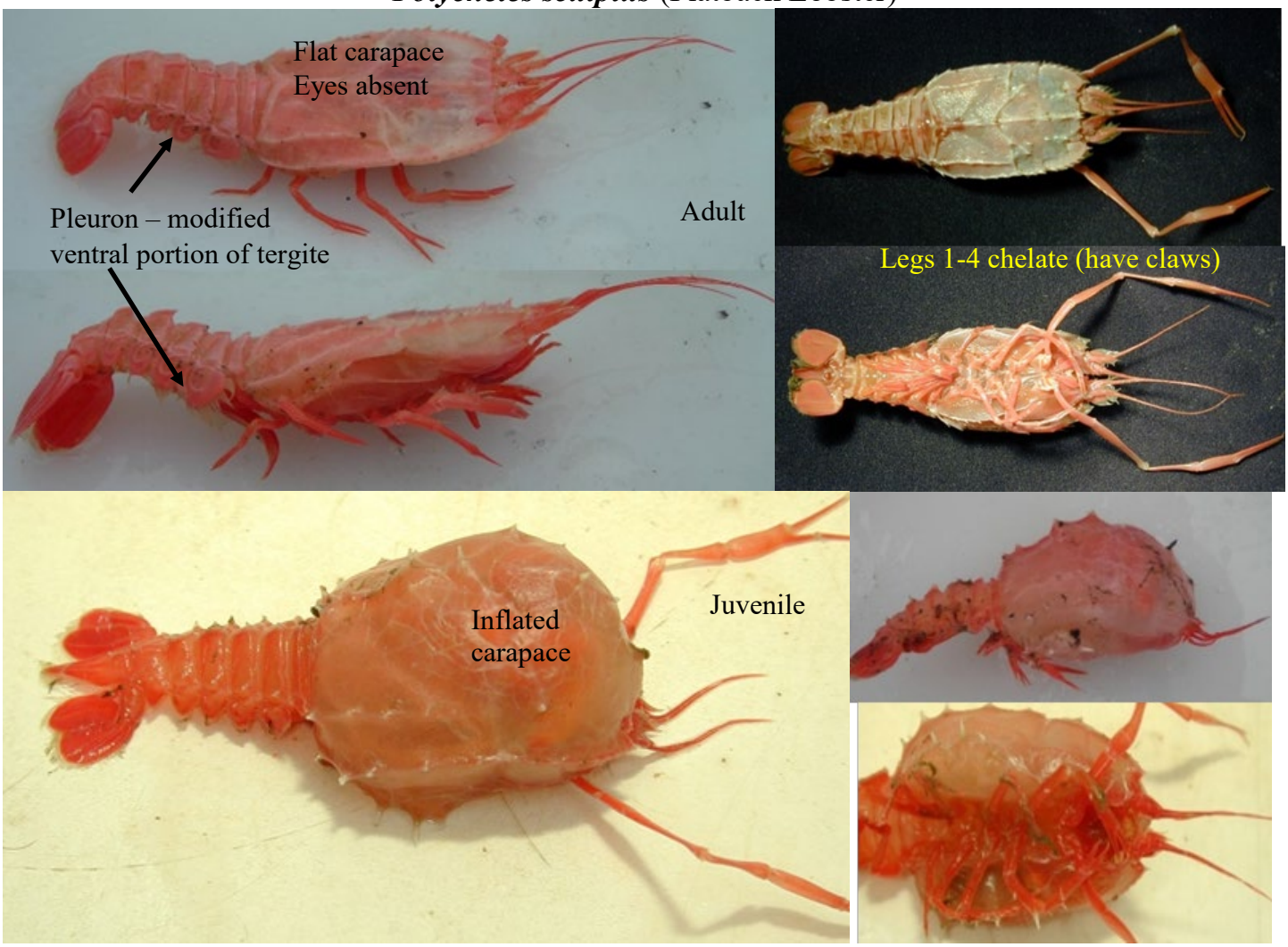
Deep-sea/Blind Lobster Characteristics and Terminology



Lobsters

Deep-sea or Blind Lobsters Polychelidae

Polycheles sculptus (Flatback Lobster)



Description

Deep-water lobsters are pink, red or tan. Adults have a wide telson, long, slender chelipeds and a distinct flattened slipper-like body. The eyes are absent or inconspicuous and may be covered by the carapace. Juveniles are similar in color to the adults and have the wide telson and long, slender chelipeds. However, the carapace is highly inflated. It is thought that it aids in buoyancy, allowing the juveniles to remain up in the water column and disperse, over wide areas prior to settling into the benthic life style of the adult. Length to 8 cm.

Similar species

The distinct body shapes of both adults and juveniles distinguish the Polychelidae from other species.

Distribution

Polycheles sculptus has a cosmopolitan distribution. They are found in all oceans between 55° S and 50° N, 230-4000 m (usually below 1000 m).

Lobsters
Spiny Lobsters Palinuridae
Panulirus interruptus (Spiny Lobster)

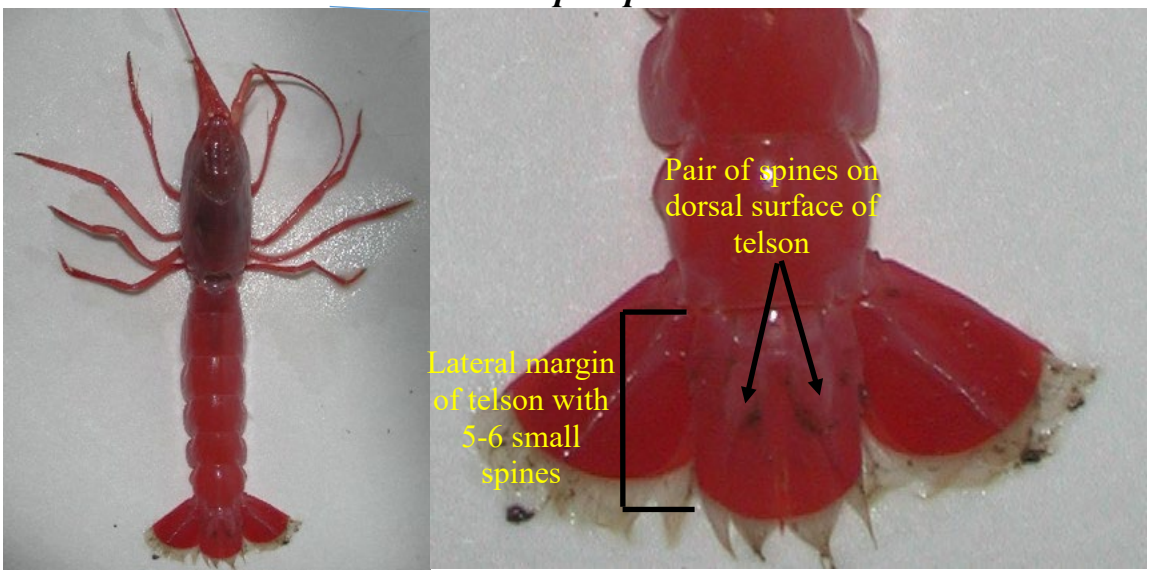
Description
This large, spiny lobster lacks the large claws of some Atlantic species. The carapace has many tubercles, and there are large black spots below the eye that function as false eyes. The body is dark red, brown, and orange. Length to about 70 cm.
Similar Species
Although extremely rare, due to unsuccessful past introductions into the Northeast Pacific, *Homarus americanus* (American lobster) are occasionally captured. However, being in the family Nephropidae (Clawed Lobsters) they are easily distinguished from Palinuridae by the presence of claws.
Distribution
California to Baja California, 0-60 m.

Lobsters
Clawed Lobsters Nephropidae
Homarus americanus (American Lobster)

Description
Clawed lobsters have one pair of long antennae with shorter, branched antennulas. The first pair of legs are modified into large claws followed by four pairs of walking legs. The protruding rostrum between the eyes has several lateral teeth and usually one or more ventral teeth. The color ranges from dark bluish green to greenish brown, with a reddish tint on body and claws, and a greenish tint on walking legs. It has very dark greenish black spots on carapace and orange to whitish below. Rare single color variations include blue, yellow, and orange. Albino lobsters appear totally white but in some cases traces of other colors may be present. These animals are referred to as leucistic. A unique split pattern where the left side of the animal is completely different from the right also occurs. The body length can reach 64 cm and 20 kg.
Similar Species
They are easily distinguished from Palinuridae by the presence of claws.
Distribution
Due to past unsuccessful introductions scattered records exist from British Columbia to California.

Lobster Shrimp Axiidae

Calocarides quinqueseriatus



Description

Calocarides quinqueseriatus has a flattened rostrum with a median ridge extending posteriorly from about mid-rostrum armed with 2-6 spines. The lateral margins have 3-7 spines extending as a ridges on the gastric area. These ridges are separated by 2 short, spined ridges for a total of 5. The smooth carapace has a deep cervical groove. The chelipeds are similar in shape but not size. The major chela (claw) has a slight gap between the fingers the minor claw does not. The telson has a pair of fixed spines on the dorsal surface and a series of 5-6 small fixed spines on the lateral margins. Length to 7 cm.

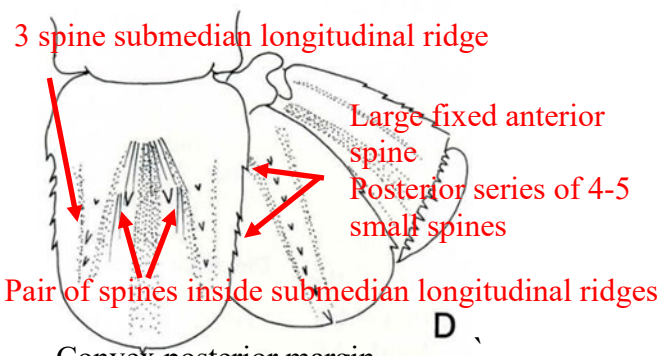
Similar species

Calocarides spinulicauda has a different spine pattern on the telson with a uniformly convex posterior margin.

Distribution

Sea of Okhotsk to San Nicolas Island, California, 288-2200 m.

Calocarides spinulicauda



Description

Calocarides spinulicauda has 5-6 lateral teeth one each side of the rostrum. The carapace has 5 anterior longitudinal ridges none reach the cervical groove. The 4 spined median ridge reaches the rostral base, and a short dorsal median ridge is near the posterior margin of the carapace. The dorsal surface of the telson has 3 spined submedian longitudinal ridges with a pair of spines on the inside. The lateral margins have a large anterior spine and a posterior series of 4-5 small spines. The posterior margin is convex. Length to 9 cm.

Similar species

Calocarides quinqueseriatus has a different spine pattern on the telson.

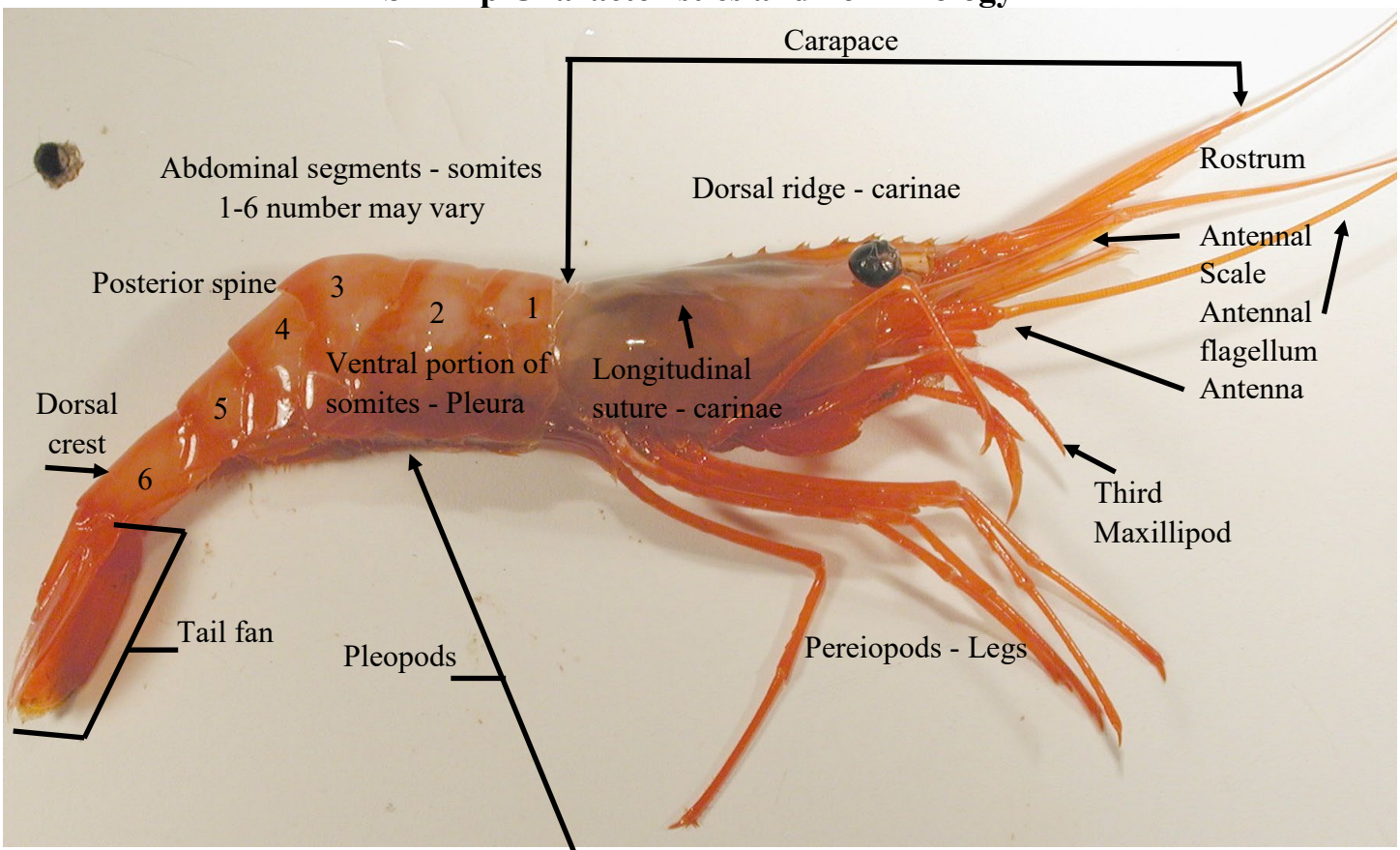
Distribution

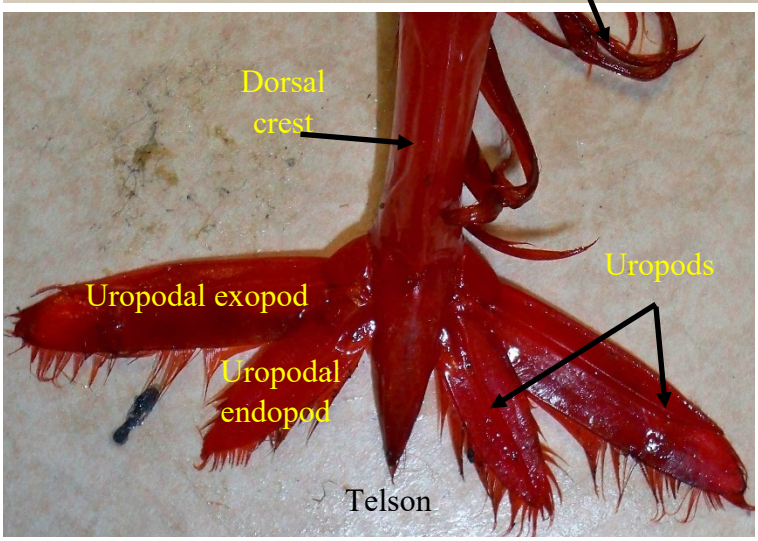
British Columbia to California, 59-256 m.

Decapod Shrimps Eucarida

Shrimp, as a group, are diverse in body form and life history. Most shrimp are benthic and some, particularly those in the family Crangonidae, burrow in the sediment, using the pleopods to excavate. Benthic shrimp use the pereiopods for walking and pleopods for swimming. Those shrimp that are pelagic are laterally compressed and have enlarged pereiopods.

Shrimp Characteristics and Terminology





True Shrimp
Crangons Crangonidae

The Crangonidae consists of approximately 23 genera and over 260 species, most are similar in appearance and identification in the field is problematic. However, the species in the genus *Metacrangon*, generally have large, spiny, carinated carapaces. Crangons are unique in the first pereiopod being subchelate, forming a 'claw.'

Crangon dalli (Ridged Crangon)

Description
The body is stout and smooth, and the eyes are moderately large. There is one large median carapace spine, and the rostrum is short. The sixth somite has 2 carinae (ridges). Length to 8 cm.
Similar species
The sixth somite carinae should distinguish this species.
Distribution
Alaska to Santa Cruz, CA, 5-174 m.

Crangon franciscorum franciscorum **(**Bay Crangon)

Description
The body is stout and the rostrum is short with a median sulcus (depression). The hepatic spines are in line with the median, and there is a lateral spine on the fifth abdominal somite. The tip of the dactylus does not cross the first fixed finger. The body is mottled gray and yellow. Length to 8 cm.
Similar species
Crangon franciscorum angustimana also has a lateral spine on the fifth abdominal somite, and the tip of the dactylus crosses the basal part of the first finger.
Distribution
Japan through the Bering Sea to British Columbia, 3-630 m.

Crangon franciscorum angustimana (Long-clawed Crangon)

Description
The body is stout and the rostrum is short with a median sulcus (depression). The hepatic spines are in line with the median, and there is a lateral spine on the fifth abdominal somite. The tip of the dactylus crosses the under the basal part of the first fixed finger. The body is mottled gray and yellow. Length to 8 cm.
Similar species
Crangon franciscorum franciscorum has a lateral spine on the fifth abdominal somite, and the tip of the dactylus in does not cross the basal part of the first finger.
Distribution
Kachemack Bay, AK to Tillamook, OR, 18-183 m.

Crangon alba (Stout Crangon)

Description
Crangon alba have a stout body, and a short rostrum with a median sulcus (depression). There is an anterior median carapace spine and the first chela is very stout. The abdominal somites lack carinae and a ventral sulcus on the sixth somite is also absent. The body is white and may be spotted with black. Length to 9 cm.
Similar species
The white color, smooth abdominal somites, and short chela of the first pereiopod should distinguish this species.
Distribution
Vancouver Island, BC to San Diego, CA, 220-86 m.

Crangons Crangonidae

Crangon nigricauda (Sand Crangon)

Description

The telson of *Crangon nigricauda* is noticeably longer than the antennal scales. The lamina (wide portion) of the antennal scale is as long as, or longer, than the antennal spine. The hepatic spine is supported by a carina and is anterior to the median spine. The eyes are large, and the fifth and sixth abdominal segments have blunt median carina. There is a broad sulcus in the anterior portion of the telson. In California, the body is dark gray or black. Length to 6 cm.

Similar species

Crangon alaskensis has an antennal spine longer than the antennal scale, and the antennal scale is as long as the telson.

Distribution

Prince William Sound, AK to Baja California, intertidal to 57 m.

Lissocrangon stylirostris (Smooth Crangon)

Description

This is the only crangon lacking a dorsal carapace spine. The body is stout, the rostrum short, and the eyes are small. The body is speckled brown, white, and black. Length to 6 cm.

Similar species

The lack of medial dorsal carapace spine should distinguish this species.

Distribution

Alaska to Santa Cruz, CA, 5-174 m

Crangon alaskensis (Northern Crangon)

Description

Crangon alaskensis, a far northern species is similar to *Crangon nigricauda*. The antennal scale is as long as the telson, and the antennal spine is noticeably longer than the antennal scale. The hepatic spine is supported by a carina and is anterior to the median spine. The eyes are large, and the fifth and sixth abdominal segments have blunt median carina. The body is brown or gray, lighter on the appendages. There are large, dark spots and smaller pale yellow or white spots on the body. Length to 7 cm.

Similar species

The body of *Crangon alaskensis* is more slender than that of *Crangon nigricauda.* The antennal scale is as long as the antennal spine in *Crangon nigricauda*, and the telson is significantly longer than the antennal spine.

Distribution

Bering Sea, AK to Puget Sound, WA, intertidal to 275 m.

Crangons Crangonidae

Crangon communis (Two-spined Crangon)

Description

This crangon has two anterior, median spines on the carapace, with the hepatic spine in line with the most anterior of the two. There is also a median, dorsal carina, and the anterior portion of the carapace is pubescent.

The second and third abdominal segments have transverse sulci, and the 3-5th abdominal segments with median carinae. The sixth segment has two median carinae, with a sulcus on either outer side. The body is mostly gray, with the branchial region of the carapace brown. The abdomen has large brown blotches and small yellow spots, and there are magenta patches on the pleopods. Length to 7 cm.

Similar species

The two dorsal, median spines on the carapace and pubescence should distinguish this species from others in this guide.

Distribution

Bering Sea, AK to San Diego, CA, 16-1537 m.

Crangon abyssorum (Abyssal Crangon)

Description

The rostrum of this crangon is longer than in most others. It is elevated and reaches to the front of the eyes. There are lateral carinae on the carapace, and the hepatic spines are anterior to the median and supported by carinae. The eyes are very large, and the sixth abdominal segment is long and with two carinae. Length to 6 cm.

Similar species

Neocrangon resima has two dorsal carapace spines and a short rostrum.

Distribution

Bering Sea, AK to Cortez Bank, CA, 97 -2975 m.

Crangons Crangonidae

Neocrangon resima

Description

This is a small crangon with two short but distinctive spines on the dorsal surface of the carapace. The rostrum is shorter than the eyestalks. Color is tan or light gray with light speckling. Length to 7 cm.

Similar species

Crangon abyssorum has a longer, elevated rostrum**,** strong lateral carinae on the carapace, and only one dorsal spine.

Distribution

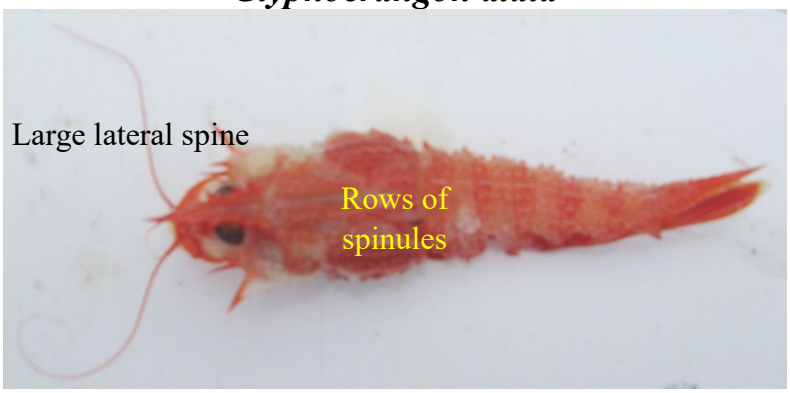
Bering Sea to California, 1-300 m.

Armored Shrimp Glyphocrangonidae

The Armored shrimp are a group of deep water benthic shrimps consisting of the single genus (*Glyphocrangon*) with approximately 96 species found worldwide on the muddy substrates of the continental slope and abyssal plain to depths over 6,000 m. Four species have been described from the survey area. The name Armored Shrimp comes from the hard highly sculptured exoskeleton. The well-developed rostrum is flat, somewhat concave and has teeth along the lateral margins. The carapace is highly sculptured with various combinations of grooves, ridges, spines and tubercles. The abdominal segments also bear nodules, spinules and teeth along the ventral margins. Color varies but most armored shrimp are various shades of red, orange, or brown.

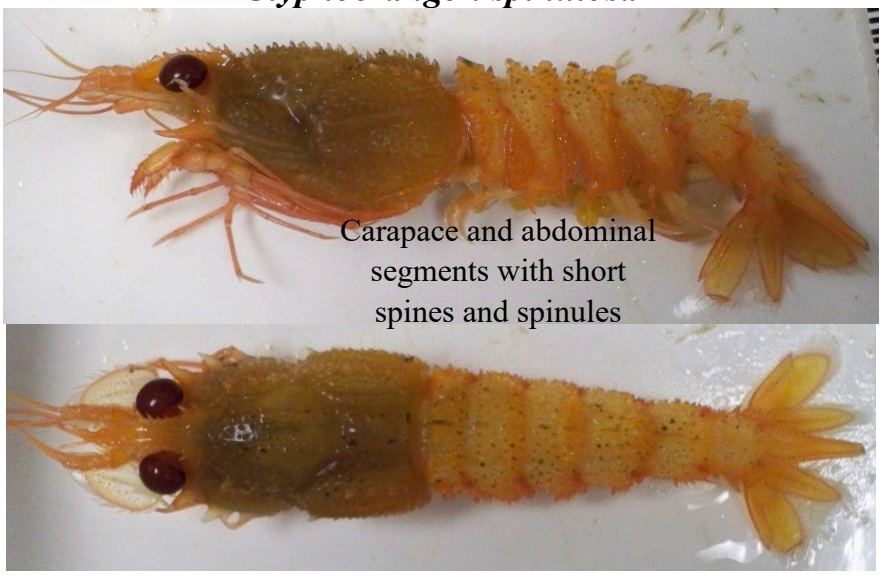
Armored Shrimp Glyphocrangonidae

Glyphocrangon alata



Description
The color is mostly red with lighter patches of pink/red. The carapace and abdominal segments are covered with rows of spinules. The anterior lateral carina (ridge) ends in a prominent spine between the antennal and branchiostegal spine. Length to 11 cm.
Similar species
The large lateral spine and rows of spinules on the carapace and abdominal segments distinguish it from the other species in the area.
Distribution
Southern California, the west coast of South America, and the Gulf of California, 800- 1800 m.

Glyphocrangon spinulosa



Description
The orange carapace and abdominal segments are covered with short spines and spinules. The rostrum has 5-7 lateral teeth and extends past the antennular peduncle. There are large antennal and branchiostegal teeth, cervical, lateral and anterior grooves. The teeth on the lateral ridge are larger than the rest of the carapace. Length to 7 cm.
Similar species
The spine and spinule covered carapace and abdominal segments distinguish it from other species in the area.
Distribution
Southern California to Costa Rica, 1000-1800 m.

Armored Shrimp Glyphocrangonidae

Glyphocrangon sicaria

Description
The color in life has not been recorded. The carapace and abdominal segments are covered with tubercles, ridges and grooves with few if any spines. The rostrum is equal in length to the rest of the carapace. It is armed with a pair of short lateral teeth slightly in advance of the front of the eyes, and another obsolete pair at the root. Between the pairs of teeth the margin of the rostrum is concave and somewhat raised. From the anterior teeth the rostrum tapers to a point and the upper surface is smooth. A low carina (ridge) extends backward from the base of the spine at the anterior external angle of the carapace over the hepatic area. This ridge is unadorned with spines and is separated by 2 tubercles with the posterior being most prominent. The gastric region is tubercle free along the medial line except for one small tubercle at the on the anterior end, near the base of the rostrum. However, on either side are tubercles that do not form well defined ridges. The abdomen has irregularly placed low tubercles that form a low keel along the median line. Length to 12 cm.
Similar species
The 2 well defined pairs of lateral teeth on the rostrum and 1 tubercle on the ridge extending back over the hepatic region distinguish *Glyphocrangon sicaria* from *Glyphocrangon vicaria.*
Distribution
The distribution has not been clearly defined. Possibly far southern California to the Gulf of Panama to Costa Rica, 1000-3000 m and below.

Glyphocrangon vicaria

Description
The carapace and abdominal segments are brownish orange with few, if any, spines. The carapace and abdominal segments are covered with ridges, grooves and small tubercles. The rostrum is armed with a pair of short lateral teeth. The first, slightly in advance of the front of the eyes and the second pair at the root. From the anterior teeth the rostrum tapers to a point and the upper surface has a corrugated appearance. A low carina (ridge) extends backward from the base of the spine at the anterior external angle of the carapace over the hepatic area. This ridge is unadorned with spines and consists of a single tubercle. The carapace has prominent antennal and branchiostegal teeth, each with a supporting carina (ridge). There are also cervical and lateral grooves and nodules along the submedian, posterior intermediate ridges, and the anterior and posterior antennal ridge. Length to 12 cm.
Similar species
The obsolete second pair of rostral spines and the 2 tubercles on the ridge extending back over the hepatic region distinguish *Glyphocrangon vicaria* from *Glyphocrangon sicaria.*
Distribution
San Clemente Basin, California to the Galapagos Islands, 900-3880 m.

Pandalid Shrimp Pandalidae

Pandalus platyceros (Spot Prawn)

Description

This is a large, robust shrimp. The distal two thirds of the dorsal side of the rostrum is smooth, and the dorsal spines are absent behind mid-carapace. The legs are banded, and there are distinctive spots on the first and fifth abdominal segments. The carapace is red or pink with a characteristic pale pink bar on the side. The sixth abdominal somite is wide. Length to 30 cm.

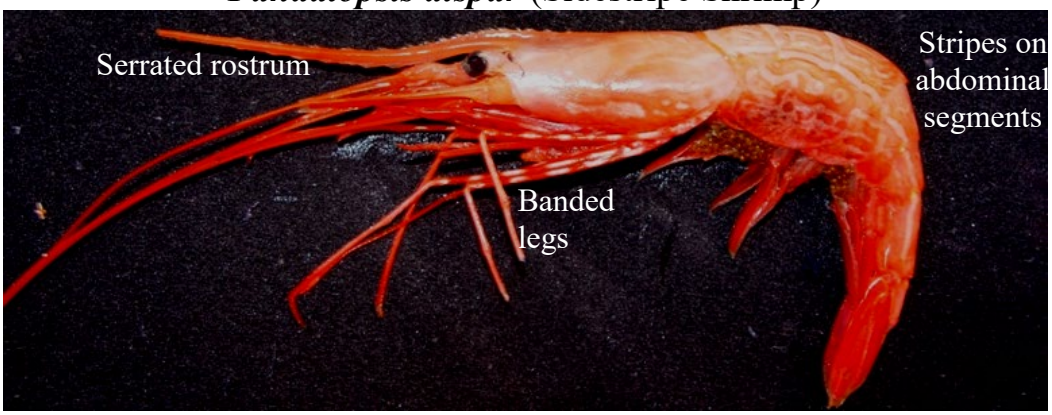
Similar species

The spots on the carapace should distinguish this species. *Pandalopsis dispar* has stripes on the abdominal segments and *Pandalopsis tridens* has yellow banded legs and no other markings, and the sixth abdominal somite is two times longer than wide.

Distribution

Aleutian Islands to Southern California, 1-500 m and below.

Pandalopsis dispar (Sidestripe Shrimp)



Description

This is a large, robust shrimp. The rostrum is serrated, the legs are banded, and there are distinctive white stripes along the abdominal segments. The carapace is red or pink with white stripes, and white-banded legs. Length to 12 cm.

Similar species

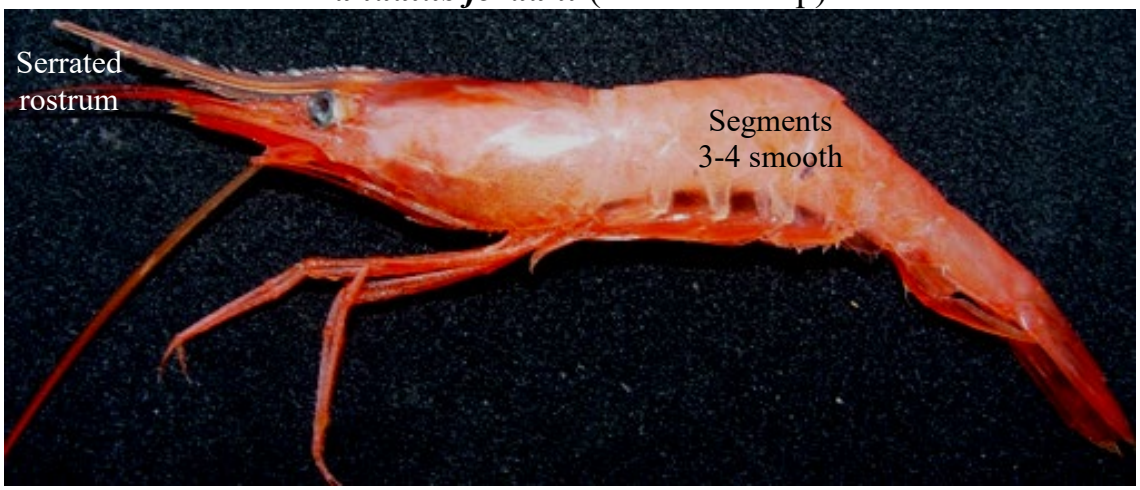
Pandalopsis ampla lacks the white strips, and the rostrum is smooth on the distal portion. *Pandalus tridens* has yellow banded legs but lacks stripes and the distal portion of the rostrum is smooth.

Distribution

Bering Sea to Oregon, 50-650 m.

Pandalid Shrimp Pandalidae

Pandalus jordani (Ocean Shrimp)



Description

This is a common shrimp that has no dorsal spine on the third and fourth abdominal segments and a serrated rostrum. The third abdomen segment is carinated (humped). Color is uniformly pink, with no banding. Length to 10 cm.

Similar species

Pandalus eous has spines on the third and fourth abdominal segments. *Pandalopsis ampla* has a smooth rostrum and a more robust body.

Distribution

Alaska to California, 15-1400 m.

Pandalopsis ampla (Smooth shrimp)

Description

This is a large, uniformly colored shrimp, lacking stripes or bands. The distal two thirds of dorsal side of the rostrum is smooth. Color is pale orange or pink, darker at the margins of abdominal segments. Length to 12 cm.

Similar species

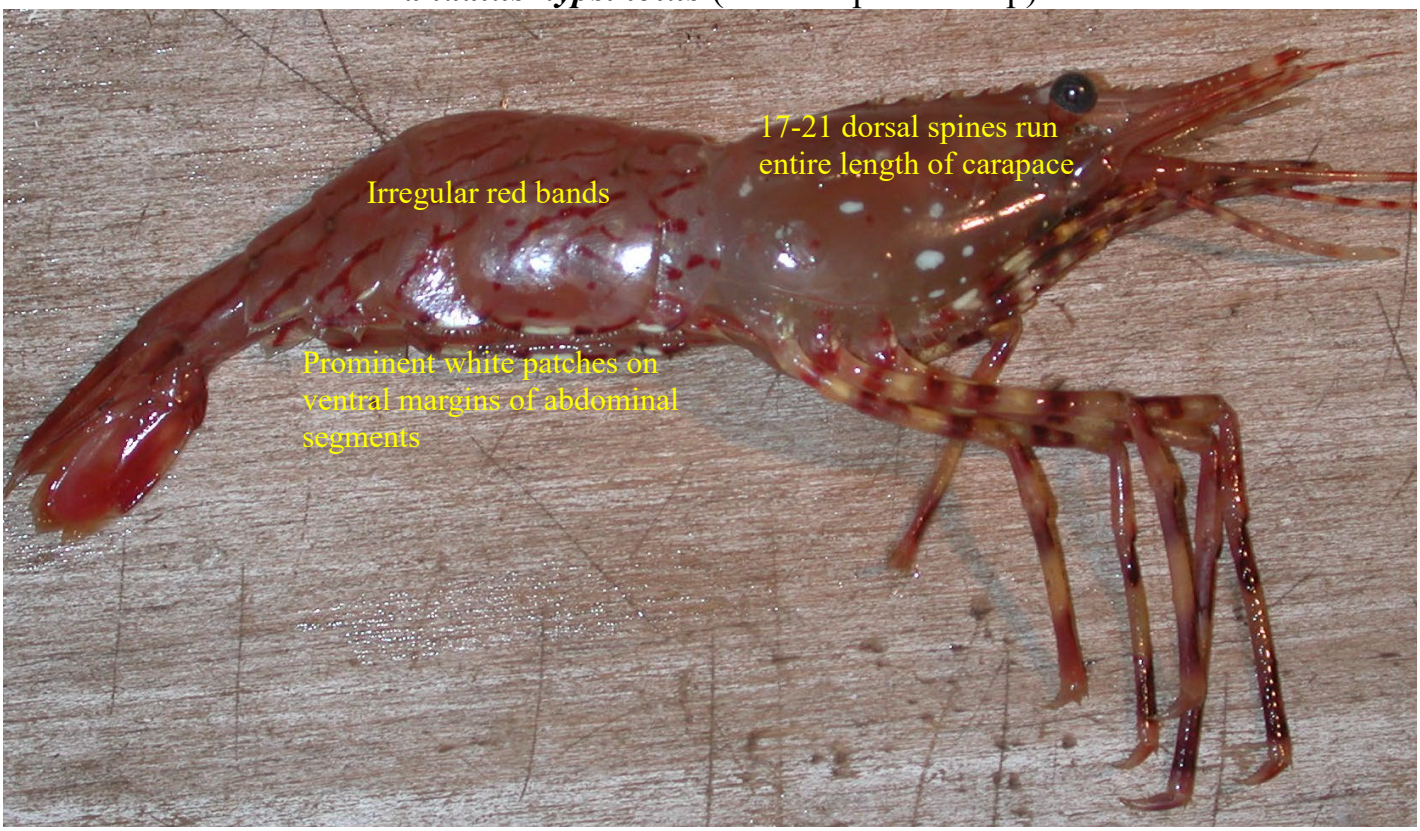
Pandalus jordani has a serrated rostrum and a less robust body. *Pandalopsis dispar* has stripes on the abdomen, a serrated rostrum, and banded legs. *Pandalopsis ampla* also has a smooth rostrum but has spots on the abdomen.

Distribution

Aleutian Islands to California, 400 m and below.

Pandalid Shrimp Pandalidae

Pandalus hypsinotus (Coonstriped Shrimp)



Description

This shrimp has an arched carapace and a serrated ridge on the carapace with 17-21 dorsal spines. It has banded legs, spots on the carapace, and the abdomen has irregular red bands and white markings on the lower portions of segments. The distal half of the rostrum is smooth and dorsal spines continue the entirety of the carapace. It is pink or red with yellow/white banded legs. Length to 15 cm.

Similar species

Pandalus danae and *Pandalus stenolepis* are similar in appearance, but have 8-12 dorsal spines and lack the elevated ridge on the carapace. The third abdominal somite of *Pandalus goniurus* is carinated (compressed) and lacks white blotches.

Distribution

Alaska to Puget Sound, 5-460 m.

Pandalus goniurus (Humpy Shrimp)

Description

This shrimp is transparent or light pink with red stripes on the abdomen that curve upward around the dorsal portion of the segments. The third abdominal segment has a dorsal projection lacking a spine, and the distal half of the rostrum lacks spines. Length to 8 cm.

Similar species

Pandalus jordani and *Pandalus eous* are uniformly pink and lack stripes. *Pandalus jordani* has spines on the distal portion of the rostrum. The upward curving red stripes on the abdomen should distinguish this species from others in this guide.

Distribution

Bering Sea to Puget Sound, 1-450 m.

Pandalid Shrimp Pandalidae

Pandalus eous (Alaskan Pink Shrimp)

Description

This shrimp is commercially fished in Alaska, similar to *Pandalus jordani* along Oregon, Washington, and California. The second abdominal segment overlaps the first and third. The third abdominal segment is carinated (humped), and the third and fourth segments have dorsal and posterior spines. It is uniformly pink. Length to 15 cm.

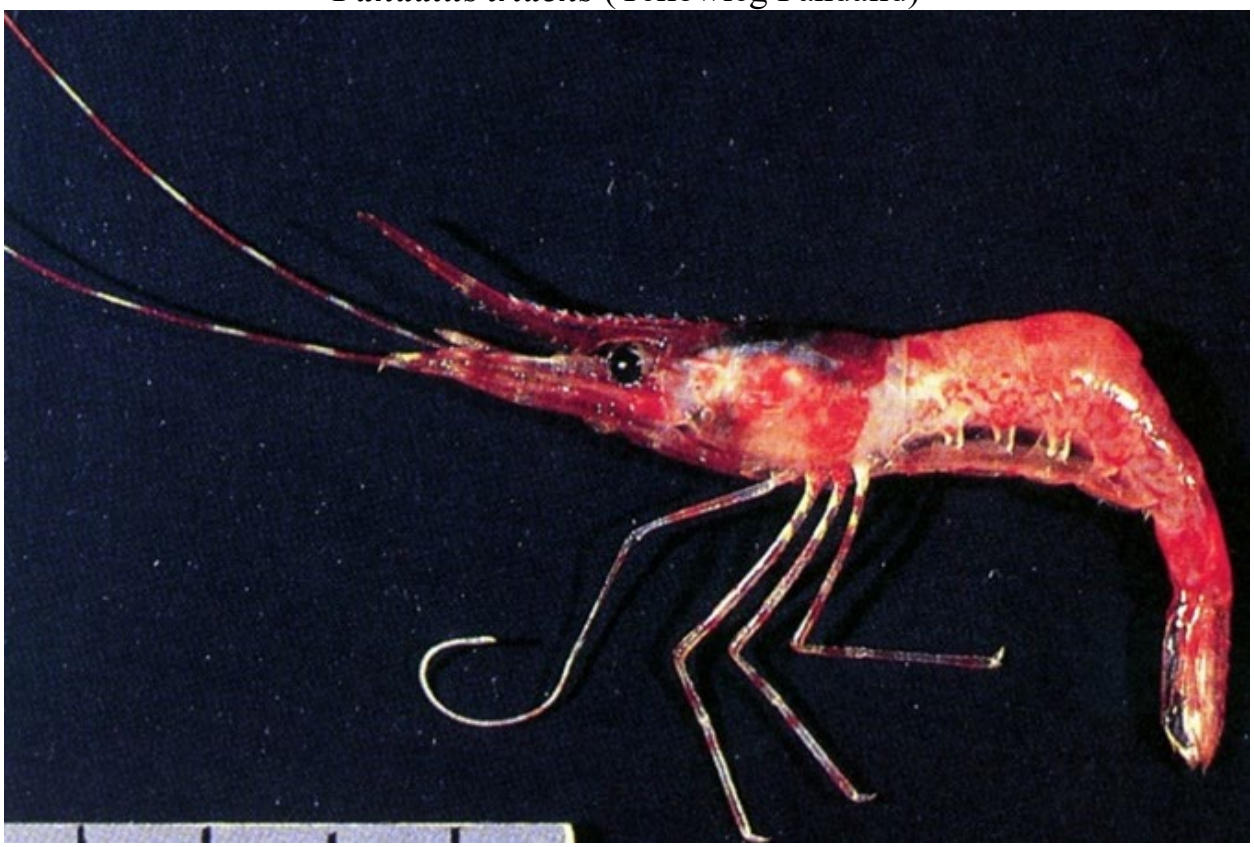
Similar species

This species was previously classified as a subspecies of the Atlantic species *Pandalus borealis,* but is now considered to be separate. *Pandalus jordani* lacks spines on the third and fourth abdominal segments.

Distribution

Alaska to the Columbia River, 16-1380 m.

Pandalus tridens (Yellowleg Pandalid)



Description

This shrimp has strongly banded legs but lacks stripes or spots elsewhere on the body. The distal half of the rostrum is smooth, and there are no dorsal spines behind mid-carapace. The sixth abdominal somite (segment) is more than two times longer than wide. It is pink or red with yellow/white banded legs. Length to 13 cm.

Similar species

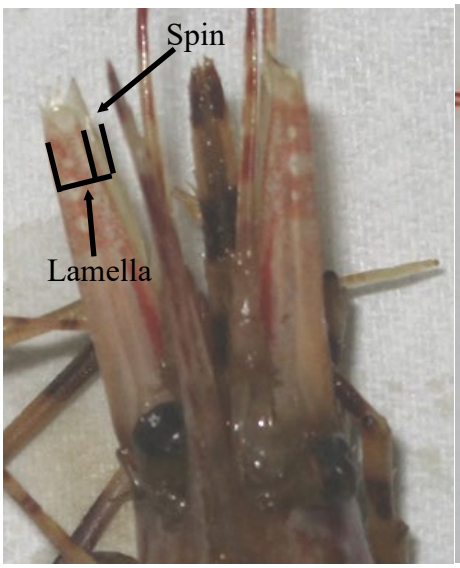
This is the only shrimp with banded legs that lacks other markings. The lack of dorsal spines behind mid-carapace is distinguishing. In *Pandalus platyceros*, which also lacks dorsal spines behind mid-carapace, the sixth abdominal somite is less than two times long as wide.

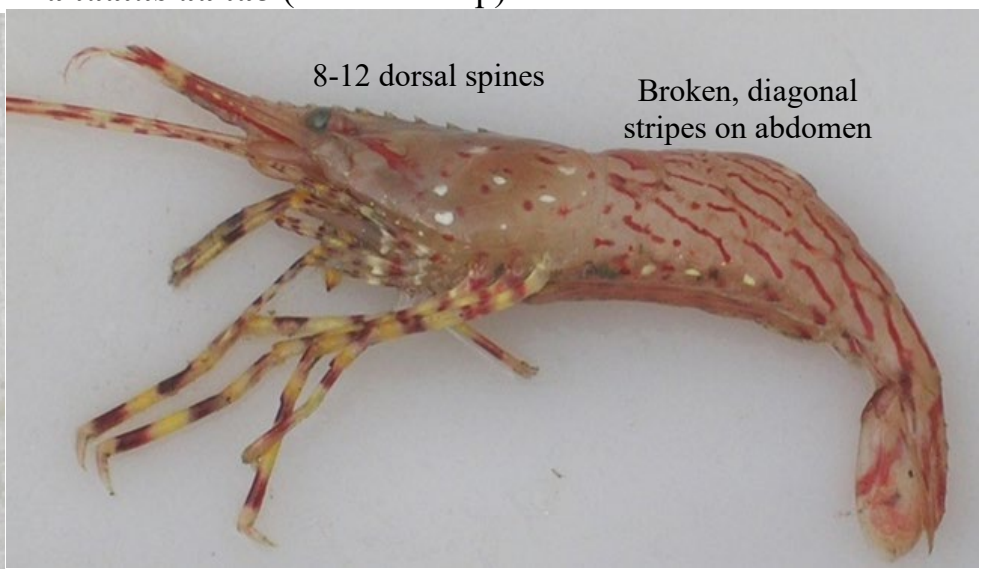
Distribution

Bering Sea to California, 5-1984 m.

Pandalid Shrimp Pandalidae

Pandalus danae (Dock Shrimp)





Description

This shrimp has red and yellow banded legs and broken, diagonal, red stripes on the abdomen. There may also be white blotches and/or small blue spots on the carapace and abdomen. The tip of the rostrum has three points. The lamella is wider than the spine on the antennal scale, and there are 8-12 dorsal spines that extend past mid-carapace. Length to 14 cm.

Similar species

The spine is wider than the lamella in *Pandalus stenolepis*. *Pandalus hypsinotus* has 17-21 dorsal spines along an elevated ridge. The white blotches along the abdominal segments are also more prominent.

Distribution

Alaska to Baja California, intertidal to 185 m.

Pandalus stenolepis (Roughpatch Shrimp)

Description

This shrimp has a red or pink body with strongly banded legs and antennae. There are brown spots on the abdomen and white and blue spots on the carapace and abdomen. The rostrum has 8-12 dorsal spines and the spine is wider than the lamella on the antennal scale. There is an area of pubescent hairs on the posterior region of the carapace. Length to 8 cm.

Similar species

Often confused with *Pandalus danae* but lacks the broken stripes on the abdomen, has more prominent blue spots, and the antennal scale spine is wider than the lamella. *Pandalus hypsinotus* has 17-21 dorsal spines and white blotches on the lower portion of abdominal segments.

Distribution

Alaska to the Oregon waters off Heceta Bank, 18-229 m.

Broken-back Shrimp Hippolytidae

Eualus macrophthalmus (Big Eyed Eualid)

Description

This is a small, slender shrimp with a distinctive blade-like, serrated rostrum. The body is transparent and pink or orange with yellow and green highlights. The blade-like rostrum is transparent. Length to 6 cm.

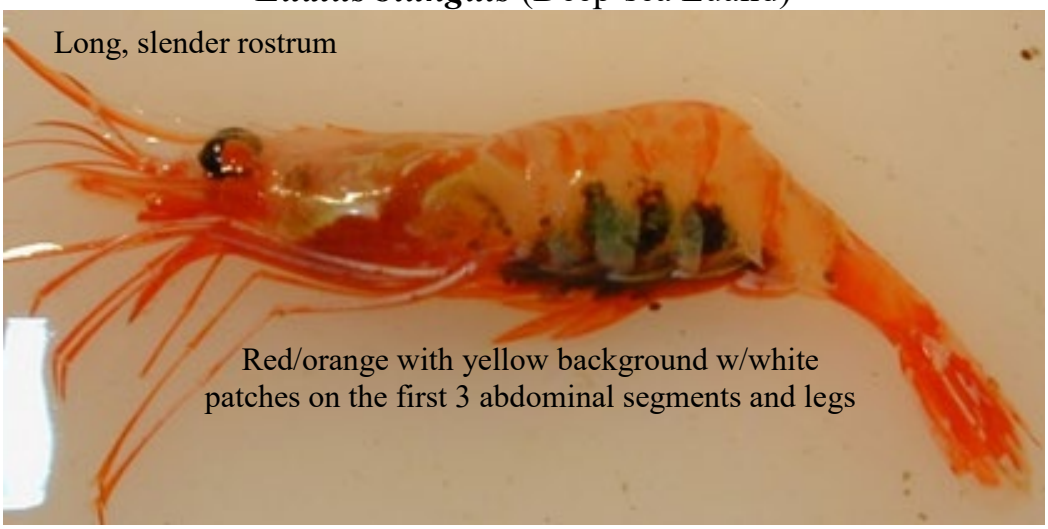
Similar species

The blade-like rostrum distinguishes *Eualus macrophthalmus*. Many closely related species of *Eualus* occur in the survey. However, the differences between them are difficult or unable to be seen unaided, making identification in the field problematic.

Distribution

Unalaska to Point Sur, California, 110-1163 m.

Eualus biunguis (Deep-sea Eualid)



Description

Eualus biunguis has a long, upwardly curved, slender rostrum almost as long as the antenna with 5-7 dorsal and 4-7 ventral teeth. The anterior half of the dorsal surface is without teeth. There are spines behind the eyes and on the first half of the rostrum. The color is mostly red/orange with a yellow background with white patches on the first 3 abdominal pleura and pereiopods. Length to 6 cm.

Similar species

Eualus lineatus has a short, straight, slender rostrum that has 3-6 dorsal and 1-3 ventral teeth. Many closely related species of *Eualus* occur in the survey. However, the differences between them are difficult or unable to be seen unaided, making identification in the field problematic.

Distribution

Bering Sea to Oregon, 90-2,000 m.

Broken-back Shrimp Hippolytidae

Eualus lineatus (Striped Eualid)

Description

Eualus lineatus has a straight, slender rostrum that reaches the second antennular segment that has 3-6 dorsal and 1-3 ventral teeth. The carapace is smooth and the dorsum straight. Most abdominal segments are smooth. However, the fourth segment has a weak posterolateral spine and the fifth has a strong posterolateral spine. The telson has 3 pairs of dorsolateral spines. The carapace color varies from nearly clear to red/orange with red diagonal lines on the carapace and first 2 abdominal segments. Red spots and blotches mark abdominal segments 3-6, and the telson and uropods. Smaller red spots mark all the anterior appendages. Length to 6 cm.

Similar species

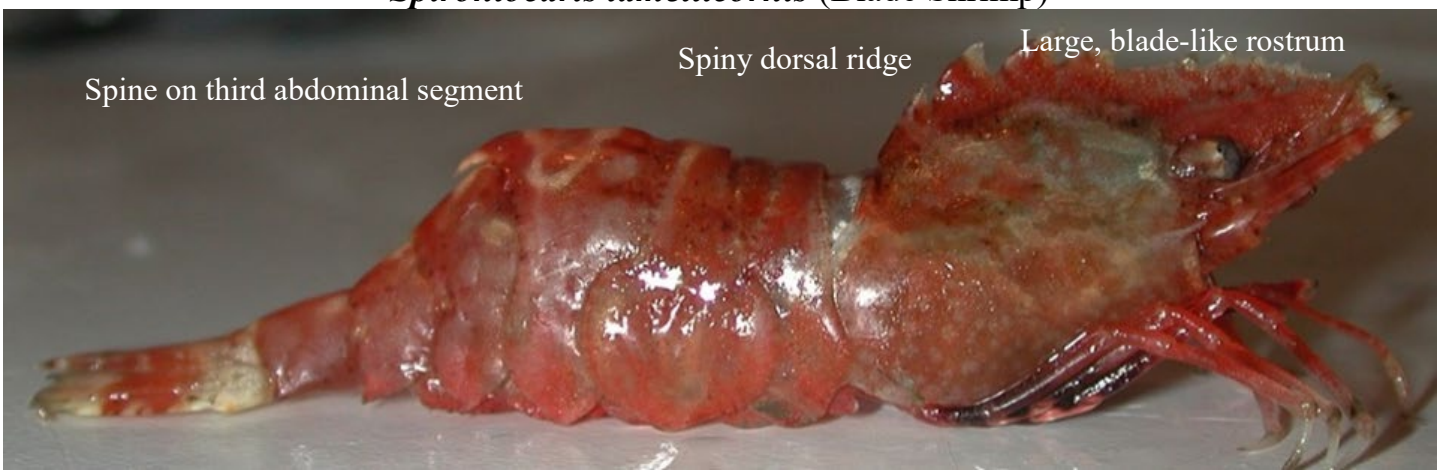
Eualus biunguis has a longer, upturned rostrum that has 5-7 dorsal and 4-7 ventral teeth. Many closely related species of *Eualus* occur in the survey. However, the differences between them are difficult or unable to be seen unaided, making identification in the field problematic.

Distribution

Sitka, Alaska to southern California, 90-2,000 m.

Thoridae

Spirontocaris lamellicornis (Blade Shrimp)



Description

This shrimp has a large, blade-like rostrum, four large dorsal spines, and a long, sharp spine on the posterior edge of the third abdominal segment. It is mottled red, white, and yellow. Length to 6.5 cm.

Similar species

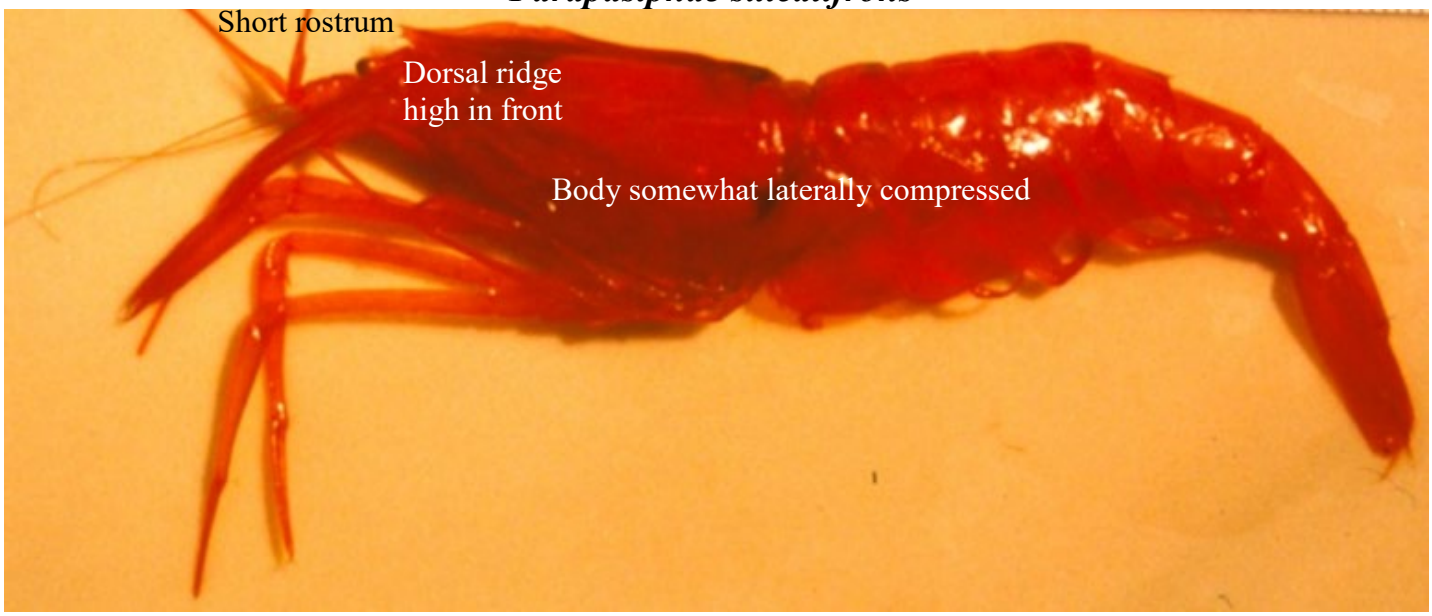
Other species of *Spirontocaris* are not likely to be taken in NMFS trawls.

Distribution

Bering Sea to Santa Monica, California although rare south of Point Conception, subtidal 3-192 m.

Glass Shrimp Pasiphaeidae

Parapasiphae sulcatifrons



Description

The rostrum is shorter than the eyestalk. The mid dorsal ridge (carina) has a groove from the tip of the rostrum to just anterior of the highest point. The first 2 legs are longer and stouter than the others and both have long claws (chelae) with the fingers of the second claw shorter than the palm with rows of close set narrow projections (pectinate) on the cutting edges. There is a ventro-lateral notch but no spines on the anterior edge of the carapace. There fourth segment has a small posteromedian spine. The telson has 4 pairs of small spines on the subtruncate narrow tip. Generally a uniform dark red with amber to bronze colored eyes. Length to 9 cm.

Similar species

Parapasiphae cristata has 2 small basal teeth on the rostrum that reaches the cornea of the eye. The fingers of the second claw are longer than the palm. *Pasiphaea spp.* are highly laterally compressed and do not have a true rostrum but a median spine.

Distribution

British Columbia to Baja California, 500-1300 m.

Parapasiphae cristata

Description

The rostrum has 2 small teeth at the base arising as a projection (reaches the cornea) on the front of the carapace. The mid dorsal ridge (carina) may have up to 2 small teeth. There is a groove along the branchial region. The lightly pigmented cornea has a distinct tubercle. The first 2 legs are longer and stouter than the others both with long claws (chelae). The fingers of the second claw longer than the palm. Most abdominal segments are smooth. The fourth segment has a dorsal ridge that ends with a spine on the posterior margin. The telson is slightly shorter than the inner uropods. Length to 9 cm.

Similar species

Parapasiphae sulcatifrons has a shorter (shorter than eyestalk) smooth rostrum and the fingers of the second claw are shorter than the palm. Pasiphaea are highly laterally compressed and do not have a true rostrum but a median spine.

Distribution

Oregon to Baja California, 400-2870 m.

Pasiphaeidae

Eupasiphae serrata

Description

The short rostrum does not exceed eyestalk. Dorsal ridge on the carapace has 16 small spinules, extends nearly the full carapace length, and has a posterior dorsal groove. The lateral ridge running posteriorly from the branchiostegal region nearly joins a ridge running horizontally along the branchial region. The stylocerite (spinous structure on the outside of the first antennae) is much longer than eye. Scaphocerite (flattened plat on the second antennule joint) with lateral tooth longer than blade. Third maxillipeds stout, shorter than first pereopod. First and second pereopods stout, chelate, with spinules on propodus and merus. Third pereopods thread-like, fourth and fifth pereopods short and with flat dactyls. First 3 abdominal segments smooth, fourth segment with a ridge and a notch above strong posterodorsal tooth. Fifth segment smooth, sixth segment without ridge but with a longitudinal groove. The telson is shorter than the uropods with a truncated tip. Total length 6.5 cm.

Similar species

The dorsal ridge with 16 spinules and running nearly the length of the carapace distinguish *Eupasiphae serrata*.

Distribution

Oregon to Baja California, 400-2870 m.

Pasiphaea chacei

Description

The prominent relatively long, straight, slender, acute rostrum points slightly upward and extends anteriorly to or slightly past the cornea. The carapace has a distinct ridge on the anterior two thirds of the dorsal surface, the posterior third is smooth. The lateral surface has a suprabranchial carina. The prominent branchial spine originates behind and extends beyond the anterior margin of the carapace. Abdominal segments I-V are smooth and dorsally rounded. The sixth segment is dorsally compressed. The telson is shorter than the sixth segment and has a broad longitudinal groove dorsally, a truncate distal margin with 4 pairs of spines that get longer from the middle out. The eyes are a dark golden brown while the body and appendages are mainly transparent with various numbers and sizes of scattered red stellate chromatophores. The dark red fingers have gray-black curved tips. The viscera is visible as a dark mass anteriorly with (when mature) posterodorsal yellow gonads.

Similar species

The carinate carapace, smooth abdomen and distally truncate telson distinguishes *Pasiphaea chacei*.

Distribution

Oregon to Baja California, 300-700 m.

Pasiphaea corteziana

Description

The dentiform (tooth shaped) rostrum does not extend past the anterior edge of the carapace. The carapace is very bluntly carinated posterior to the rostrum. The abdominal segments are not carinated and the telson has a deep notch. The branchiostegal spine is near the antereolateral angle and does not extend past the anterior margin of the carapace. The eyestalks become somewhat enlarged distally and the eyes are a reddish brown. Body color in life undocumented. Total length to 6.4 cm.

Similar species

Differences in the shape and length of the rostrum, presence, absence, extent and definition of the carina on the carapace and/or abdominal segments and the length of, presence/absence of a notch and or grooves in the telson distinguish *Pasiphaea corteziana* from related species.

Distribution

Known from near Cortez Bank at 776 m and Santa Cruz Island, 764-892.

Pasiphaeidae

Pasiphaea emarginata

Description

The spine-like rostrum is directed obliquely upwards. The carapace is about as long as the first five and a half abdominal somites (segments), has a small knob anterior to the post frontal tooth and a small branchiostegal tooth supported by a carina. The dorsal carina extends to the posterior margin of the carapace. There is a lateral H shaped carina extending posteriorly along the lateral sides with 2 smaller parallel carina above (dorsally). There is a small Y shaped carina near the antenna. Abdominal somites (segments) I-V are slightly carinate, somite VI with a faint carina. The telson has a distinct dorsal groove and a shallow V shaped posterior notch. Total length to about 8 cm.

Similar species

The long carapace, spine-like rostrum, carinate carapace and abdomen and the shallow notch in the telson distinguish Pasiphaea emarginata from related species.

Distribution

Southern California to Baja and the Gulf of California, 0-1600 m.

Pasiphaea magna

Description

The bright red laterally compressed carapace has a dorsal carina (ridge) extending to the posterior margin. The heavy blade shaped rostrum extends nearly to the anterior margin of the eyes has a convex lower margin. There is a small knob above the eyestalk and small branchiostegal tooth that nearly reaches the anterior margin of the carapace. There is Y shaped carina along the lateral sides from near the antenna to nearly the posterior margin. Although faint on abdominal somite (segment) I all somites have a dorsal carina. The posterior margin truncate telson has 6 pairs of spines with a small unpaired median spine.

Similar species

The spine configuration on the telson, the heavy triangular rostrum and the branchiostegal spine not extending past the anterior margin of the carapace distinguishes *Pasiphaea magna*.

Distribution

California to Chile, 509-1019 m.

Pasiphaea pacifica (Pacific Pasiphaeid, Pacific Glass Shrimp)

Description
The highly laterally compressed and mostly translucent body has scattered orange/red chromatophores but especially along the dorsal surface of the abdomen, the telson and the ventral margin of the carapace the chelipeds and the central visceral mass. Carapace about half the length of the abdomen. Gastric tooth variable, more or less inclined upward, terminally usually slender, anterior margin concave; continued back as a thin, sharp keel, which becomes a rounded ridge behind the gastric region. Branchiostegal spine situated over the angle of the anterolateral sinus. Abdominal segments 2-6, inclusive, carinate. Telson nearly as long as sixth abdominal segment (somite). Total length to 8 cm.
Similar species
Other genera of deep sea shrimps are not as highly laterally compressed.
Distribution
Alaska to the Gulf of California, 0-1076 m, but most common between 75-500 m.

Pasiphaea tarda (Crimson Pasiphaeid)

Description
This highly laterally compressed red shrimp has a thin carapace, a mid-dorsal carina (ridge) extending the length of the dorsal midline including the abdominal somites (segments). There is a small branchiostegal tooth supported by a short carina. There is a short carina above the Y shaped carina along the branchial region that does not reach the posterior margin. The telson has a dorsal groove, a V shaped posterior notch and is shorter than the uropods. The bladelike rostrum is a post frontal spine rising from the dorsal carina and extends just past the anterior margin of the carapace. Total length to 22 cm.
Similar species
The short bladelike rostrum distinguish *Pasiphaea tarda* from other related species.
Distribution
Unalaska to Ecuador, 0-2400 m, but most common between 200-2000 m.

Carid Shrimp Nematocarcinidae

Nematocarcinus Sp. A (Red Sword Shrimp)

Description

This is a uniformly dark red, slender shrimp with a long, robust, smooth rostrum. Length to 10 cm.

Similar species

Many similar species occur in the survey area and the differences are subtle making field identification problematic. *Neognathophausia* spp. have inconspicuous eyes and lateral and posterior spines on the carapace.

Distribution

Southern California, 400 m and below.

Peaked Shrimp Acanthephyridae

Acanthephyra curtirostris (Peaked Shrimp)

Description

Peaked shrimp are uniformly red. The triangular rostrum has 6-9 small dorsal and 1-2 ventral teeth. The carapace has a prominent ridge extending rearward from the branchiostegal tooth and grooves extending rearward from the orbit and antennal region. Abdominal segments (somites) 2-6 have a strong dorsal ridge with segments 3-5 ending with a posterior spine with the spine on segment 3 the strongest. The telson has 6-15 dorsolateral spines. Length to about 8 cm.

Similar species

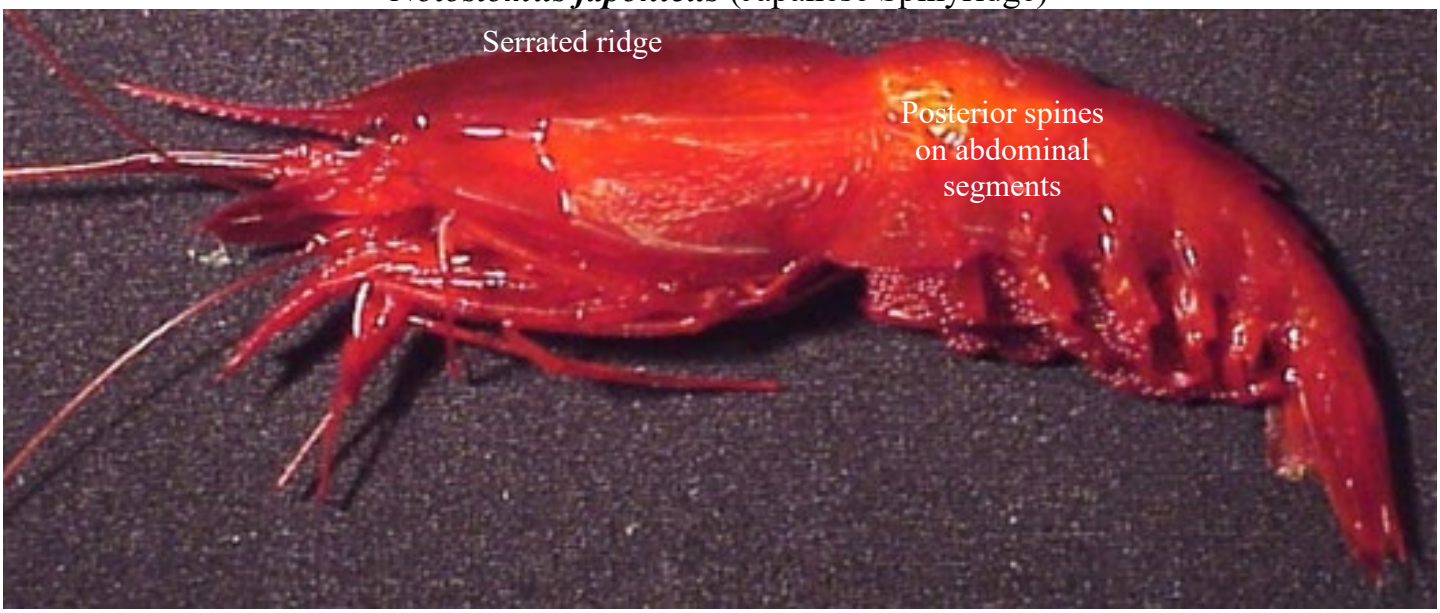
Many visually similar species occur in the survey area and the differences are subtle making field identification problematic. However the large, triangular rostrum distinguishes this species from related genera.

Distribution

British Columbia to Peru, 300-2000 m.

Peaked Shrimp Acanthephyridae

Notostomus japonicus (Japanese Spinyridge)



Description

Notostomus japonicus is red with somewhat darker ridges. The slender rostrum has 10-18 ventral teeth and 55-83 dorsal teeth extending rearward most of length of the carapace. The arched anterior portion of the carapace has antennal and branchiostegal teeth. All abdominal segments have a median dorsal ridge. Segments 3-6 have a posterior dorsal spine. The telson has a dorsal groove, 3-4 pairs of dorsolateral spines and a blunt tip with 5 distal spines. Length to 15 cm

Similar species

Many visually similar species occur in the survey area making field identification problematic. However, the serrated ridge on the rostrum and carapace distinguish *Notostomus japonicus* from similar species.

Distribution

Bering Sea to California, 400 m and below.

Paneid Shrimp Benthesicymidae

Benthesicymus spp.

Description

In general *Benthesicymus* are a uniform red. The highly setose rostrum is triangular and blade-like. The pereiopods (legs) are long. The elongate pleopods are setose and biramous (divide into 2 branches). There is a podobranch (small gill-like respiratory structure) at the base of the second maxilliped to the third pereiopod. The arthrobranch (gill-like respiratory structure) of the first maxilliped is larger than the pleurobranch (gill) of the second maxilliped. The telson has 3 or more pairs of mobile lateral spines and usually a small posteromedian point or spine. The dactylus (tip) of pereiopods 4-5 not subdivided.

Similar species

The highly setose triangular blade-like rostrum, the long pereiopods (legs) and the long, setose, and biramous pleopods distinguish *Benthesicymus* from the other species in this guide. Several species of *Benthesicymus* occur within the survey area. However, the characteristics used for species identification are difficult to see in the field making identification problematic.

Distribution

Southern California to Chile, 485-4130 m.

Rock Shrimp Sicyoniidae

Sicyonia ingentis (Ridgeback Rock Shrimp)

Description

Ridgeback shrimp are reddish brown dorsally becoming red and eventually light on the ventral portions of the carapace. The abdominal segments become red ventrally with white edges. The legs are whitish with red/orange spots or bands. The short rostrum does not extend past the distal end of the antennular peduncle is armed with dorsal teeth the ventral side is smooth. A prominent ridge runs the length of the carapace and continues the length of the abdomen. Length to 25 cm.

Similar Species

S. penicilliata Target Rock Shrimp has a large dark spot on each side of the carapace.

Distribution

Central California to Mexico, 5-300 m.

Sicyonia penicilliata (Target Rock Shrimp, Peanut Rock Shrimp)

Description

Target rock shrimp are tan to light grey with grey, brown or black mottling. Both sides of the carapace have a large dark spot with a light border and sometimes a yellowish spot in the center. The abdominal segments become lighter ventrally with white edges. A prominent ridge runs the length of the carapace and abdomen. Length to 14 cm.

Similar Species

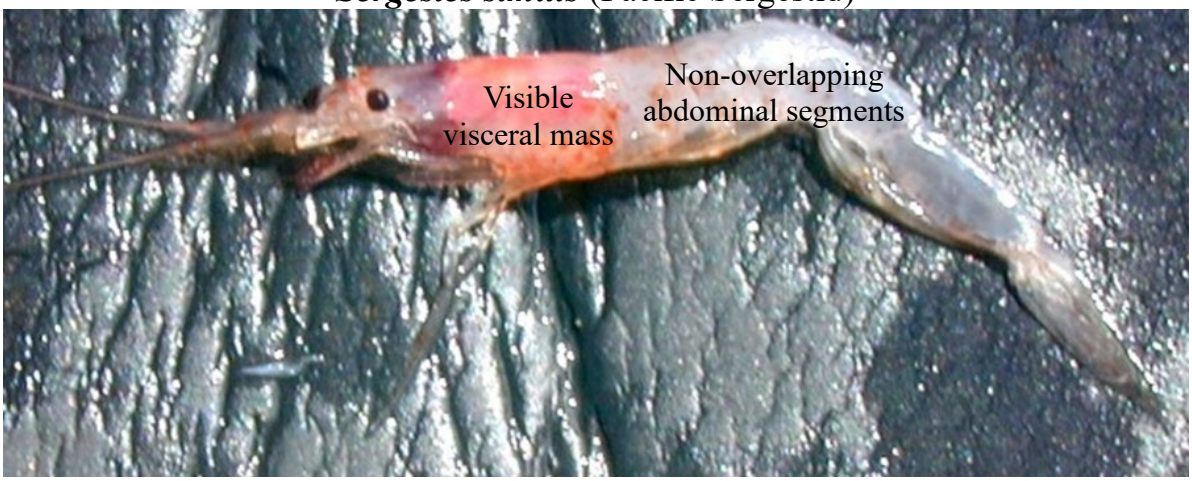
The large dark spot on each side of the carapace distinguishes *S. penicilliata* from other species in this guide.

Distribution

Punta Canoas on the West Coast of the Baja peninsula the Gulf of California to Costa Rica Central, near shore to over 300 m. Not confirmed off the U.S. West Coast.

Sergestidae

Sergestes similis (Pacific Sergestid)



Description

This is a small, slender shrimp that is round in cross section. The second abdominal segment does not overlap the first and third. Color is transparent, with red or orange speckles and red and purple visceral mass visible through carapace. Length to about 6 cm.

Similar species

Pasiphaea pacifica is laterally compressed and second abdominal segment overlaps the first and third.

Distribution

Benthopelagic, Bering Sea to southern California, 0-400 m and below.

Stalked Barnacles Pedunculata

***Lepas* spp.** (Pelagic Barnacle)

Description

These pelagic barnacles are either found attached to floating organisms (algae, driftwood) or form floats themselves. Armored plates completely cover the capitulum (body of animal, including the viscera and the appendages). When feeding, cirri extend through the plates to capture particles. Capitulum to 8 cm.

Similar species

There are several species of pelagic barnacles. They differ in number of plates, shape of the carina base, and life history.

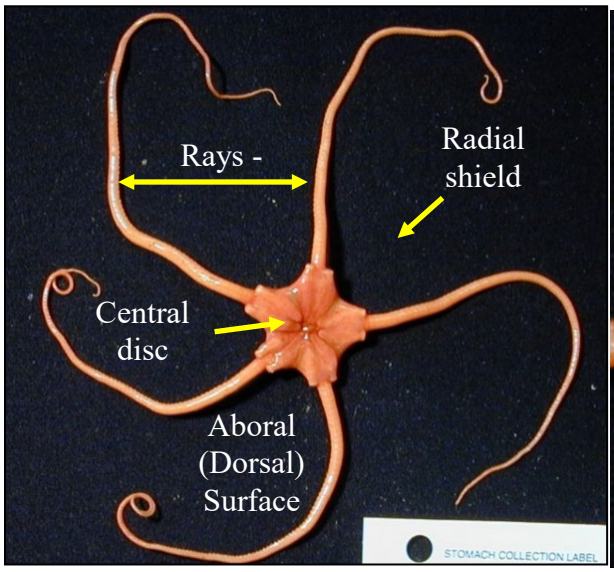
Distribution

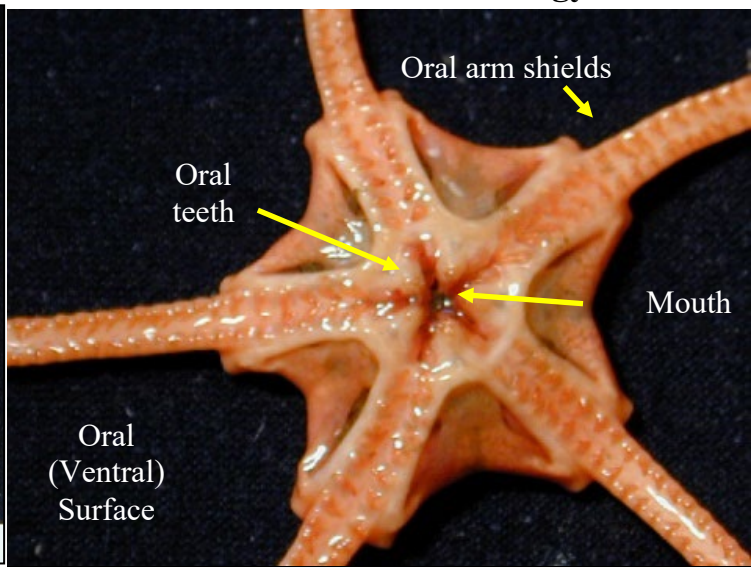
Pelagic, cosmopolitan.

Basket Stars / Brittle Stars Ophiuroidea

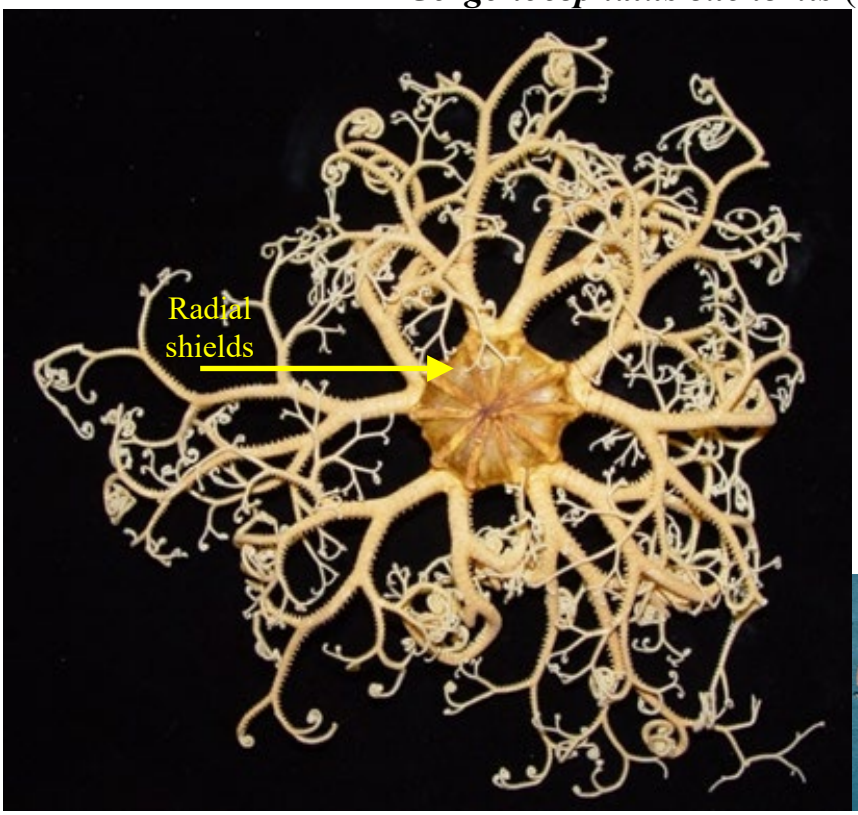
Ophiuroids are radially symmetrical, and the arms may be branched. The aboral surface of the central disc may be smooth or granular, and may have shields, either extending radially in ridges, or flat. The mouth and oral teeth are in the center of the oral surface. The arms may have spines and shields (calcareous plates) on the one or both sides.

Basket/Brittle Star Characteristics and Terminology





Gorgonocephalus eucnemis (Basket Star)



Description
This ophiuroid has a large central disc and arms that branch multiple times and end in curled tendrils. There are ten ridges of radial shields (small, calcareous plates) extending radially from the disc center. The disc and arms are pink, tan, or brown. Disc diameter to 5 cm, arms to 35 cm.

Similar species
The arms of *Astrochele* spp. do not branch as profusely, and they are often found living on gorgonians.

Distribution
Bering Sea to Baja California, 20-800 m and below.

Brittle Stars

***Astrochele* spp.** (Serpent Star)

Description

The central disc has ten ridges of radial shields (small, calcareous plates) radiating from the center. The long slender arms end in curled tendrils. Branching of arms also occurs. The disc is light brown on both sides. Disc diameter to 2.5 cm, arm lenght to 10 cm.

Similar species

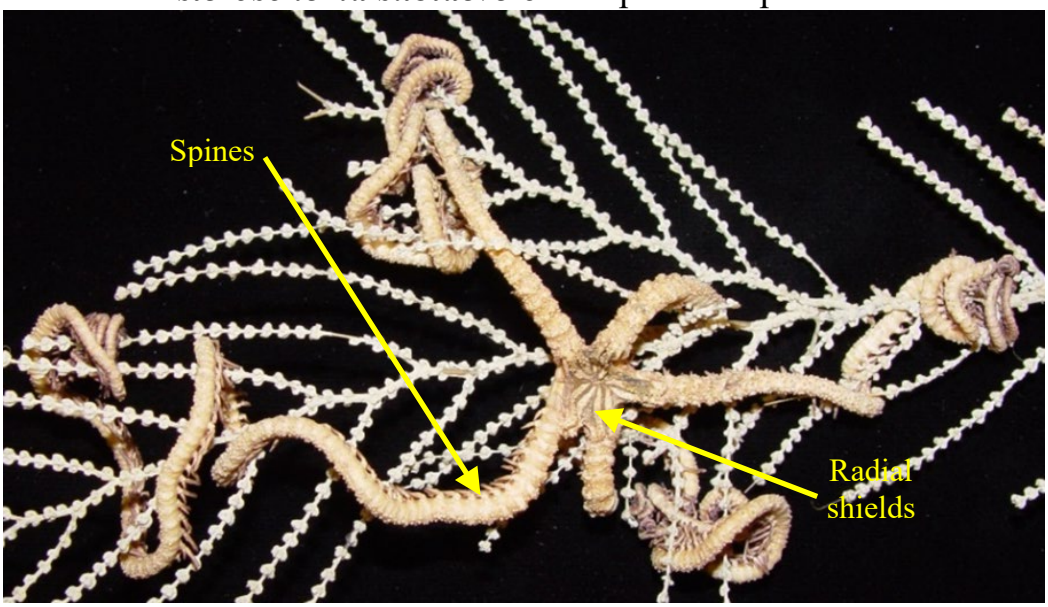
Gorgonocephalus eucnemis arms branch profusely. *Asteronyx* spp. has a red or pink disc.

Distribution

The ranges have not been defined. Currently known only from southern Oregon at 1200 m.

Brittle Stars

Asteroschema sublaeve **cf** Deep Sea Serpent Star

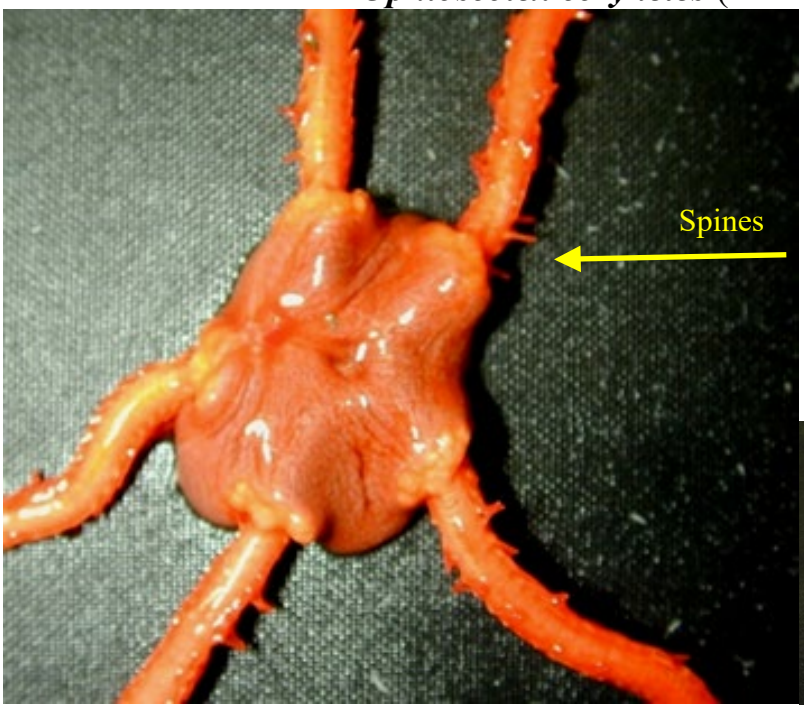


Description
This large, flexible tan or brown ophiuroid has very long, thick arms with prominent spines and shields (calcareous plates) on the oral side. There are radial shields in ridges on the central disc. Diameter of disc to 1 cm, arms to 18 cm.

Similar species
Gorgonocephalus eucnemis arms branch profusely and the central disc has a greater relative size. *Astrochele* spp. arms branch and disc size is also relatively greater. *Asteronyx* spp. are orange or red and have thinner arms.

Distribution
Gulf of Alaska to southern Oregon, 1200 m and below.

Ophioscolex corynetes (Blob Disc Serpent Star)



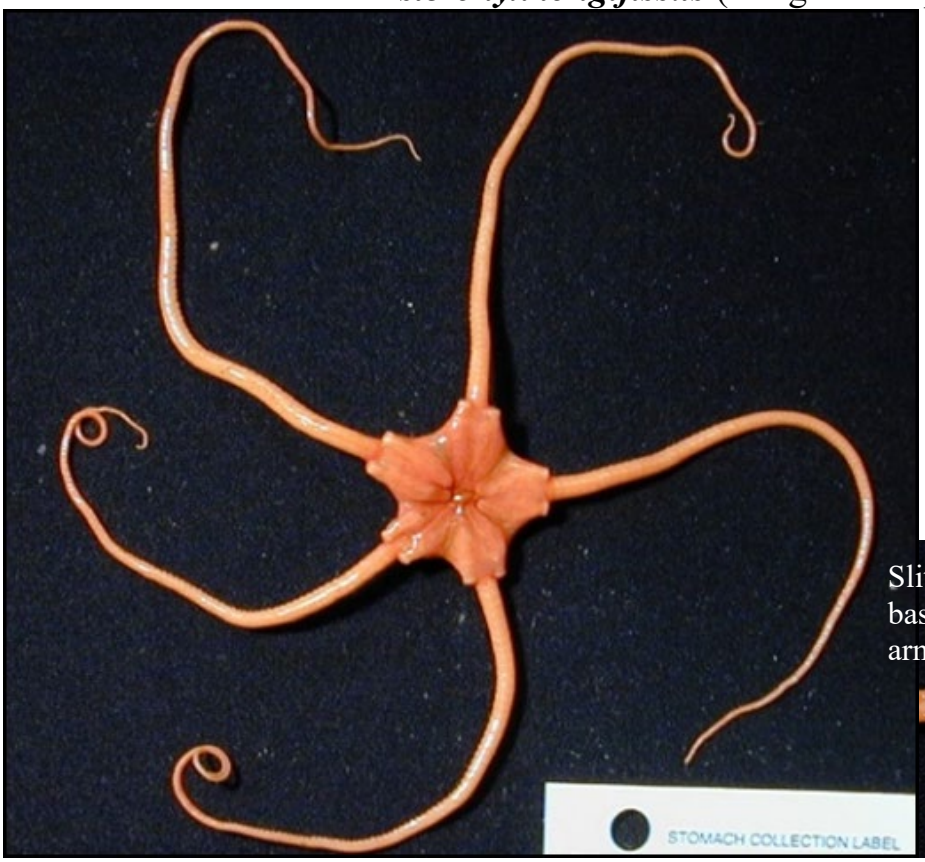
Description
This red or orange star has a soft fleshy disc which is usually missing, leaving the arms and ring of mouth plates. There are arm spines, but no shields on the arms or disc. Disc diameter to 2 cm, arm length to 9 cm.

Similar species
Asteronyx spp. have flat discs with prominent ridges of shields.

Distribution
Gulf of Alaska to California, 250-800 m.

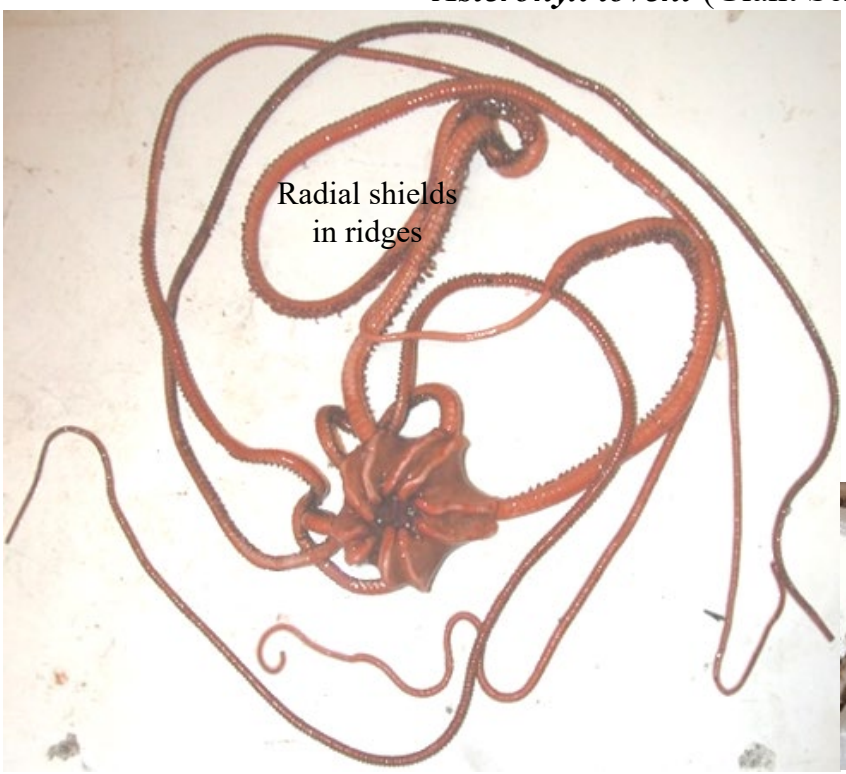
Brittle Stars

Asteronyx longifissus (Long-slit Serpent Star)



Description
This orange or red star has a flat central disc and radial shields but no prominent ridges. There are long, narrow slits at the base of arms on the ventral side of disc. Disc to 2 cm, arms to 10 cm.
Similar species
Asteronyx loveni has radial shields in prominent ridges, longer arms, and holes at the base of arms.
Distribution
California to Mexico, 400-800 m.

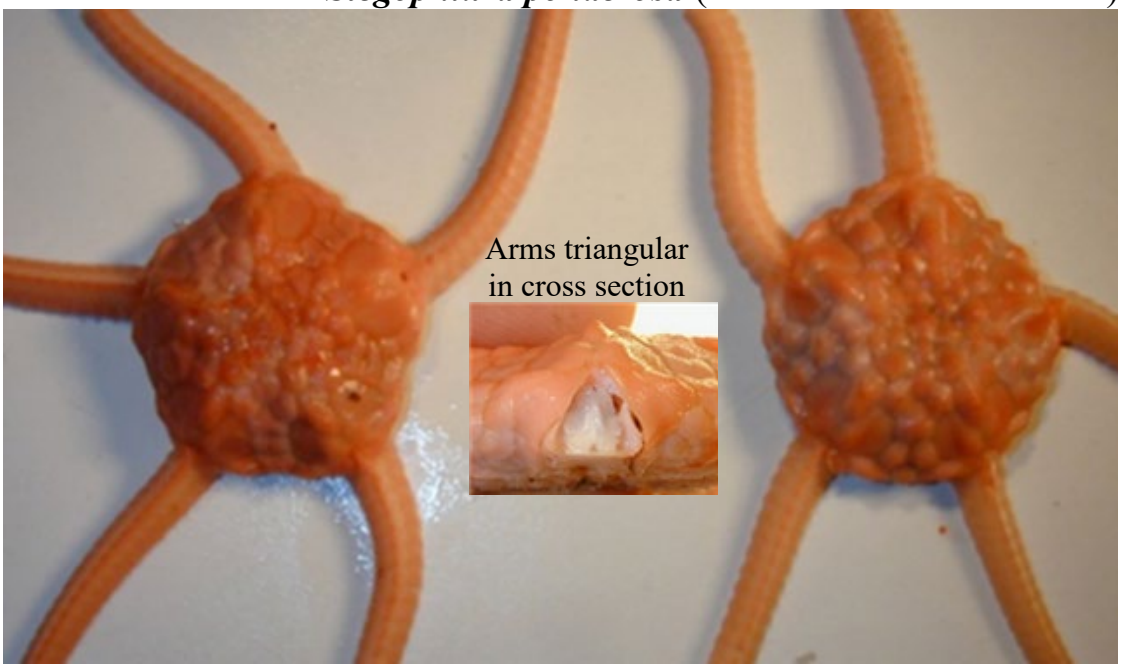
Asteronyx loveni (Giant Serpent Star)



Description
This red, brown, or orange star has extremely long slender arms dorsal surface and holes at the base of the arms on the ventral side. Disc to about 5 cm, arms to 35 cm.
Similar species
Asteronyx longifissus has a smaller, flatter central disc, shorter arms and long slits at the base of the rays.
Distribution
Bering Sea to California, 100-1000 m.

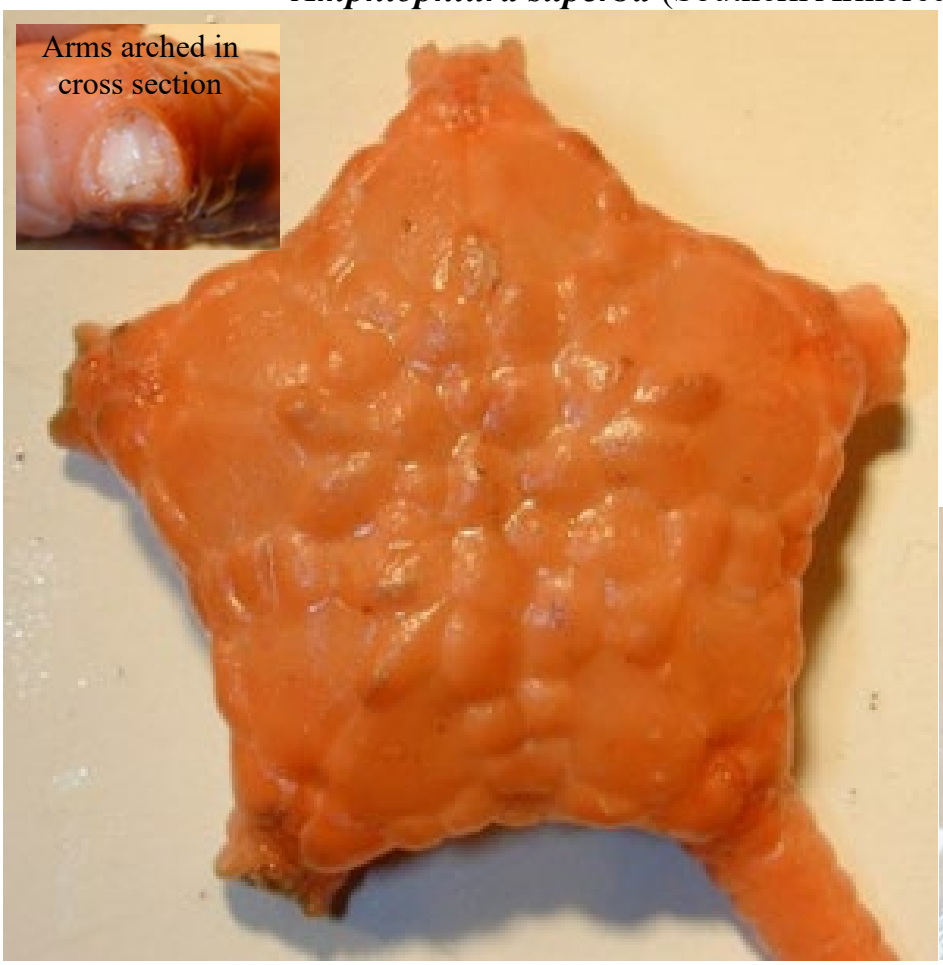
Brittle Stars

Stegophiura ponderosa (Giant Armored Brittle Star)



Description
This pink, orange or red solid, rigid star has a thick disc and arms that are triangular in cross section. Disc to 5 cm, arms to15 cm.
Similar species
The arms of *Amphiophiura superba* are arched in cross-section, not triangular.
Distribution
Aleutian Islands to California, 300-800 m.

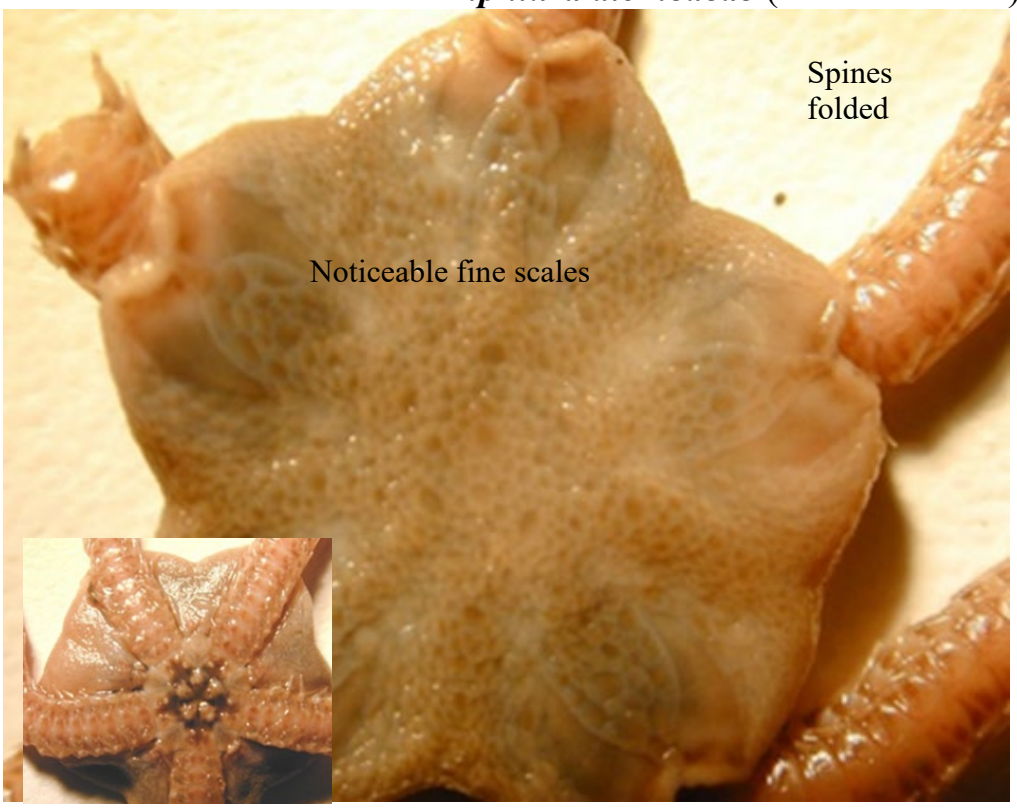
Amphiophiura superba (Southern Armored Brittle Star)



Description
This is a rigid brittle star, and the arms are arched (rounded, flat on bottom) in cross section. The disc and arms are pink or light orange. Disc diameter to 3.2 cm, arms to about 7 cm.
Similar species
The arms of *Stegophiura ponderosa* are triangular in cross section.
Distribution
SE Alaska to California, 400-800 m possibly more.

Brittle Stars

Amphiura diomedeae (Tan Brittle Star)



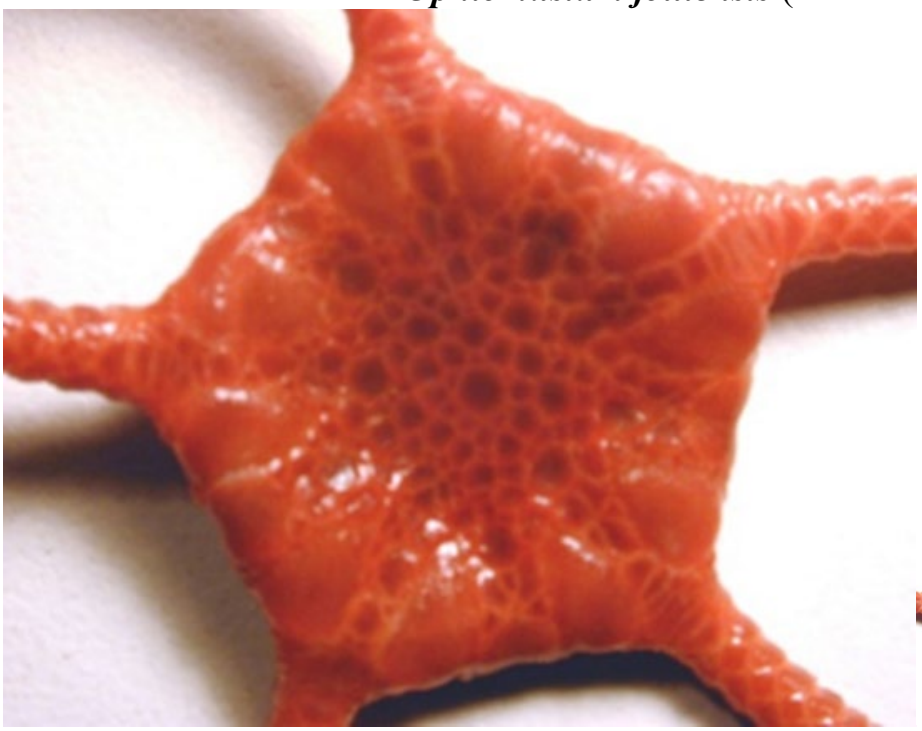
Description
This small pink or tan star has slender arms. The disc scales are very fine. Arm spines are often laid flat against arms, and there two tentacle scales (moveable scales) at base of each tube foot. Diameter disc to 1.5 cm, arms to 5 cm in length.
Similar species
Ophiopthalmus normani is red or pink has a scaleless central disc, and longer arm spines. *Amphiura carchara* (not pictured) has one tentacle scale, and *A. diomedeae* has two.
Distribution
British Columbia to Baja California, 450-3000 m.

Ophiopthalmus normani (Rosy Brittle Star)

Description
The disc of this pink, brown, or light orange star is covered with papillae or granules, making scales hard to see. The arms have long spines. Diameter of disc to 1.5 cm, arms to 5 cm in length.
Similar species
The name of this species is in question, and is also called *Ophiacantha normani.* The disc of *Amphiura diomedeae* is covered with scales and arm spines are relatively smaller. Differentiation between *A. diomedeae* and the very similar *Ophiacantha diplasia* is not reliable in the field.
Distribution
Washington to Baja California, 400 m.

Brittle Stars

Ophiomusium jolliensis (Red Brittle Star)

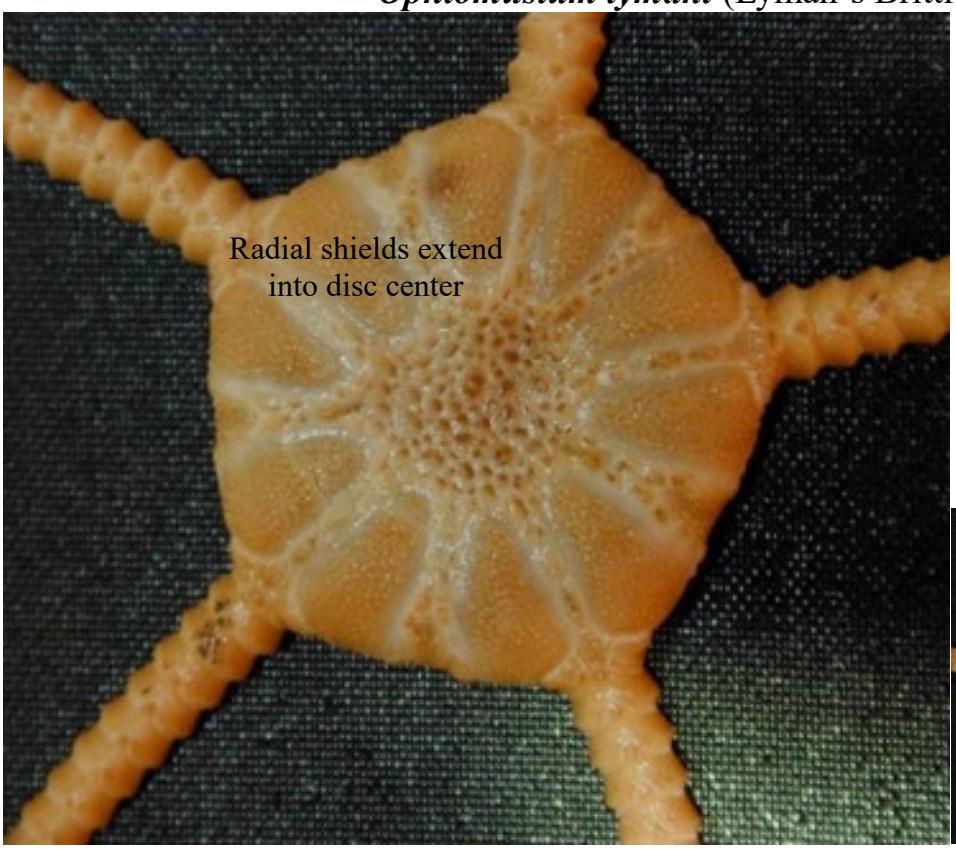


Description
This small, red or orange flat, smooth brittle star with slender, spineless arms. The radial shields do not extend far into disc center. Diameter of disc to 1.7 cm, arms to 5 cm in length.

Similar species
Ophiomusium lymani has slits at the base of the arms on the oral side and the radial shields extend to the disc center.

Distribution
Oregon to Baja California, 20-1400 m.

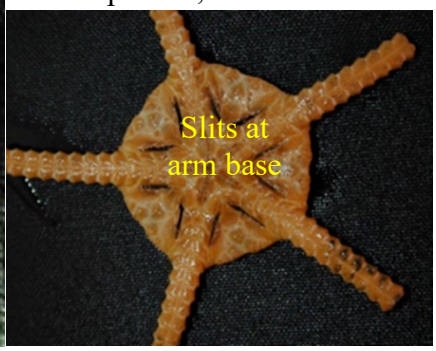
Ophiomusium lymani (Lyman's Brittle Star)



Description
This is a flat brittle star, with large, granular radial shields on the aboral disc surface. The color is light orange or tan. Disc diameter to 3 cm, arms to 6 cm in length.

Similar species
The radial shields of *Ophiomusium jolliensis* do not extend as far into the disc center and it lacks slits on oral disc surface.

Distribution
Cosmopolitan, 1200 m and below.



Brittle Stars

Ophioderma panamense (Panama Brittle Star)

Description
The disc of this brittle star is covered in microscopic scales and appears smooth to the naked eye. There are very short arm spines and prominent arm segments. The color is tan, gray, or brown, often with light bands on the arms. Diameter of disc to 3 cm, arms to 12 cm.

Similar species
Ophioplocus esmarki, has longer arm spines, the disc is more circular, and arm segments are not prominent.

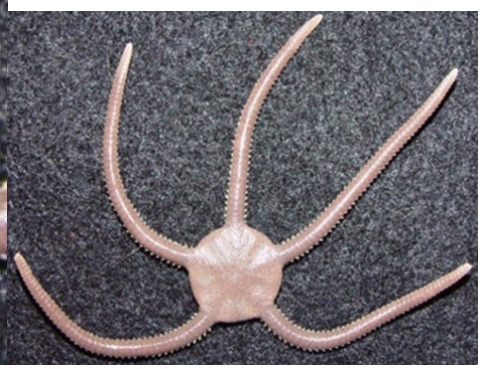
Distribution
Southern California to Peru, 0-30 m possibly greater

Ophioplocus esmarki (Smooth Brittle Star)

Description
The disc of this brittle star is covered with microscopic scales and appears smooth to the naked eye. Scales on the arms obscure the segments, and arm spines are short and stubby. Diameter of disc to 2 cm, arms to 6 cm.

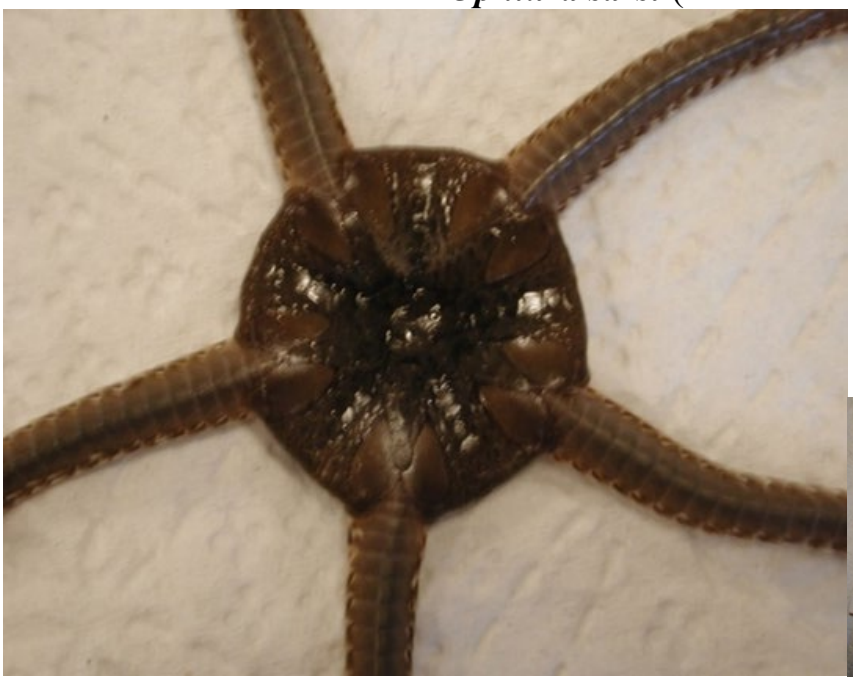
Similar species
Ophioderma panamense arm segments are more pronounced, the arm spines are small to see, and the disc is more pentamarous.

Distribution
Northern California to Baja California, 0-70 m.



Brittle Stars

Ophiura sarsi (Notched Brittle Star)



Description
This brittle star has a smooth central disc and arms that are triangular in cross section. It is dark olive, black, or brown. Diameter of disc to 2.5 cm, arms to 8 cm.
Similar species
Not likely to be confused with other species.
Distribution
Alaska to Baja California, 10-1200 m.

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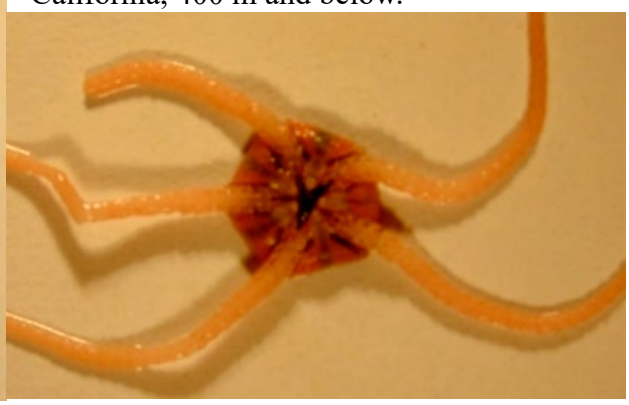
Ophiura sp. A

Description
Ophiura spp. are small brittle stars with flattened arms and commonly have spines on the lateral arm shields. The central disc is flat with radial notches, and the disc shields are separate. The individual pictured here has an orange colored disc with dark markings radiating from the center. The arms are light orange. Diameter of disc to 1.2 cm, arms to 4 cm in length.
Similar species
There are several closely related species of *Ophiura* in the area making field identification problematic.
Distribution
California, 400 m and below.

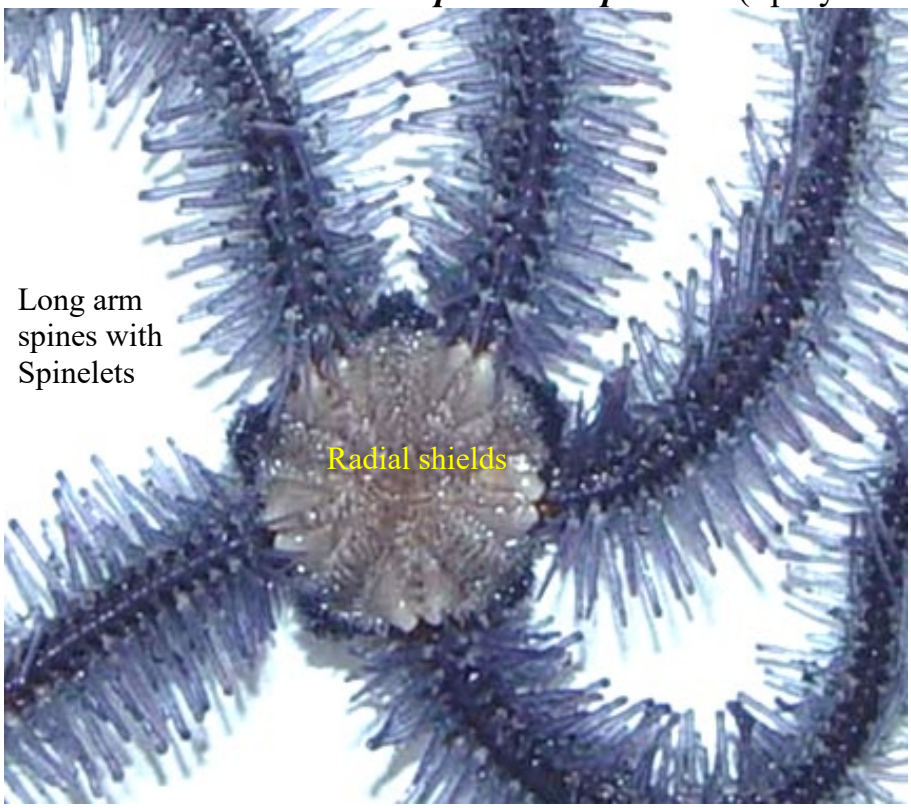


Brittle Stars

Ophiacantha diplasia (Lacey Brittle Star)

Description
The disc of this brittle star is covered with papillae, which obscures the disc plates. There are very long, hollow arm spines. The disc is mottled brown and may have bands. Disc diameter to 1.5 cm, arms to 8 cm. in length.
Similar species
Ophiopholis spp. are more slender and brightly colored. *Ophiothrix spiculata* has a spiny disc, radial shields, and the arm spines bear tiny spinelets at the tips.
Distribution
Aleutian Islands to California, 70-1350 m.

Ophiothrix spiculata (Spiny Brittle Star)



Description
The disc of this brittle star has noticeable radial shields and a very circular disc. There are very long arm spines which bear small spinelets at the tips. The color is highly variable. Pictured specimen is brown and black. Disc diameter to 4 cm, arm length to 17 cm.
Similar species
Ophiopholis spp. and *Ophiacantha diplasia* spines do not bear spinelets, and the central disc of *Ophiopholis* spp. is covered with papillae.
Distribution
Central California to Peru, 0-2000 m.

Brittle Stars

***Ophiopholis* spp.**

Description

These brittle stars are small, and may have long spines on the disc and/or arms. Color is variable, but may be pink, purple, or yellow, often with light or dark bands on the arms. Disc diameter to 1.2 cm, arm length to about 8 cm in length.

Similar species

Due to their small size and highly variable appearance they are easily confused with other genera and species.

Distribution

Alaska to California, 20-800 m, usually found on sponges.

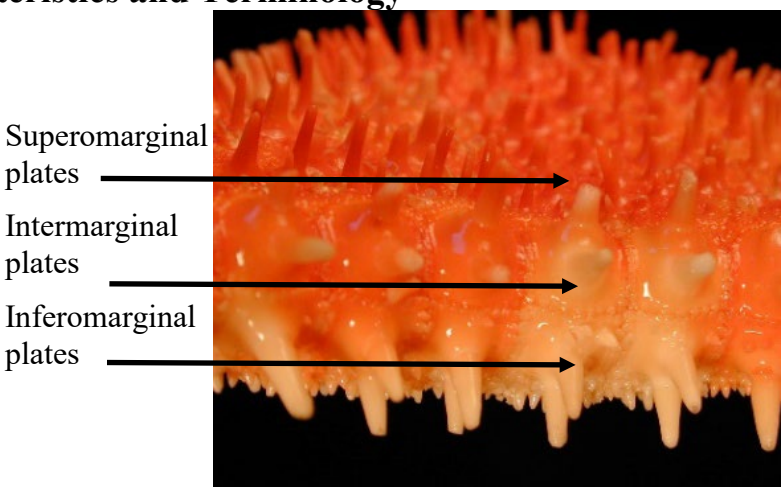
Sea Stars Asteroidea

Sea stars have five radial rays (arms), and unlike ophiuroids, the point of attachment of the arms and central disc is not distinct. There are several marginal plates on the arms that may bear distinguishing spines. The madreporite on the aboral surface allows surrounding sea water to enter the internal water vascular system and ultimately into tube feet that are used in locomotion. The families Pterasteridae and Pythonasteridae have an additional large pore, or osculum, on the aboral surface through which water is expelled.

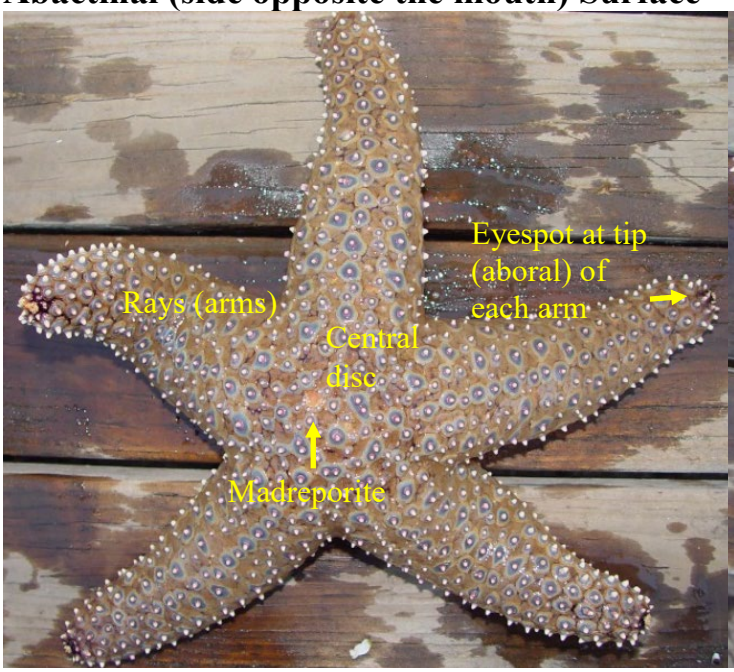
Sea Star Characteristics and Terminology

The aboral surface may be covered by:

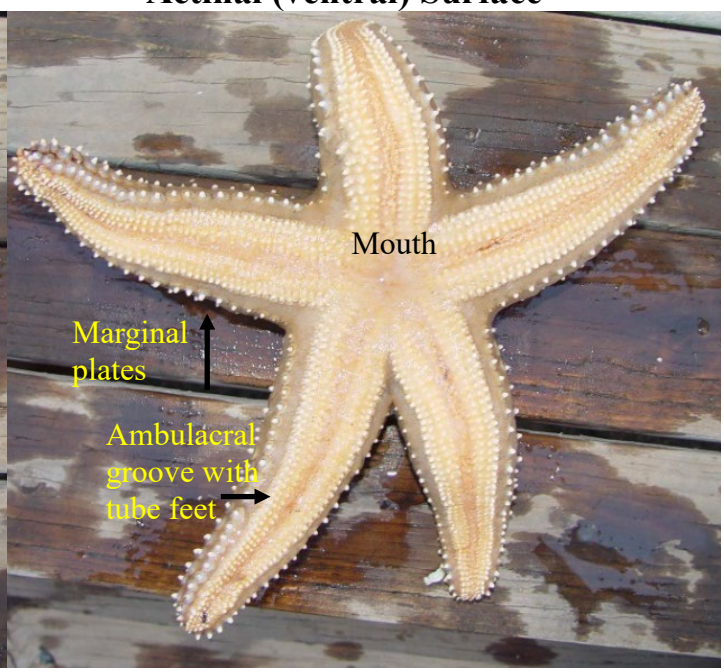
- **Aboral (point farthest from mouth) tabulate plates**: peg-like plates with granules on surface
- **Pseudopaxillae**: paxillae with fixed spinelets
- **Paxillae**: mushroom-like aboral plates with moveable spinelets
- **Pedicellariae**: jaw-like structures occurring in groups on dorsal surface, function in removal of objects and food capture
- **Spines**



Abactinal (side opposite the mouth) Surface



Actinal (ventral) Surface



Sea Stars

Poraniopsis inflata (Thorny Star)

Description
This star is often inflated and has prominent, net-like skeletal mesh. It is covered with long, thorny spines. These stars are yellow, pink, or white dorsally and pale ventrally. Diameter to 20 cm.

Similar species
Poraniopsis flexilis has thinner arms and more blunt spines.

Distribution
Gulf of Alaska to southern California, 20-360

Poraniopsis flexilis (Flexible Thorny Star)

Description
This spiny star has thin arms and is usually pink with red mottling dorsally and pale pink ventrally.
Diameter to 10 cm.

Similar species
Poraniopsis inflata body is usually more rigid, spines are longer, and the skeletal mesh is visible

Distribution
Oregon to central California, 40-700 m.

Sea Stars

Stylasterias forreri (Fish-eating Star)

Description
This large, rather brittle star has long, slender, spiny arms. Spines are surrounded by numerous pedicellariae, giving a bumpy appearance. Color is uniformly brown and black dorsally with rows of white spines and cream colored ventrally. Diameter to 60 cm.

Similar species
Henricia spp. do not have spines. *Astrometis* and *Sclerasterias* are mottled and have wider arms.

Distribution
Gulf of Alaska to southern California, 5-550 m.

Orthasterias koehleri (Rainbow Star)

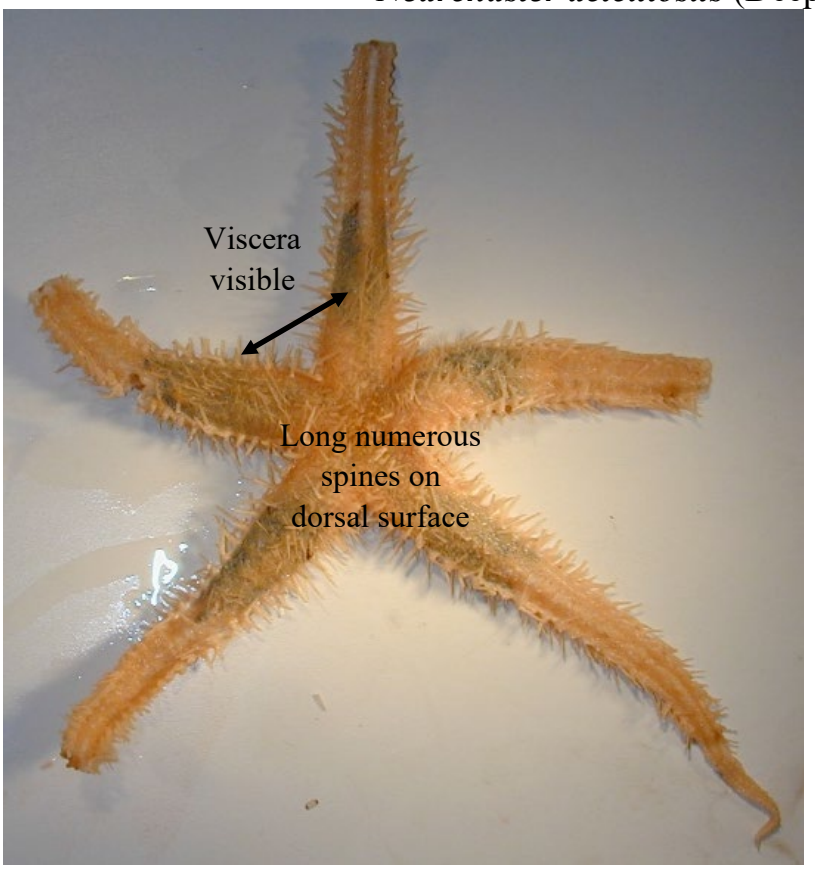
Description
This star is distinguished by concentric bands of pink, red, or purple and white. It has long, thin arms and white spines. Diameter to 40 cm.

Similar species
Lophaster spp. have pseudopaxillae and visible skeletal mesh. *Nearchaster aciculosus* is beige and has a flatter body. *Henricia* spp. do not have spines. *Cheiraster dawsoni* has larger central disc and different coloration pattern.

Distribution
Gulf of Alaska to southern California, 1-300 m.

Sea Stars

Nearchaster aciculosus (Deep-sea Fragile Star)



Description
This soft star has long, thin arms and large, soft spines. The body is pale yellow, orange, or beige dorsally, and the internal organs are often visible through the dorsal surface. Diameter to 30 cm.
Similar species
Cheiraster dawsoni is found in shallower water and has more brilliant coloration, often red, and with less spines on dorsal surface of arms. *Lophaster spp.* have pseudopaxillae and no spines.
Distribution
Aleutian Islands to Baja, 500-1500 m.

Cheiraster dawsoni (Fragile Star)

Description
This bright-colored star has slender arms, and the disc is covered with fine, sharp spines. The marginal plates also have prominent spines. The central disc and arms are orange or red with white or yellow blotches on the arms near the central disc. The madreporite is almost touching the outer margin. Diameter to 25 cm.
Similar species
Nearchaster aciculosus is found in deeper water, is lighter color, and has more numerous spines on dorsal surface of arms. *Cheiraster californicus* has a madreporite at least a madreporite diameter from the outer margin.
Distribution
Bering Sea to northern California, 70-400 m.

Sea Stars

Cheiraster californicus

Description

The color of this 5 armed star in life has not been recorded. The abactinal (the part of a radiate animal from where the arms radiate and opposite the mouth) paxillae have a long central spine surrounded by spines nearly as long or as long as the central spine. The paxillar spinules are short, blunt and granular. The madreporite is at least its diameter from the outer margin. Maximum diameter has not been determined.

Similar species

Also known as *Luidaster californicus* the differences between it and closely related species are slight making field identification problematic.

Distribution

The ranges have not been defined. Known only from the waters off Catalina Island, 550-650 m.

Hippasteria spinosa (Spiny Star)

Description

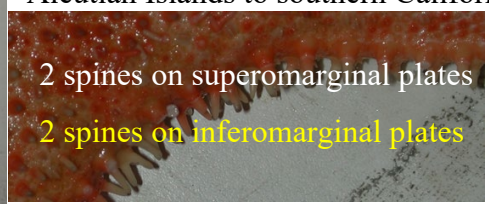
This star usually has two spines on the inferomarginal and two on the superomarginal plate. The dorsal surface has may short spines. Color is uniformly red-orange dorsally and pale orange or cream ventrally. Diameter to 20 cm.

Similar species

Hippasteria Californica has one spine and two tubercles on each marginal plate.

Distribution

Aleutian Islands to southern California, 10-500 m.



Hippasteria californica (Deep-sea Spiny Star)

Description

This large star has few spines dorsally. The inferomarginal and superomarginal plates are inconspicuous, each with one spine and two short tubercles. Color is uniformly orange/ brown dorsally and yellow ventrally. Diameter to 20 cm.

Similar species

Hippasteria spinosa marginal plates usually have four spines; *Cryptopeltaster lepidonotus* has grains, not spines, on dorsal surface.

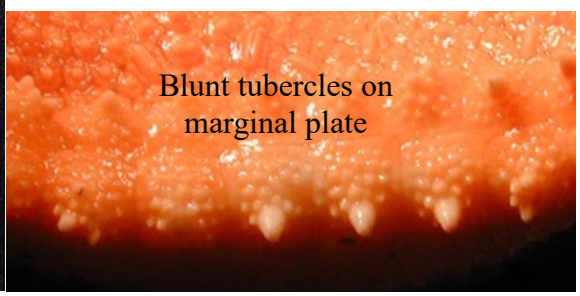
Distribution

Aleutian Islands to southern California, 400-1500 m.

Sea Stars

Cryptopeltaster lepidonotus (Grainy Star)

Description
This star is similar to *Hippasteria* spp., but the dorsal surface is covered with grainy-appearing bivalve pedicellaria and tubercles. The marginal plates have one or more blunt tubercles or spines, and the madreporite is prominent. Color is orange dorsally and lighter ventrally. Diameter to 20 cm.
Similar species
Hippasteria spp. have wider arms, dorsal spines and, a less noticeable madreporite.
Distribution
Southeastern Alaska to Baja California, 600-1200 m.


Blunt tubercles on marginal plate

Leptasterias polaris katherinae (Katherine's Six-rayed Star)

Description
This is a six-armed star that has long, slender arms with a ridge of white, conical spines. There is a distinct, darker colored central disc with various mottling on the arms, usually orange, tan, gray, purple, and brown. Diameter to about 40 cm.
Similar species
This is the only six-armed species likely to be taken in the area. *Sclerasterias heteropaes* infrequently has six arms, but has large, tan spines.
Distribution
Bering Sea to northern Oregon, intertidal (in Alaska) to 140 m.

Sea Stars

Astrometis sertulifera (Fragile Rainbow Star)

Description
This is a large, firm star, and the arms are oval in cross-section. The dorsal surface is mottled brown, gray, and green, with red-orange spines. Diameter to 25 cm.

Similar species
Similar to *Sclerasterias heteropaes*, but the oval cross-section of the arms and reddish spines distinguish it. *Stylasterias forreri* is not mottled and has thinner arms.

Distribution
Southern California to Baja California, 0-60 m.

Sclerasterias heteropaes (False Rainbow Star)

Description
This large, firm star has five or six arms that are pentagonal in cross section. The dorsal and lateral angles defined by a row of prominent spines. Color is mottled tan and brown with yellow bands and bearing tan spines. Diameter to about 15 cm.

Similar Specie
Astrometis sertulifera has red spines and an oval cross section of arms. *Stylasterias forreri* is not mottled and has thinner arms.

Distribution
Central California to Baja California, 40-200 m.

Sea Stars

Pisaster brevispinus (Short-Spined Pink Star)

Description
This pink, thick star has minute spines, and is very rigid. The rays are broad at point of attachment to the central disc, tapering to the tips. Diameter to 60 cm.
Similar species
Pteraster gigantea is gray or brown and has larger spines.
Distribution
Southeastern Alaska to southern California, 0-90 m.

Pisaster gigantea (Giant Star)

Description
This large, thick, firm star has blunt spines. It is gray or brown with white or pink spines. The spines have a blue ring at the base. Diameter to 60 cm.
Similar species
Evasterias troschelii has shorter spines without blue ring at base and longer, flexible arms.
Distribution
British Columbia to southern California, 0-90 m.

Sea Stars

Evasterias troschelii (Mottled star)

Description
A large, five armed star with long, slender arms and profuse, small white spines of variable sizes and in no uniform pattern. The dorsal color is uniform or mottled blue, green, red, orange, or tan. Diameter to over 60 cm.

Similar Species
Leptasterias polaris katherinae has six arms and a prominent ridge of spines along dorsal side of the arms; *Pisaster* spp. have wide, rigid arms.

Distribution
Bering Sea, Alaska to central California, intertidal to 75 m.

Myxoderma platyacanthum (Red Star)

Description
These small, firm stars have prominent, blunt spines. The color is uniformly deep orange or red. Diameter to 10 cm.

Similar species
Lophaster spp. have pseudopaxillae, not spines, and are more flexible.

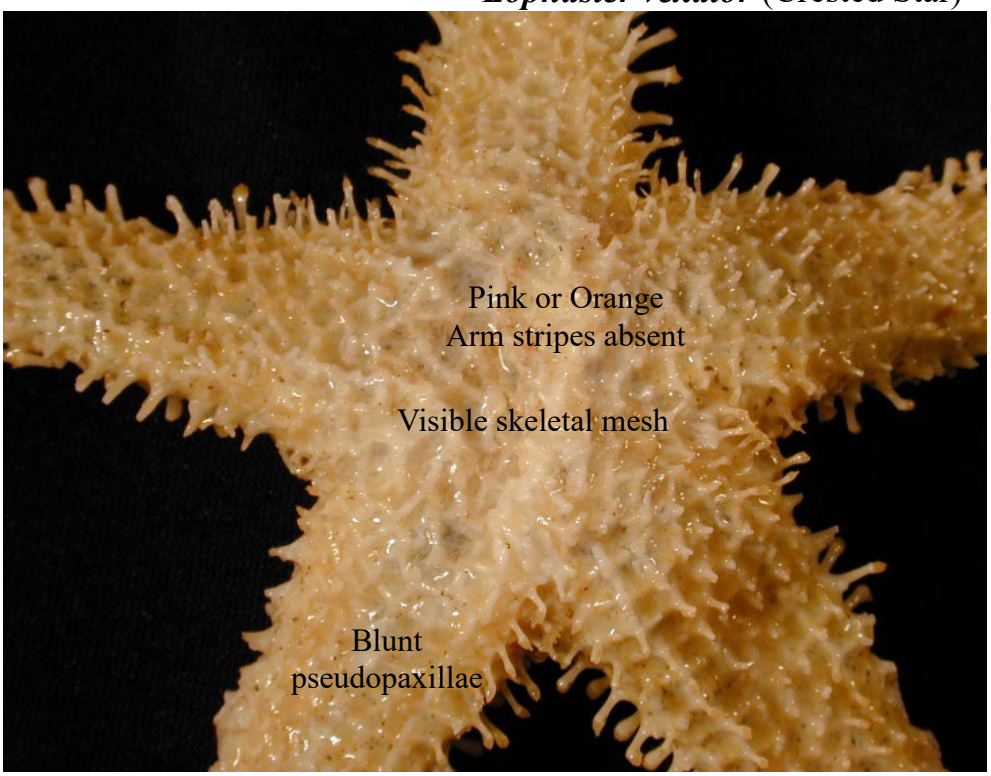
Distribution
Oregon to Baja California, 350-600 m.

Sea Stars

Lophaster furcilliger (Pink Crested Star)

Description
This small, soft star is covered with slender pseudopaxillae, and the skeletal mesh is visible. Color is uniformly pink (orange in photograph) on both sides. Diameter to about 8 cm.
Similar species
Lophaster vexator has a larger central disc, is found at shallower depths, has a multicolored dorsal and cream ventral surface, and blunt pseudopaxillae. *Orthasterias koehleri* has more definite stripes on arms.
Distribution
Bering Sea to southern California, 350-2010 m.

Lophaster vexator (Crested Star)



Description
Live specimens are yellow or cream often with a pink or light orange stripe down the arms and a cream ventral surface. The calcareous skeletal mesh is visible and blunt, spinose pseudopaxillae are prominent. Diameter to 20 cm.
Similar species
Lophaster furcilliger has a smaller central disc, thinner arms, more slender pseudopaxillae, is pink on both sides, and is found deeper.
Distribution
Bering Sea to northern California 21-670 m.

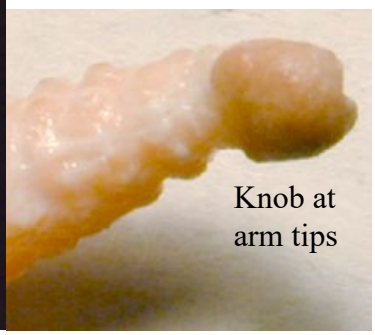
Sea Stars

Zoroaster evermanni (Slender Star)

Description
This is a large, slender star with long arms. The skeletal mesh is very visible, and the arms have small spines. The dorsal color is pale orange, pink, or white. Diameter to 50 cm.
Similar species
Myxoderma sacculatum has knob at arm tips and the central disc is relatively larger. *Lophaster* spp. have wider arms and long pseudopaxillae, not spines. *Ampheraster marianus* has wider arms, a larger central disc, and skeletal mesh in less prominent ridges.
Distribution
Washington to southern California, 450-1500 m.

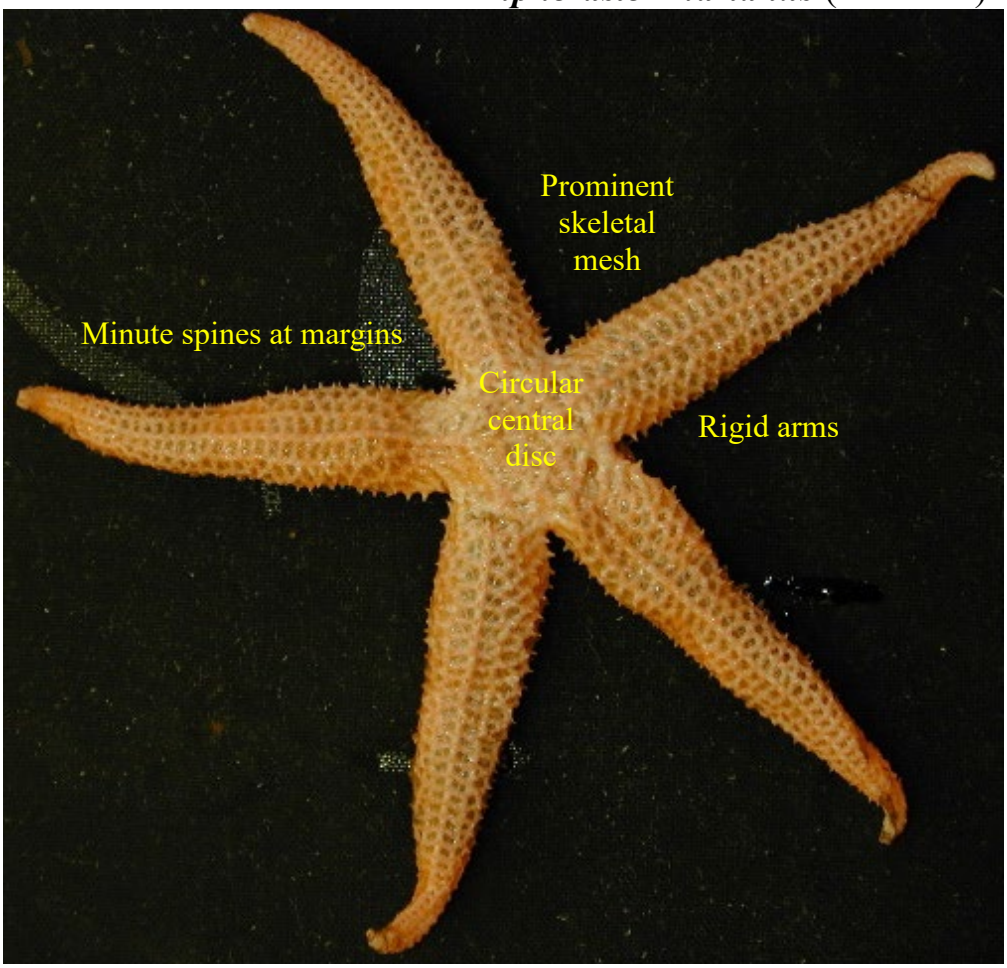
Myxoderma sacculatum (Snakehead Star)

Description
This large, slender star has short spines and distinctive knobby ossicle at the tips of the arms. Color is straw, white, or pale pink or orange. Diameter to 70 cm.
Similar species
Zoroaster evermanni lacks knobs at tips and a smaller central disc.
Distribution
Bering Sea to southern California, 900 m and below.



Sea Stars

Ampheraster marianus (Pink Star)

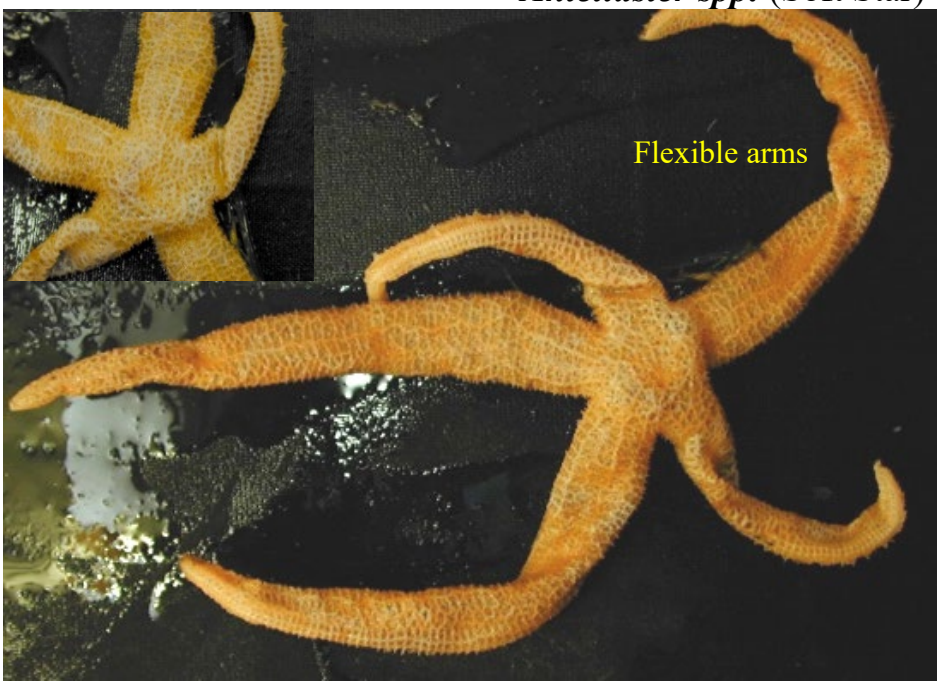


Description
This large, firm star has a prominent skeletal mesh and minute spines along the arm margins. Its color is pink or orange. Diameter to about 15 cm.

Similar species
Zoroaster evermanni has thinner arms, more prominent mesh and dorsal spines, and smaller central disc. It is commonly lighter in color and found deeper. *Anteliaster* spp. are flexible and lack marginal spines. *Lophaster* spp. have noticeable pseudopaxillae on dorsal surface. *Henricia* spp. Do not have circular central disc and skeletal mesh is less prominent.

Distribution
Washington to Mexico, 500-800 m.

Anteliaster spp. (Soft Star)



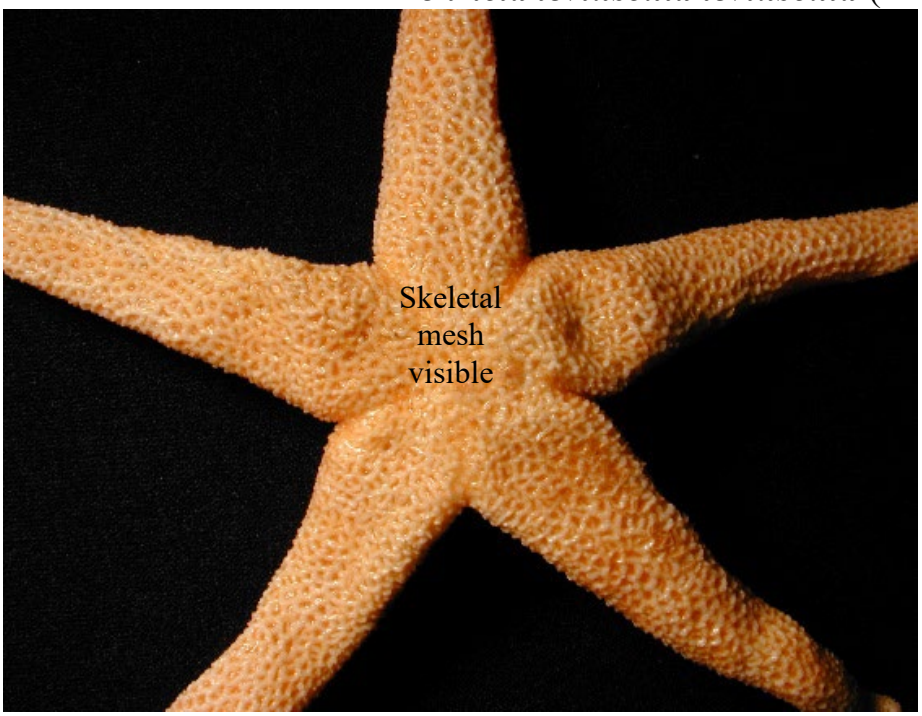
Description
This large, soft star is usually found broken, and has a visible skeletal mesh. Color is orange to white dorsally and white ventrally. Diameter to 12 cm.

Similar species
Ampheraster marianus has rigid arms and small marginal spines.

Distribution
Oregon to Mexico, 400-1000 m.

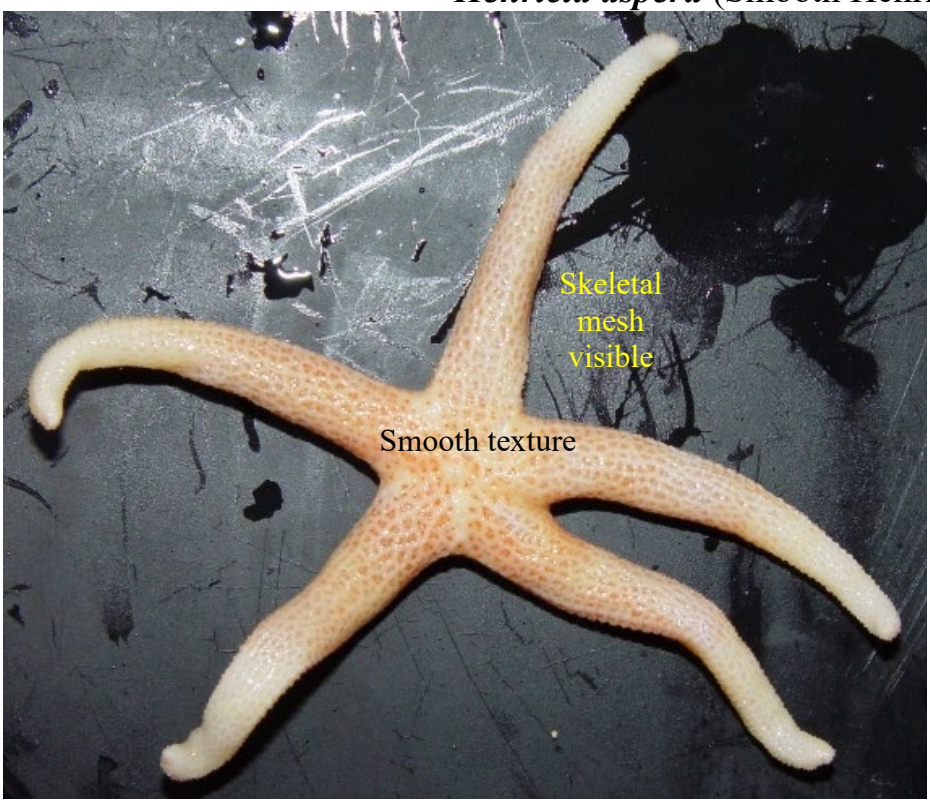
Sea Stars

Henricia leviuscula leviuscula (Blood Star)



Description
This firm, rough-textured star has long, slender arms and is distinctly red or orange. Diameter to 12 cm.
Similar species
There are several *Henricia* species and field identification is difficult. This species is red or orange.
Distribution
Bering Sea to California, 0-400 m.

Henricia aspera (Smooth Henricia)



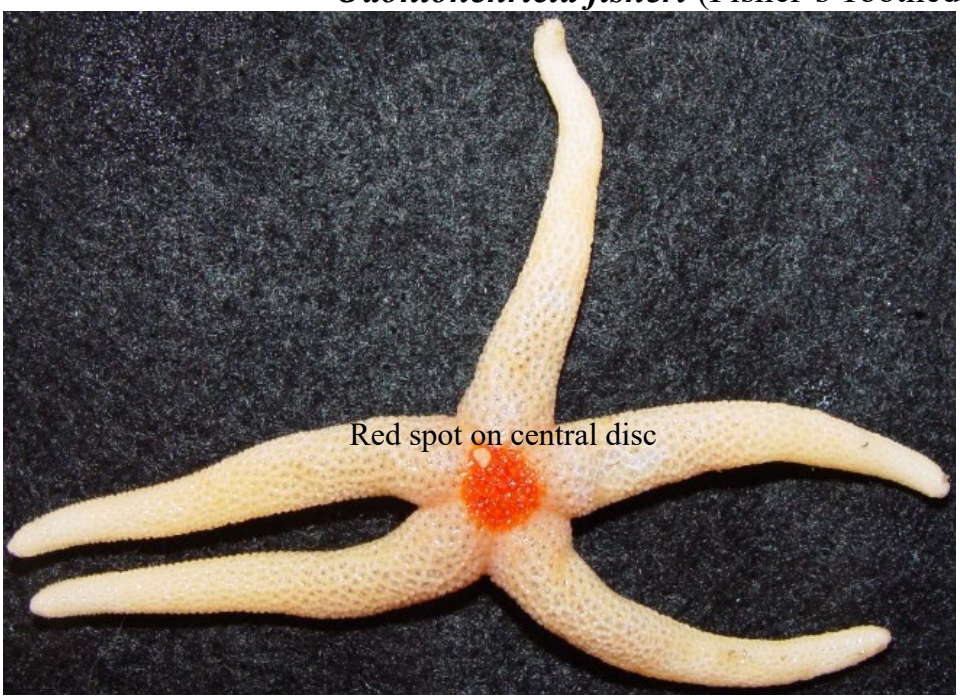
Description
This firm star has long, slender arms, a small central disc, and smooth texture. Color is straw or pale orange on both sides. Diameter to 12 cm.
Similar species
Odontohenricia fisheri has red spot on central disc. There are several *Henricia* species and field identification is difficult. This species is smooth in texture.
Distribution
Aleutian Islands to central California, 5-900 m.

Sea Stars

Henricia clarki (Serpent-arm Henricia)

Description
This large star has visible skeletal mesh and rough texture. The arms are distinctly long and contorted. Its color is beige or tan. Diameter to 15 cm.
Similar species
The very long, slender contorted arms distinguish this species.
Distribution
Northern California to Mexico, 250-800 m.

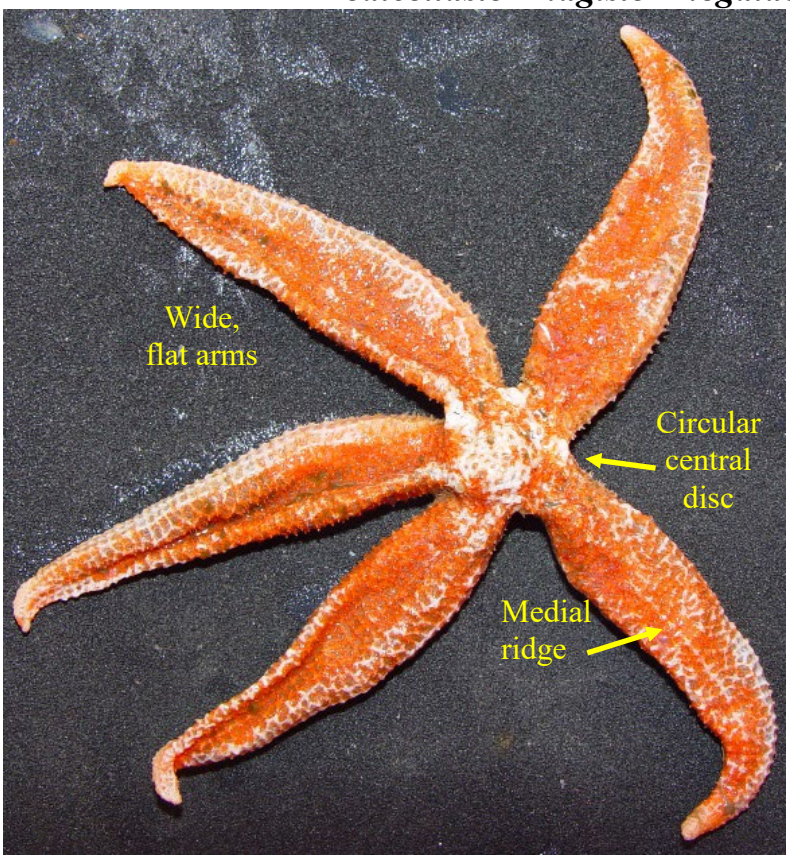
Odontohenricia fisheri (Fisher's Toothed Henricia)



Description
This slender, five-armed star has visible skeletal mesh. There are paired oral (mouth) plates fused at apices and each bears a single prominent tooth. Color is white with a bright red spot on the central disc. Diameter to 13 cm.
Similar species
Henricia spp. do not have prominent apical oral teeth and red spot on central disc.
Distribution
Alaska to Mexico, 250-800 m.

Sea Stars

Pedicellaster magister megalabis (Majestic Sea Star)



Description
This is a large star with long, flat arms. It has a visible skeletal mesh with a medial ridge on each arm and minute white spines. Color is red or orange dorsally and lighter ventrally, and the tube feet are green. Diameter to about 40 cm.
Similar species
Ampheraster marianus is pink in color and arms are inflated. Most *Henricia* spp. do not have the noticeable circular central disc.
Distribution
Bering Sea to northern Oregon, intertidal to 140 m.

Brisingella exilis (Lacy-armed Star)

Description
This star looks like a brittlestar, with ten fragile arms and a star has a flat, circular disc. The arms and disc are orange or red with a white skeletal mesh dorsally. There are visible skeletal rings (costae) on the arms and long marginal spines. This star is often found in pieces; arms may not be connected to central disc. Diameter to about 30 cm.
Similar species
Other *Brisingella* spp. live deeper than 1500 m.
Distribution
Alaska to California, 300 m and below.

Sea Stars

Rathbunaster californicus (Deep-sea Sunflower Star)

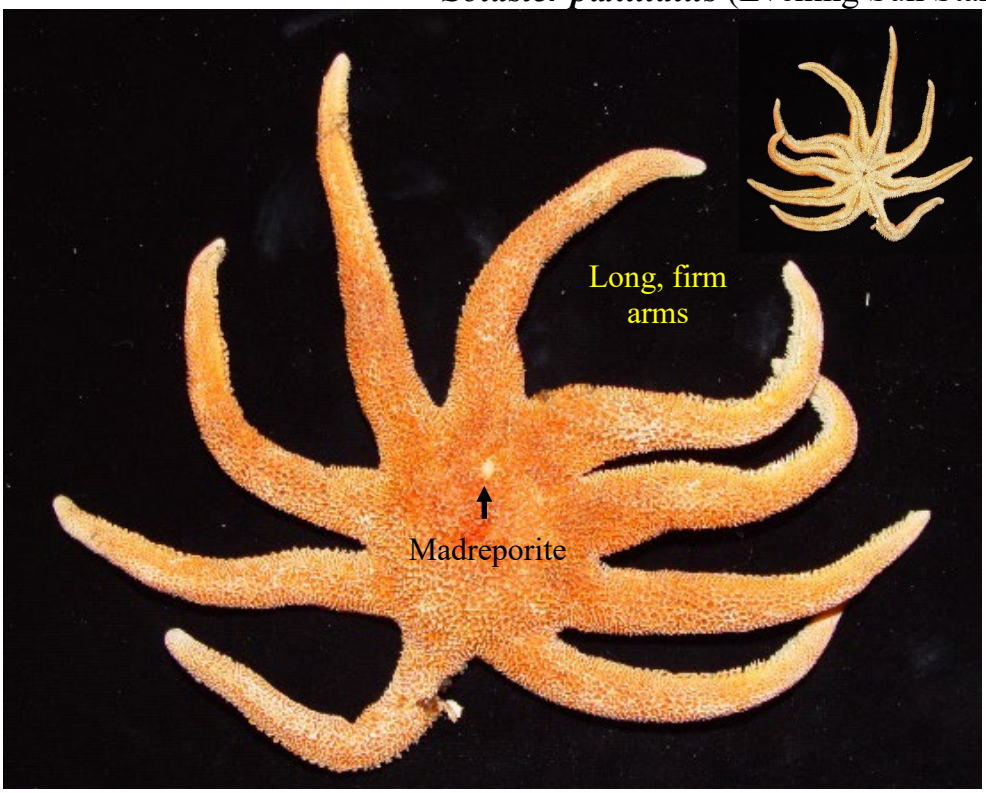
Description
This star is very fragile, as it is often found in pieces. It has fifteen to twenty arms and is mottled orange, red, and yellow dorsally and cream ventrally. Diameter to 40 cm.
Similar species
Pycnopodia helianthoides has a broader central disc, is found in shallower water, and has wider, thicker arms. *Solaster* spp. are rigid and have less arms.
Distribution
Gulf of Alaska to Baja California, 90-600 m.

Pycnopodia helianthoides (Sunflower Star)

Description
This large, soft star has sixteen to twenty-four arms. The central disc is very broad and the arms are thick and wide. The color is variable, often purple, orange, red or gray on both surfaces. Diameter to 1 m.
Similar species
Rathbunaster californicus has thinner arms, a smaller central disc, and a cream colored ventral surface.
Distribution
Alaska to southern California, 0-200 m.

Sea Stars

Solaster paxillatus (Evening Sun Star)



Description
This large star usually has eight to ten arms. The surface is rough textured and firm to touch due to a crown of spinelets on each pseudopaxillae. The madreporite is yellow and of noticeable size. The color is orange dorsally and cream ventrally. Diameter to 24 cm.
Similar species
The uniform orange coloration should distinguish this from other sun stars. *Solaster exiguus* has fleshy arms and is found deeper than 1000 m.
Distribution
Aleutian Islands to Oregon, 10-640 m.

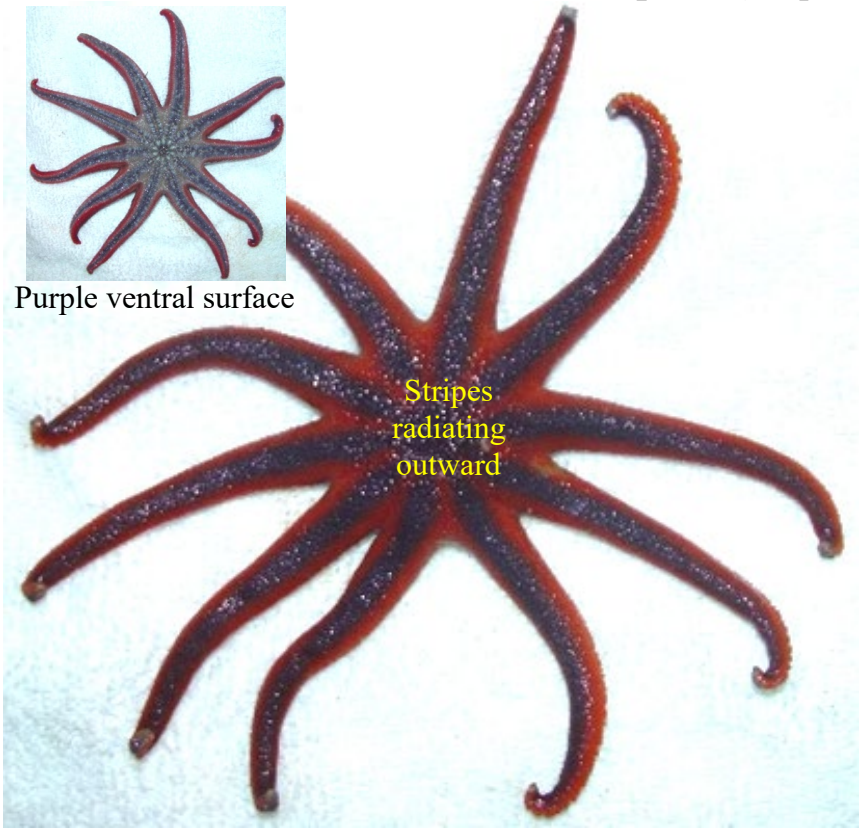
Solaster endeca (Northern Sun Star)

Description
This sun star is large, soft, and has eight to thirteen arms. The texture is smooth dorsally, with minute pseudopaxillae, and it lacks marginal spine fans. The arms are wider and shorter than other *Solaster* spp. Color is variable; dorsal colors may be uniformly red, orange, or purple, but is often pink or purple outlined in red or orange. Ventral color is often yellow. Diameter to 24 cm.
Similar species
Solaster stimpsoni usually has ten, longer and thinner arms.
Distribution
Arctic Ocean to Oregon, 1-475 m.

Sea Stars

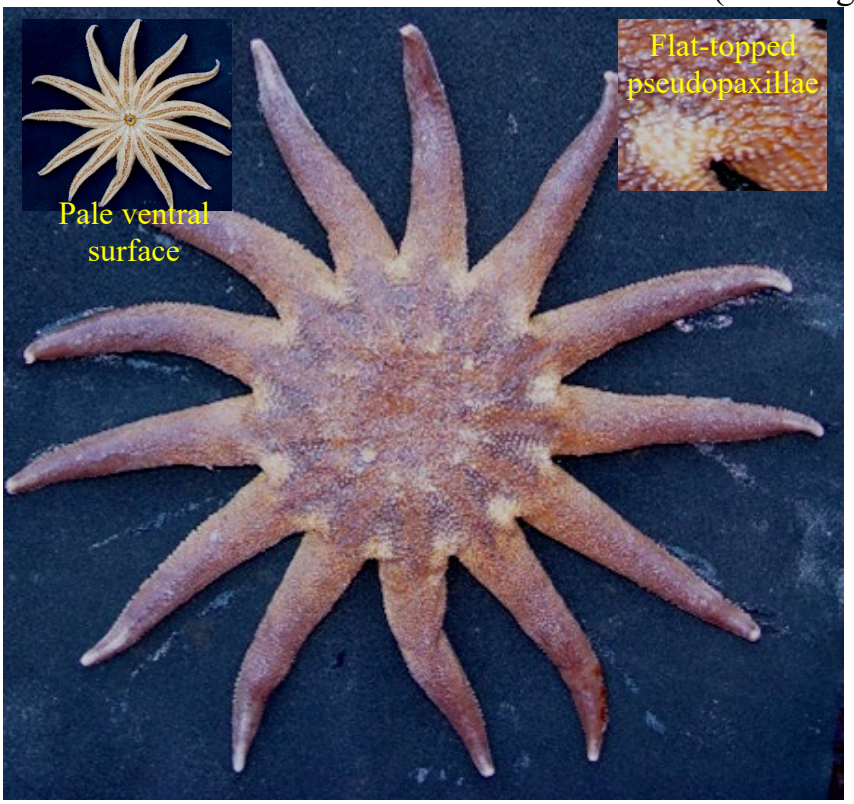
Solaster stimpsoni (Striped Sun Star)

Purple ventral surface



Description
Large, rigid star with 10 long, slender arms. The dorsal surface is orange or red with purple or blue stripes radiating outward, and the aboral paxillae are densely packed. Ventrally, this star is purple or blue. Diameter to 50 cm.
Similar species
Solaster endeca has wider, shorter arms. *Solaster dawsoni* has a different coloration pattern dorsally and a pale ventral surface.
Distribution
Alaska to central California 1-100 m.

Solaster dawsoni (Morning Sun Star)



Description
Large evenly textured sun star with 12 to 14 arms and flat-topped pseudopaxillae on the dorsal surface. Color is uniformly purple, gray, or brown, on dorsal surface and pale yellow or cream ventrally. Diameter to about 40 cm.
Similar species
The flat-topped spinelets and coloration pattern are specific to this species.
Distribution
Bering Sea to central California, intertidal to 200 m.

Sea Stars

Solaster exiguus (Deep-sea Sun star)

Description
This large star has 7-9 arms and lacks marginal spines. It is very fleshy and often has a raised central disc. Color is uniformly pale orange or tan dorsally and cream ventrally. Diameter to 20 cm.

Similar species
This star has fewer arms than other *Solaster* spp. It is the only member of this genus found at depths below 1000 m. *Crossaster borealis* is not as fleshy and has ten to twelve arms. *Solaster paxillatus* has long, rigid arms.

Distribution
Oregon to southern California, 1000-3000 m.

Crossaster papposus (Rose Star)

Description
This 10-13 armed star has widely spaced pseudopaxillae, numerous spines dorsally, and prominent pseudopaxillae and spines on the marginal plates. There are bands of red, purple and cream dorsally, and is cream ventrally. Diameter to 10 cm.

Similar species
Other *Solaster* spp. do not have concentric coloration pattern.

Distribution
Arctic Ocean to northern California, 1-400 m.

Sea Stars

Crossaster borealis (Grooved Sun Star)

Description
Deep-sea star with 11 to 16 arms and small spines on arm margins. There are distinct grooves on the central disc between the arms. The color is orange dorsally and cream ventrally. Diameter to 25 cm.
Similar species
Heterazonia alternata is pink ventrally. *Solaster exiguus* is fleshy and has seven to nine arms.
Distribution
Bering Sea, Alaska to southern California, 500-2000 m.

Heterozonias alternatus (Pink Sun Star)

Description
Deep-sea star with ten to twelve arms and lacking distinct grooves between arms. The inferomarginal plates have large spines. Its color is pink or coral on both surfaces. Diameter to 20 cm.
Similar species
Crossaster borealis is pale ventrally.
Distribution
British Columbia to southern California, 500-1200 m.

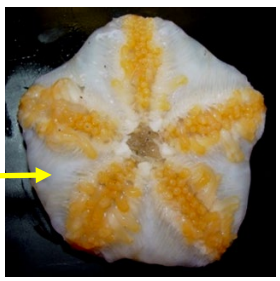
Sea Stars

Diplopteraster multipes (Pincushion Star)

Description
This large, firm, pentagonal star has white spines protruding through the dorsal surface. The tube feet are large, orange, and arranged in four rows. The color is brown or pink dorsally, often with a pattern. It is cream-colored ventrally. Diameter to 20 cm.

Similar species
Pteraster jordani has tiny spines and longer arms with upturned tips. *Pteraster tesselatus* lacks spines.

Distribution
Arctic Ocean to southern California, 90-1200 m.



Pteraster jordani (Jordan's Slime Star)

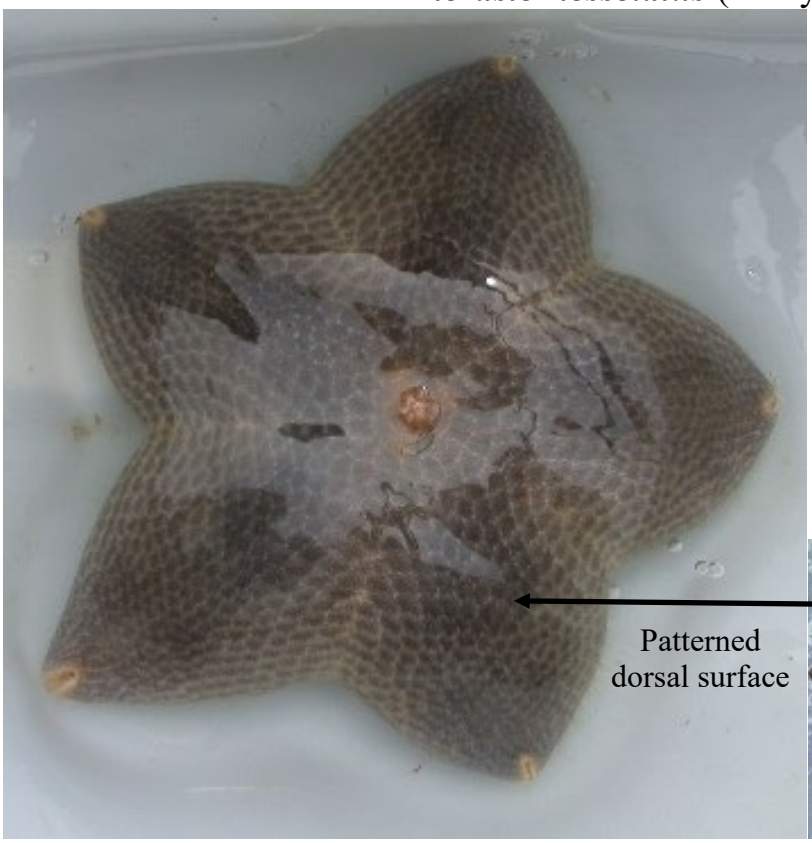
Description
This large, firm, pentagonal star has minute spines protruding through a slimy dorsal surface. Color ranges from pink, orange, or brown dorsally and yellow ventrally. Arm tips are upturned. Diameter to 15 cm.

Similar species
Pteraster tesselatus lacks spines.
Diplopteraster multipes has large spines, a pale ventral surface and four rows of tube feet.

Distribution
Aleutian Islands to southern California 500 m maximum depth has not been defined.

Sea Stars

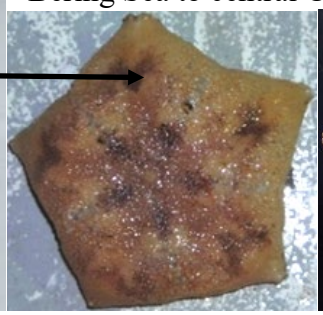
Pteraster tesselatus (Slimy Cushion Star)



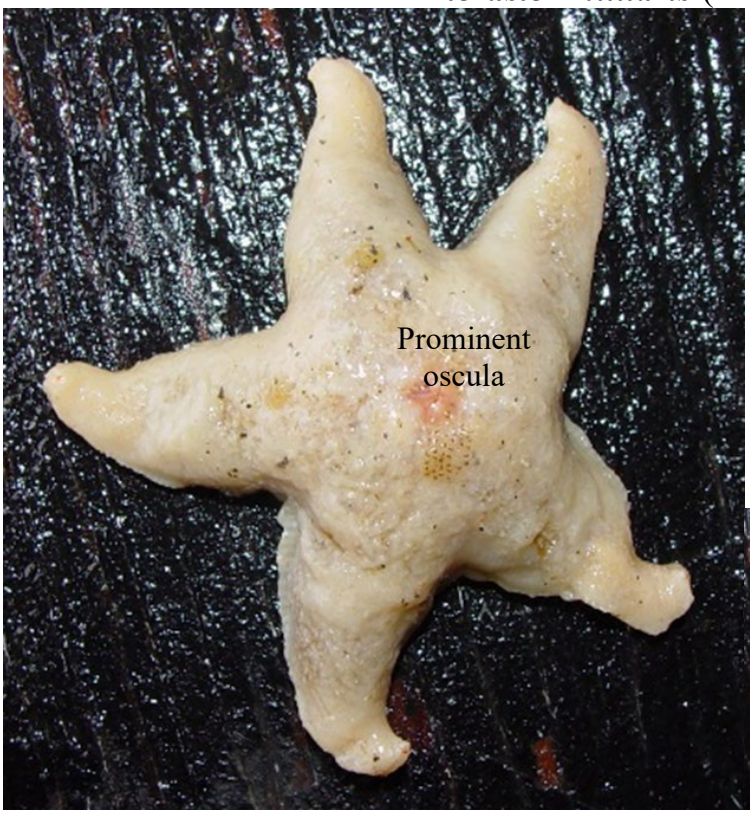
Description
This is a thick, fleshy star that is often very slimy. The osculum is prominent. Color and dorsal surface patterning are highly variable. This star often produces a great deal of slime when agitated. Diameter to 20 cm.

Similar species
Diplopteraster multipes has small spines protruding through dorsal surface. *Pteraster militaris* is uniformly pale yellow or pink and the arms are longer. *Asterina minata* is leathery to the touch and has longer arms.

Distribution
Bering Sea to central California, 2-450 m.



Pteraster militaris (Wrinkled Slime Star)



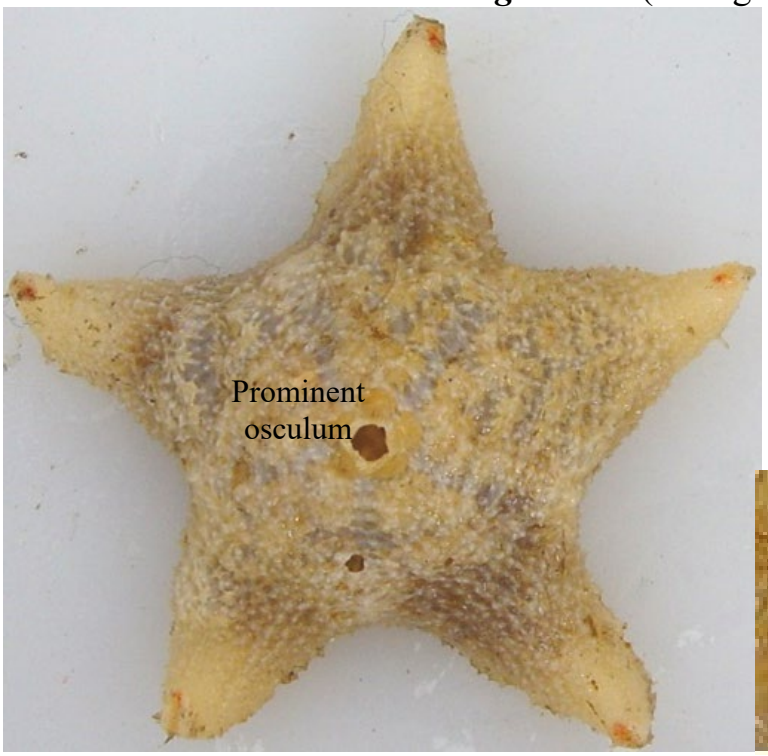
Description
This star is fleshy with moderately long arms. The surface is soft and wrinkled to touch, and the osculum is prominent. There is a fringe of webbed marginal spines. Color is white, tan, or pale pink on both sides. Diameter to about 13 cm.

Similar species
Pteraster trigonodon has shorter, straighter arms and a mottled dorsal surface. *Pteraster tesselatus* has shorter arms, is inflated, and often has dorsal markings.

Distribution
Arctic Ocean to Oregon 10-1100 m.

Sea Stars

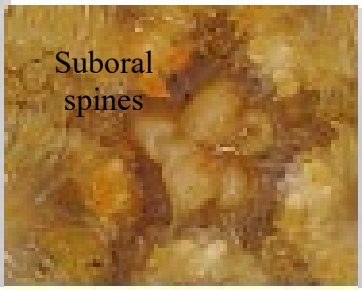
Pteraster trigonodon (Triangle-toothed Cushion Star)



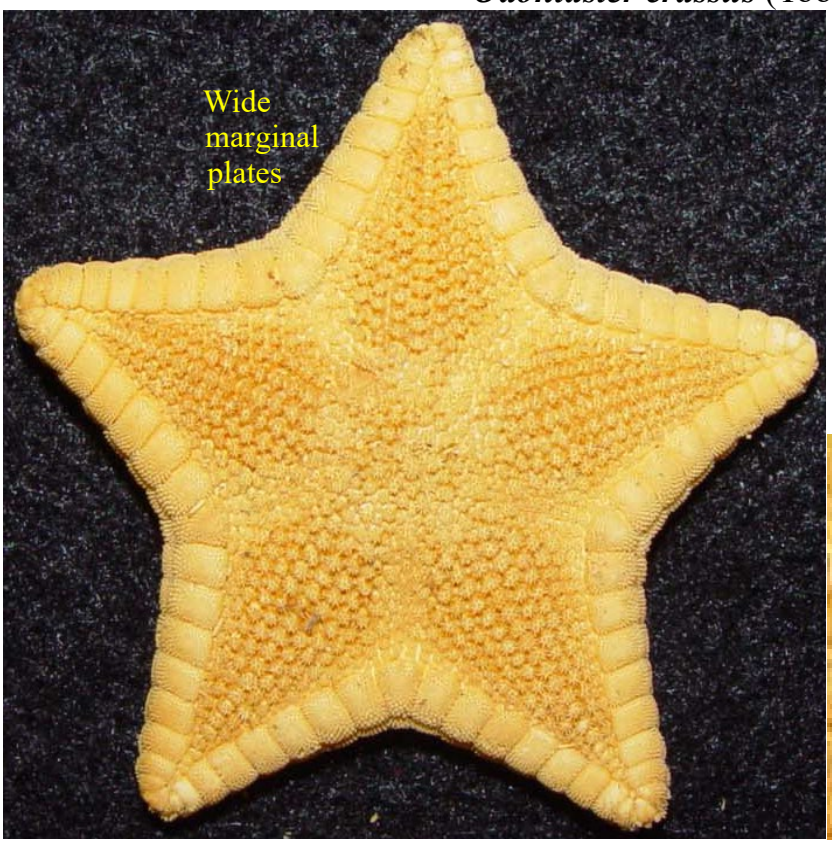
Description
This small, inflated star has a thin translucent, papillose appearing dorsal membrane. The mouth plates have a single, large three sided suboral spine. The dorsal surface is mottled yellow, tan, and gray. Diameter to about 6 cm

Similar species
Pteraster militaris is uniform in color and does not have suboral spines.

Distribution
Central California to Baja California, 400 m maximum depth has not been defined.



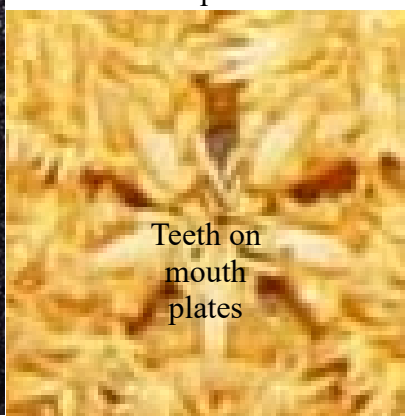
Odontaster crassus (Toothed Star)



Description
This small, broad and flat star has very wide marginal plates. The mouth plates have five large teeth. The color is uniformly pale orange or yellow. Diameter to 2.5 cm.

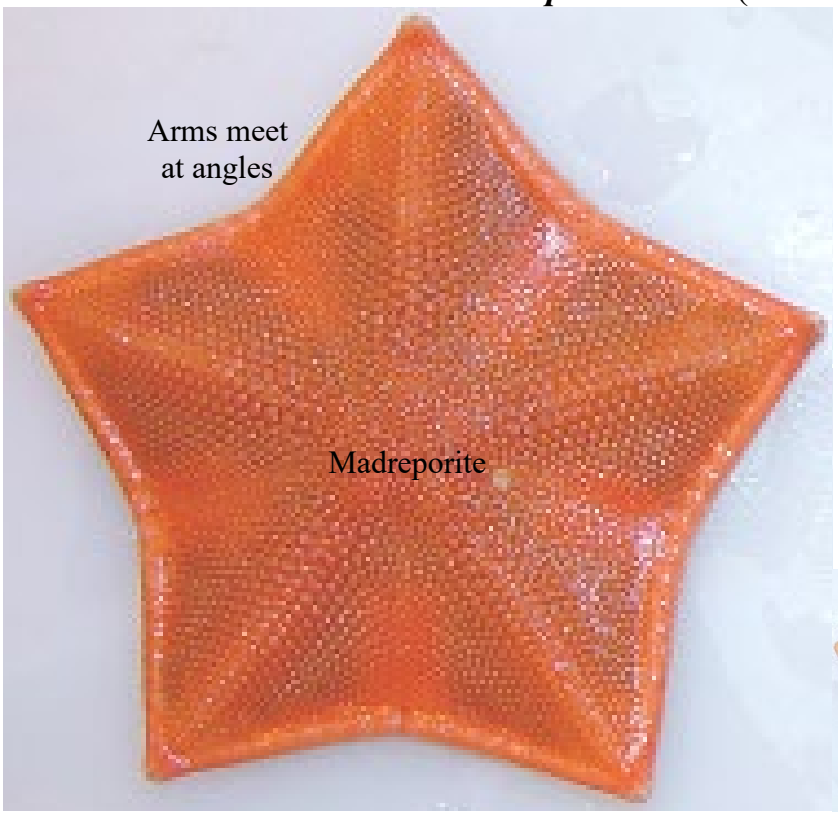
Similar species
Ceramaster spp. do not have wide marginal plates and shorter arms.

Distribution
Central California to Baja California, 400 m maximum depth has not been defined.



Sea Stars

Ceramaster leptoceramus (California Cookie Star)

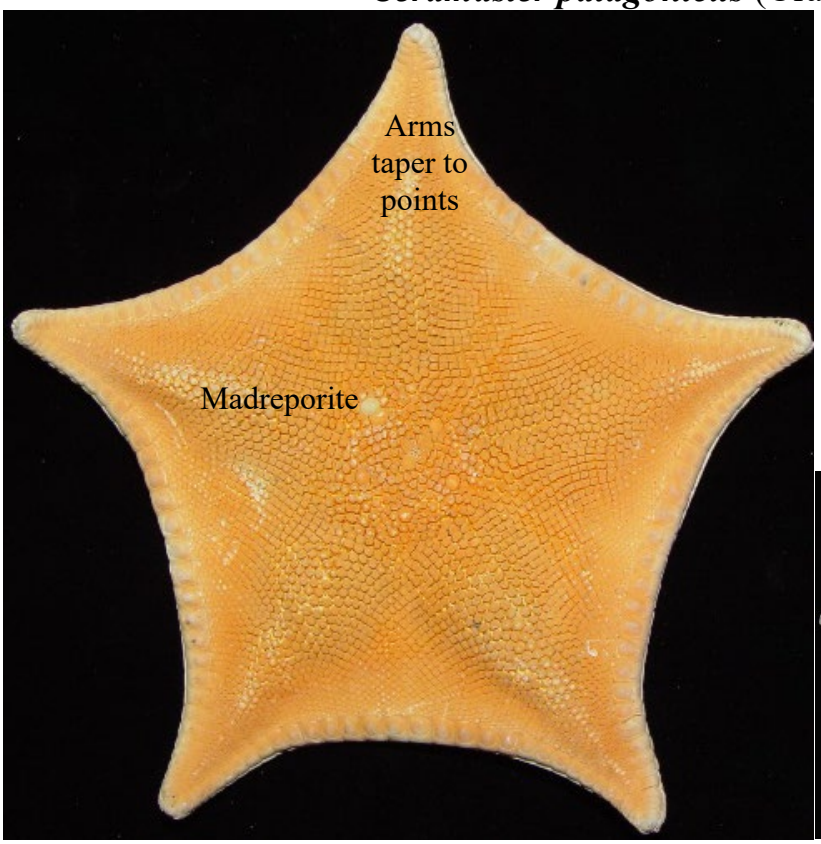


Description
This flat, pentagonal star has broad arms that form distinct shallow angles at the base. The madreporite is noticeable. Color is red, pink, or pale orange. Diameter to 15 cm.

Similar species
The bases of the arms of other *Ceramaster sp.* in the survey area have tapered arms that do not form angles. The characteristics used to identify the many subspecies in the survey area are subtle making field identification problematic.

Distribution
Central California to Baja California, 200-600 m.

Ceramaster patagonicus (Orange Cookie Star)



Description
This flat star has broad arms that taper sharply. Where the arms join is straight. This star is colored orange or yellow. The madreporite is noticeable. To about 20 cm.

Similar species
The characteristics used to identify the many closely related subspecies in the survey area are subtle making field identification problematic.

Distribution
Bering Sea to Chile, 10-500 m.

Sea Stars

Thrissacanthias penicillatus (Carpet Star)

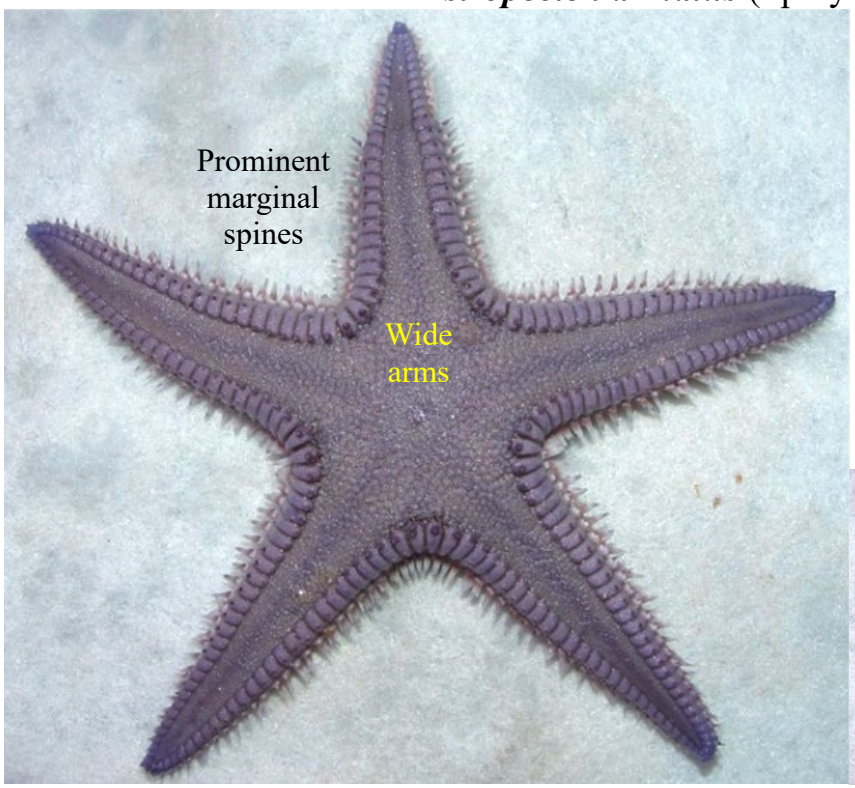
Description
This deep-water star has long arms with transverse rows of fine spines on the dorsal surface and prominent marginal spines. Color is brown, purple, or burgundy. The madreporite is noticeable. Diameter to 50 cm.
Similar species
Astropecten spp. are darker in color, do not have a large madreporite, have thinner arms, and marginal spines not as prominent
Distribution
British Columbia to Baja California, 500 m maximum depth has not been defined.

Astropecten ornatissimus (Ornate Sand Star)

Description
This flat star has noticeable marginal plates and small marginal spines. Color is purple-brown to orange dorsally and yellow ventrally. Diameter to 12 cm.
Similar species
Astropecten armatus has wider arms and larger marginal spines, and *Astropecten californicus* has thinner arms and is red/purple in color.
Distribution
Southern California to Baja California 10-100 m.

Sea Stars

Astropecten armatus (Spiny Sand Star)

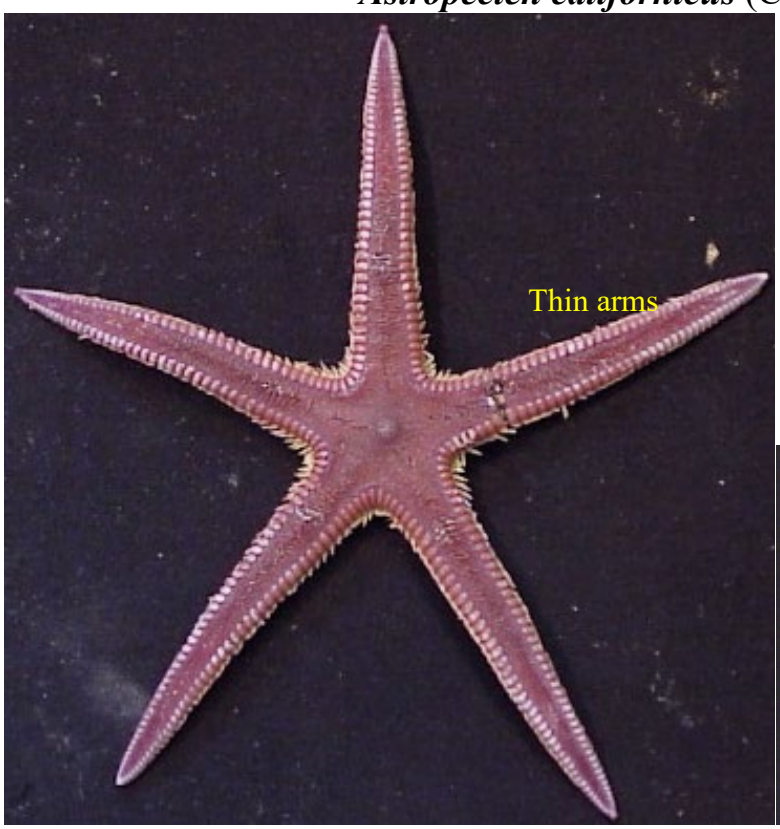


Description
This large flat star has prominent marginal plates with large, flat spines. The dorsal and ventral surfaces are gray or purple. Diameter to 20 cm.

Similar species
This star can be distinguished from the other California *Astropecten* by the broad arms, larger marginal spines, and color.

Distribution
Monterey Bay, California to Baja California 10-60 m.

Astropecten californicus (California Sand Star)



Description
This flat star has long, slender arms, prominent marginal plates and short, flat spines. Color is purple dorsally and straw ventrally. Diameter to 15 cm.

Similar species
Astropecten ornatissimus is gray-brown in color, has wider arms, and more prominent marginal plates.

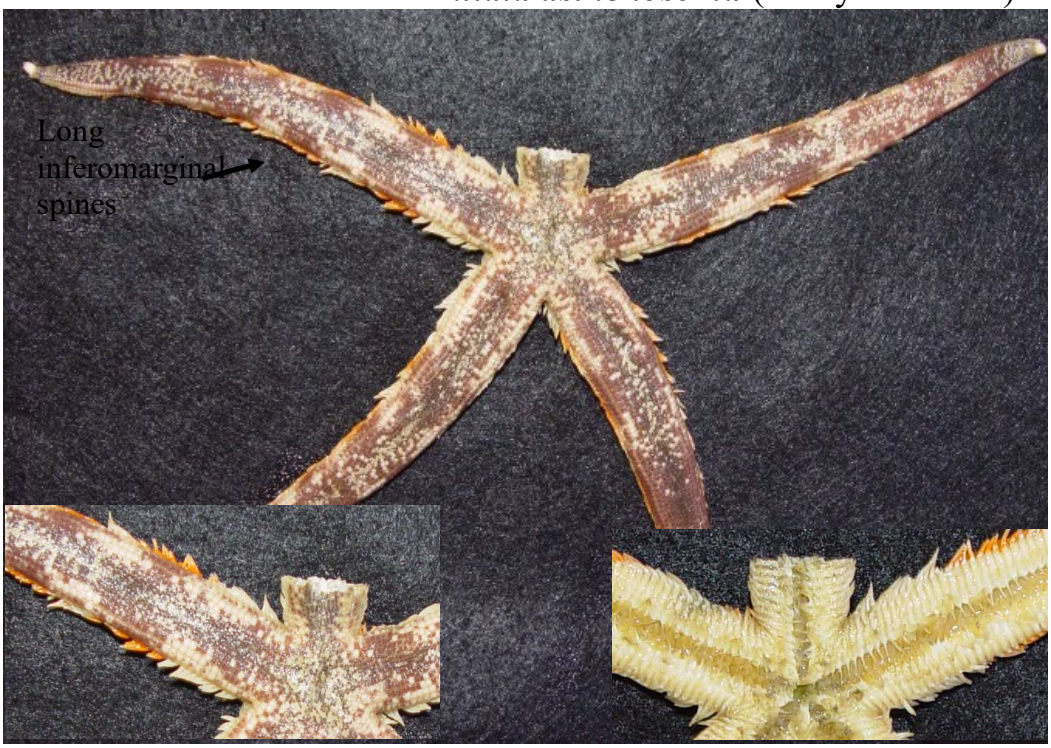
Distribution
Coos Bay, Oregon to Baja California, 10-300 m.

Sea Stars

Luidia foliolata (Flat Mud Star)

Description
This is a commonly encountered, large, flat star with small spines along the inferomarginal edge. The color is brown dorsally and yellow or white ventrally. Diameter to 60 cm.
Similar species
Luidia ashenasoma has longer spines and is mottled brown, cream, and orange.
Distribution
Gulf of Alaska to southern California, 10-650 m.

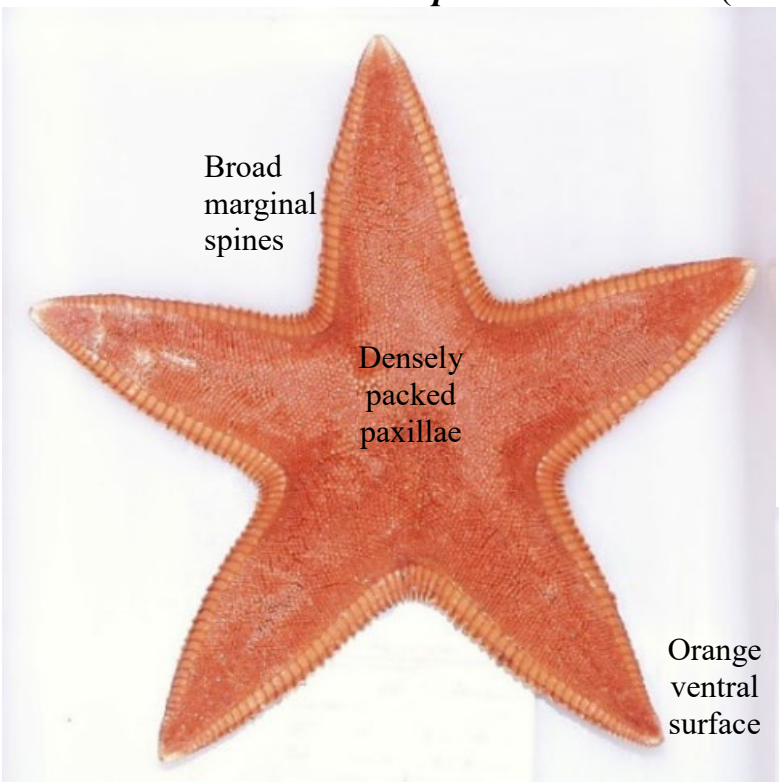
Luidia asthenosoma (Pretty Mud Star)



Description
This is a flat star with long marginal spines. The dorsal color is mottled brown and cream, with alternating sets of cream and orange spines. Diameter to 25 cm.
Similar species
Luidia foliolata is uniformly brown and has smaller marginal spines.
Distribution
Southern California to Baja California, 30-100 m.

Sea Stars

Dipsacaster borealis (Northern Sand Star)

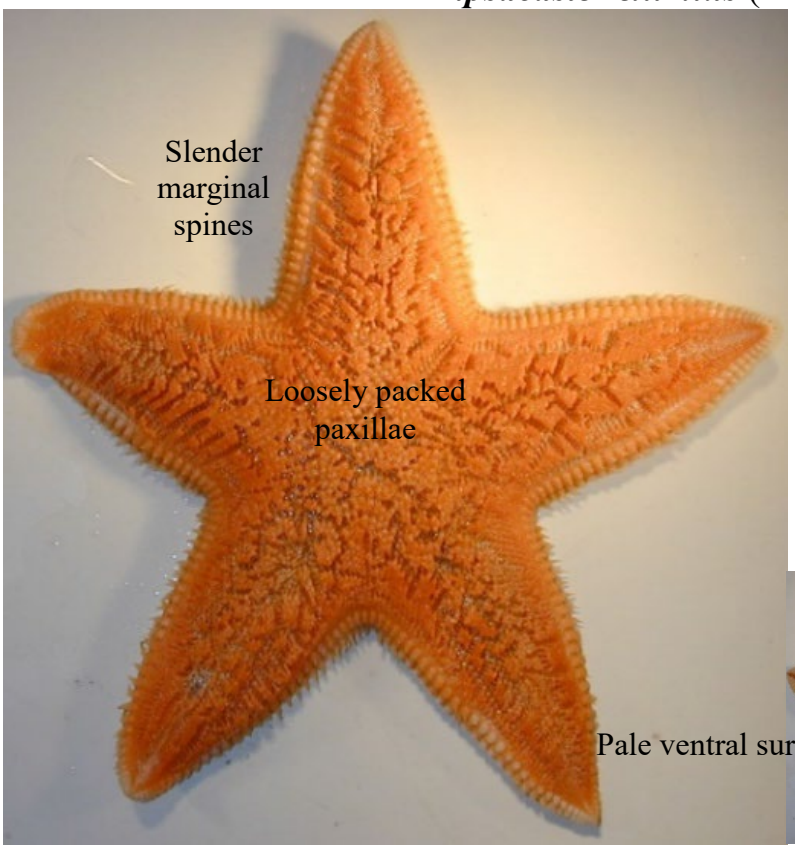


Description
The dorsal surface of this broad, flat star is covered with densely packed minute paxillae. The wide marginal plates have broad spines and sharp spinelets. Its color is uniformly orange both dorsally and ventrally. Diameter to 20 cm.

Similar species
Dipsacaster eximius has slender marginal spines, loosely packed dorsal paxillae, a light ventral surface and a more southerly geographic range.

Distribution
Bering Sea to northern Oregon, 220-750 m.

Dipsacaster eximius (Broad Sand Star)



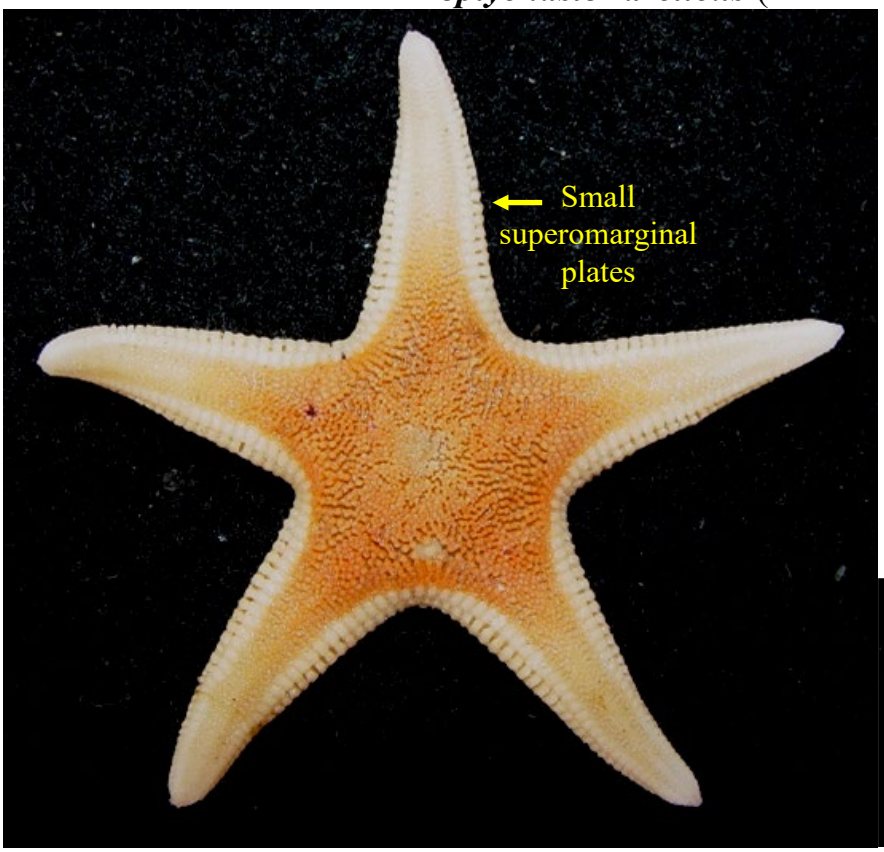
Description
This broad, flat star has minute paxillae on the dorsal surface that are loosely packed. The marginal and ventral plates are wide and with sharp spinelets and slender spines. Color is uniformly orange dorsally and pale ventrally. Diameter to 25 cm.

Similar species
Dipsacaster borealis has broad spines on the marginal and ventral plates, dorsal paxillae are densely packed, ventral surface is orange, and is found in a more northern geographic region.

Distribution
Oregon to southern California, 600 m maximum depth has not been defined.

Sea Stars

Leptychaster arcticus (Arctic Sand Star)



Description
This is a small, flat star with prominent marginal plates in two rows. The upper (superomarginal) plates are smaller than the lower (inferomarginal) plates. Marginal plates do not have spines. The color is cream with orange center dorsally and cream ventrally. Diameter to 6 cm.

Similar species
Leptychaster pacificus has a larger upper marginal plate, is uniformly cream in color, and has blunt arm tips.

Distribution
Arctic Ocean to Oregon, 35-1250 m.

Leptychaster pacificus (Pacific Sand Star)

Description
This is a small, flat star with prominent marginal plates in two rows. The upper (superomarginal) plates are approximately the same size as the lower (inferomarginal) plates. Color is uniformly cream on both sides. Diameter to 5 cm.

Similar species
Leptychaster arcticus has orange on the dorsal surface, smaller upper marginal plates, and arms are more tapered.

Distribution
Bering Sea to Oregon, 100-500 m.

Sea Stars

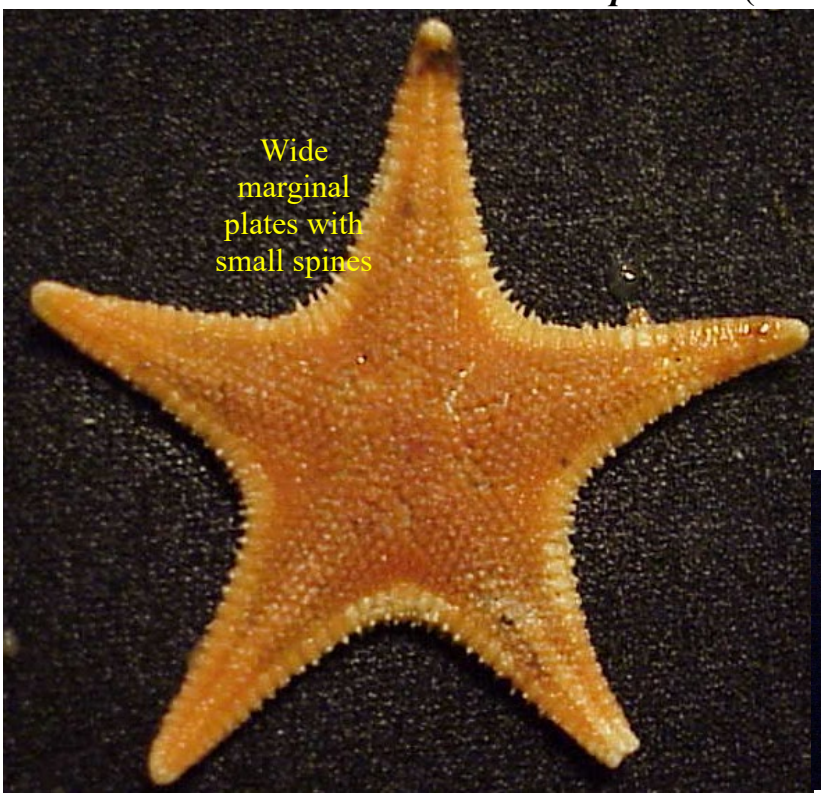
Ctenodiscus crispatus (Mud Star)

Description
This is a small, flat star with a cone-like projection at the center of the dorsal surface. The prominent marginal plates have short, conical spines. It is uniformly tan or yellow. Diameter to 6 cm.

Similar species
Leptychaster spp. do not have thorns on marginal plates and the cone-like projection.

Distribution
Arctic Ocean to Panama, 10-1850 m.

Pseudarchaster pusillus (Little Pseudarchaster)



Description
A small, rough star with short, broad arms. There are small spines on marginal plates. The color is variable but often burgundy, red, or brown. To about 6 cm.

Similar species
Pseudarchaster alascensis marginal plate spines are smaller and the arms taper more. The marginal plates are also not as wide.

Distribution
Northern California to Baja California, 180-700 m.

Sea Stars

Mediaster aequalis (Equal Armed Star)

Description
This flat star has tapering arms, and aboral tabulate plates not uniform in size. The aboral plates are larger at the center of the dorsal surface. The color is uniformly red dorsally and orange ventrally. Diameter to 15 cm.

Similar species
Pseudarchaster alascensis aboral tabulate plates are uniform in size, the marginal plates have spines near the central disc and the arms are narrower.

Distribution
Aleutian Island to Baja California, 1-300 m.

Mediaster tenellus (Pale Equal Armed Star)

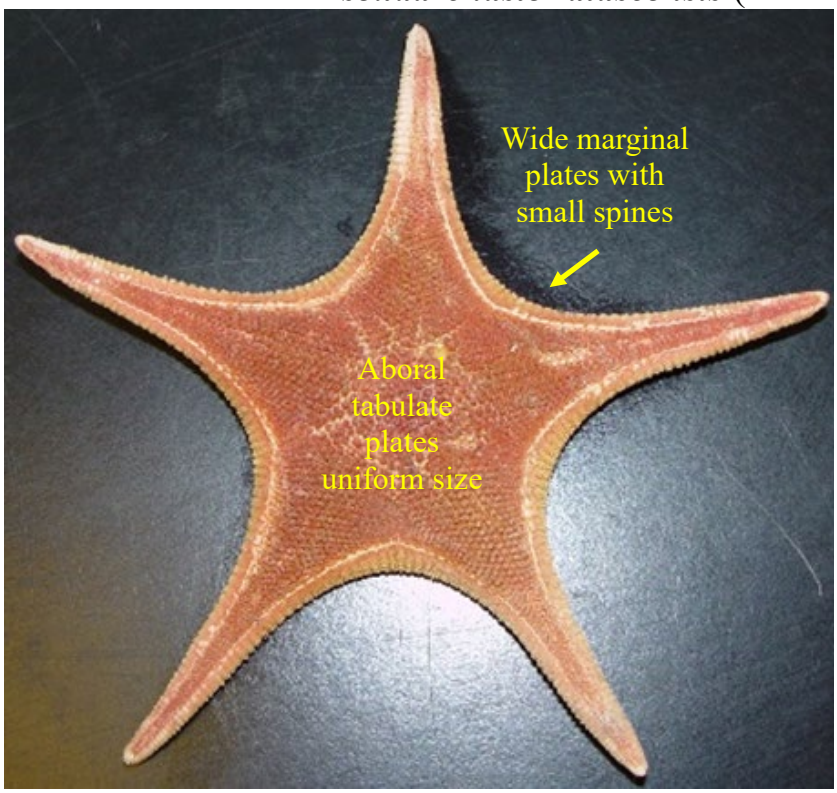
Description
This small pale orange star has a flat central disc and tapering arms. The marginal plates lack spines, and aboral tabulate plates have surrounding spinelets. Diameter to 7 cm

Similar species
Mediaster aequalis is red and the arms are not as tapered. *Pseudarchaster dissonus* is brown, and has spines on the marginal plates. *Pseudarchaster alascensis* has wider marginal plates with spines.

Distribution
Bering Sea to Mexico, 600 - 1200 m.

Sea Stars

Pseudarchaster alascensis (Alaskan Pseudarchaster)

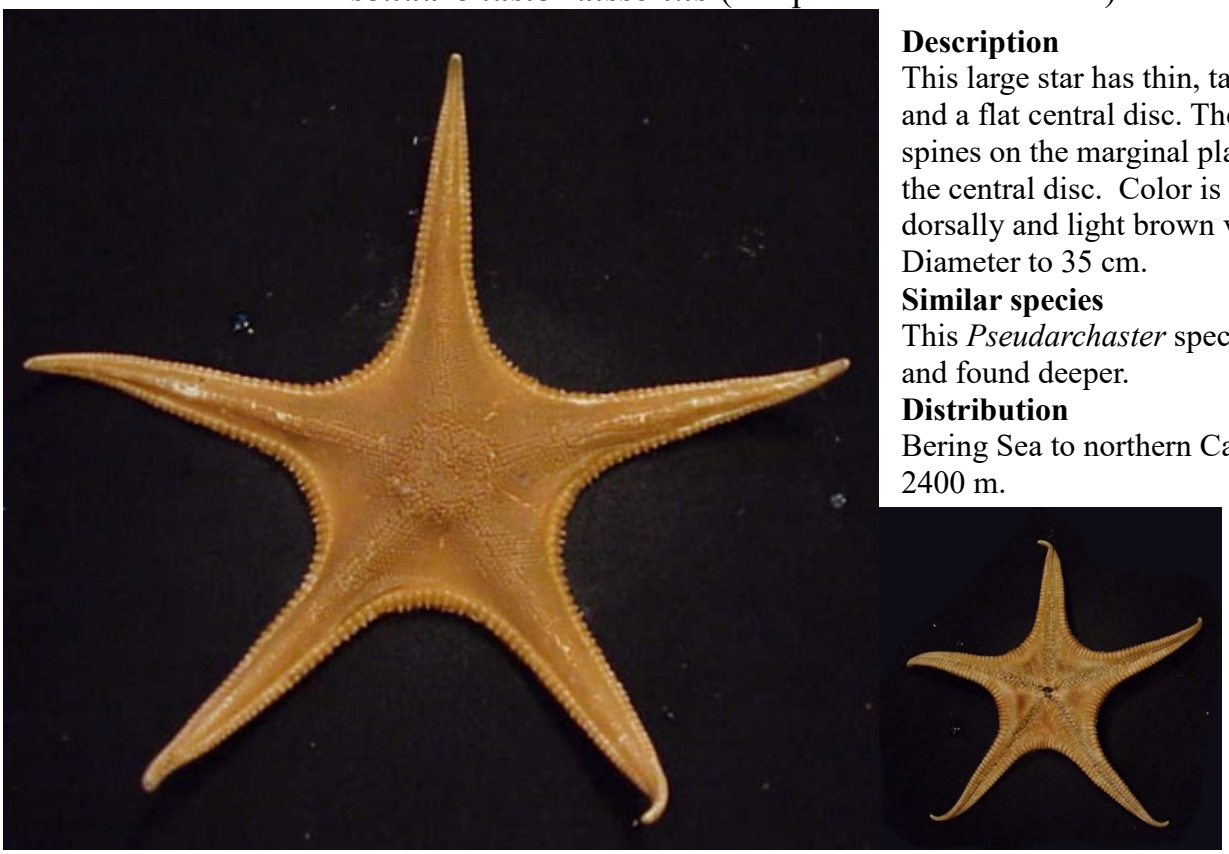


Description
Flat star with long, tapering, slender arms. The marginal plates are granular, with short spines near the central disc. The aboral tabulate plates are of uniform size. The color is purple, red, brown, orange, or burgundy. Diameter to 15 cm.

Similar species
Mediaster aequalis aboral tabulate plates are larger near the central area of the dorsal surface, and the arms are not as long or slender. *Mediaster tenellus* has more narrow marginal plates without spines and arms taper more.

Distribution
Gulf of Alaska to central California, 124-1900 m.

Pseudarchaster dissonus (Deep-sea Pseudarchaster)



Description
This large star has thin, tapering arms and a flat central disc. There are small spines on the marginal plates close to the central disc. Color is brown dorsally and light brown ventrally. Diameter to 35 cm.

Similar species
This *Pseudarchaster* species is brown and found deeper.

Distribution
Bering Sea to northern California, 1000-2400 m.

Sea Stars

Asterina miniata (Bat Star)

Description
This large, thick, firm star, has short, broad rays, and is flat on the ventral side. The dorsal surface is inflated and covered with overlapping plates. The color is variable but often bright dorsally and cream ventrally. Diameter to 20 cm.
Similar species
Pteraster spp. are not as rigid.
Distribution
Southeast Alaska to Baja California, 0-285 m.

Dermasterias imbricata (Leather Star)

Description
This large, smooth star feels leathery to touch, and the madreporite is prominent. Its color is variable, often mottled red, gray, green, or pale orange. Diameter to 24 cm.
Similar species
Pteraster tesselatus has shorter arms and does not feel leathery to touch.
Distribution
Gulf of Alaska to Baja California, 0-200 m but rare below 50 m.

Sea Stars

Asthenactis fisheri (Slimy Deep-sea Sun Star)

Description
This is a slimy sun star with nine to ten flexible arms and a prominent osculum on the aboral surface. It is colored rusty-orange dorsally and pale orange ventrally. Diameter to about 20 cm.
Similar species
Solaster spp. are not very slimy and are more rigid.
Distribution
Washington to California, 1200 m and below.

Hymenaster **spp**. (Pancake Star)

Description
This flat, very thin star has a prominent osculum. The skin is stretched out over long, lateral spines. Color is variable, often yellow, orange, tan, gray or purple. Diameter to 12 cm.
Similar species
Not easily confused with other genera. Differentiation between species is problematic.
Distribution
Bering Sea to southern California, 1200 m maximum depth has not been defined.

Sea Stars

Linckia columbiae (Comet Star)

Description

This small, smooth appearing sea star has 3-7 arms, some are often regenerating. The dorsal surface is red, mottled with orange and purple. The ventral surface is cream colored. Diameter to about 10 cm.

Similar species

Henricia spp. have visible skeletal mesh and are not as firm and smooth.

Distribution

Southern California to Columbia and the Galapagos Islands, intertidal to 75 m.

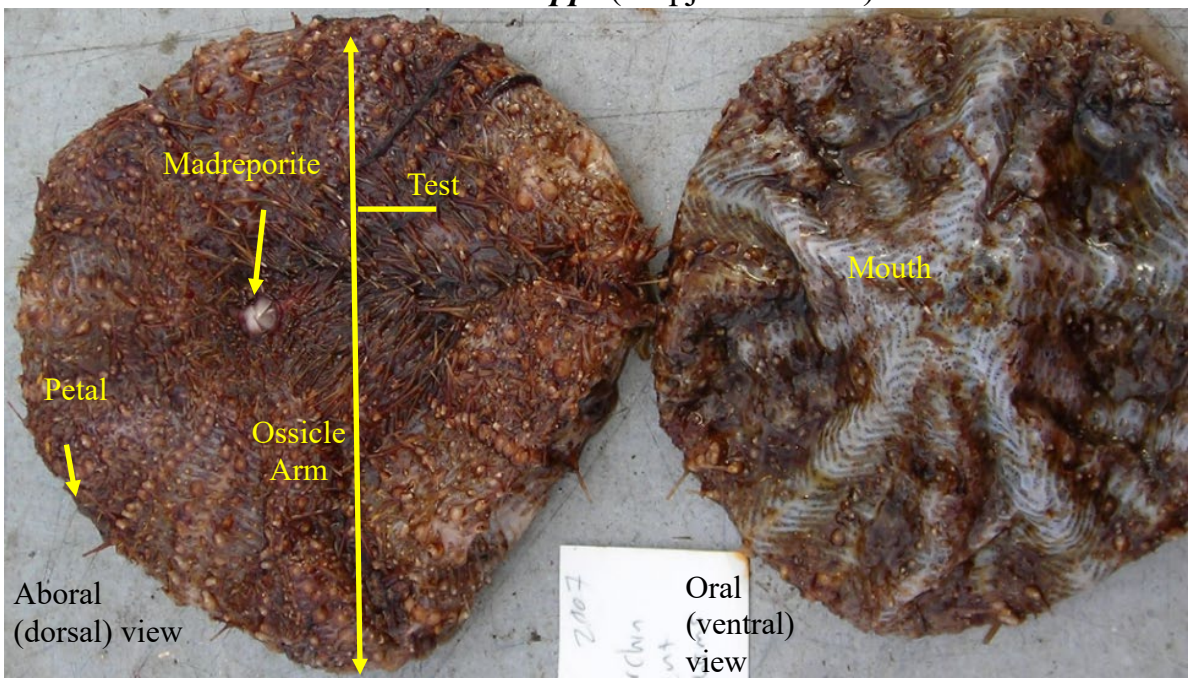
Sea Urchins/Heart Urchins/Sand Dollars

Echinoidea

Urchins like their relatives the Sea stars are pentaradial or five armed. The five arms or ossicles form a rigid rounded skeleton known as a "Test". There are 3 types of urchins. The spherical (proper or regular) sea urchin, this group also includes the family Echinothuriidae or "Leather Urchins" due to their soft skeleton or test. This group includes species in the genus *Asthenosoma*. They are known as "Fire Urchins" due to their bright colors and painful and poisonous sting are. The other groups are the asymmetrical (irregular, spatangoid urchin, mud urchin or sea potato) heart urchin and the flattened disc shaped urchins (sand dollars). Urchins have moveable spines and tube feet in rows of five along the five rows of interanbulacral plates in the ossicles. The tube feet are used for both movement and respiration. There are five pairs of teeth arranged in a circular structure called Aristotle's lantern which is used to scape food from hard surfaces. The main differences between heart, sea urchins and sand dollars is that heart urchins have both a defined front and back end. There is a small indentation or depression on the anterior margin near which the mouth (peristome) is located and the anus (periproct) at or near the margin on the opposite end. Sea urchins include several different taxonomic groups, but in general are symmetrical with the mouth generally centered on the ventral side and the anus generally centered on the dorsal. Sand dollars are a flattened disk shaped with the mouth generally centered on the ventral side with the anus located in or near a small indentation or depression along the lateral edge.

Leather or Soft Sea Urchins

Tromikosoma spp. (Flapjack Urchin)



Description

This large and unusual deep water urchin differs from other urchins in that its test plates are collapsible, resulting in a flattened disk as seawater drains. It is brown to pale pinkish in color. Diameter to 20 cm.

Similar species

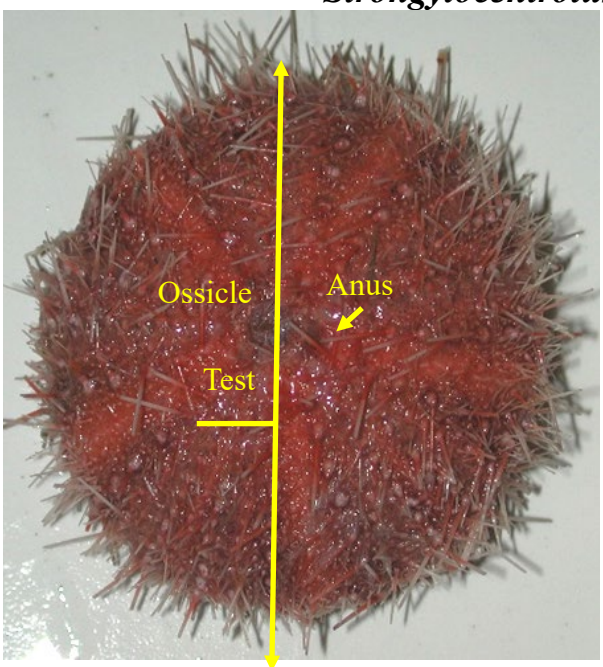
The size, depth of capture and ability to flatten without crushing should set this genus apart from others.

Distribution

Encountered in southern California at depths of 900 m maximum depth has not been defined.

Regular or Proper Urchins

Strongylocentrotus fragilis (Fragile Red Sea Urchin)



Description

The ambulacral plates of this common sea urchin are easy to see through the short spines. The test and spines are pink or orange. Diameter to 10 cm.

Similar species

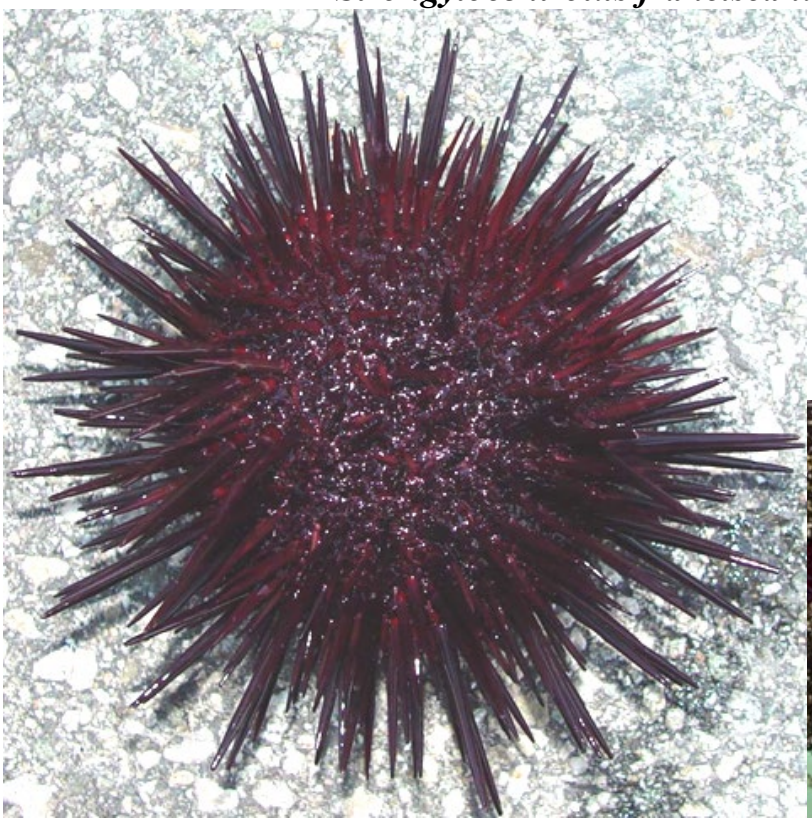
Formerly known as *Allocentrotus fragilis* is now invalid. *Strongylocentrotus franciscanus* has longer spines and is found in shallower water. *Lytechinus anamesus* have dark blotches, and are white or green in color and it is difficult to see the ambulacral plates.

Distribution

Bering Sea to Baja California, 200-1260 m.

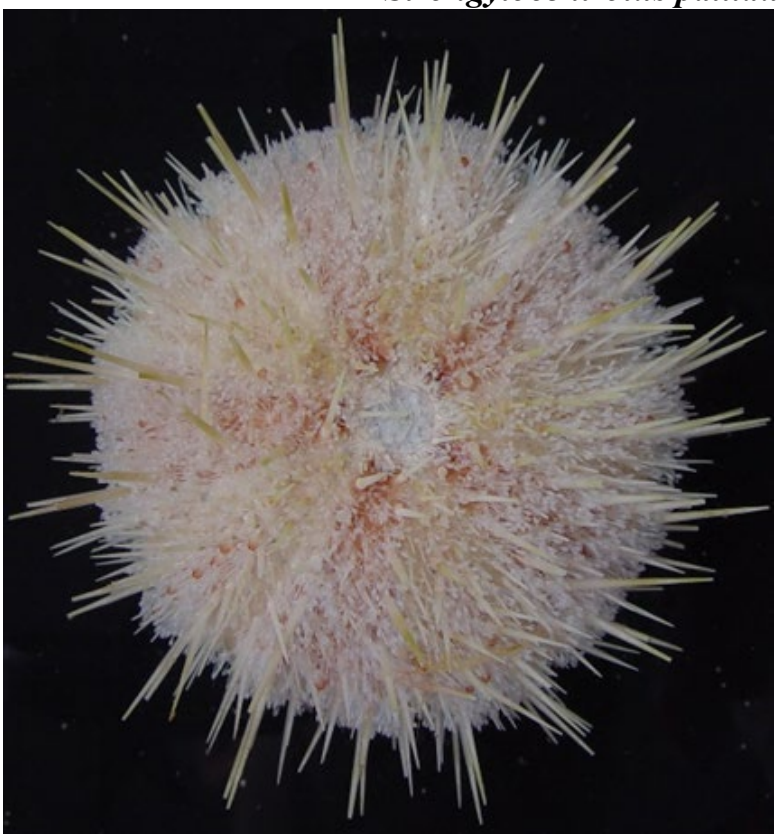
Regular or Proper Urchins

Strongylocentrotus franciscanus (Red Sea Urchin)



Description
This relatively large urchin has long, stout and vertically striated spines. The test is dark and the spines are red to dark purple. Diameter to 20 cm, spines to 10 cm.
Similar species
Strongylocentrotus fragilis has much shorter, pink spines and is found in deeper water.
Distribution
Bering Sea to Baja California, 0-90 m.

Strongylocentrotus pallidus (Pale Sea Urchin)



Description
This is a small, round urchin not often encountered while trawling. The test is pink or white, the spines pale green, and the tube feet white. Diameter to about 7 cm.
Similar species
Strongylocentrotus droebachiensis has long, dark green spines. *Lytechinus anamesus* has shorter spines and brown blotches.
Distribution
From the Barents Sea off Russia to the Central Sea of Japan to the west. From northern Alaska to Oregon in the east as well as off Norway in the North Atlantic, 0-1600 m.

Regular or Proper Urchins

Strongylocentrotus droebachiensis (Green Sea Urchin)

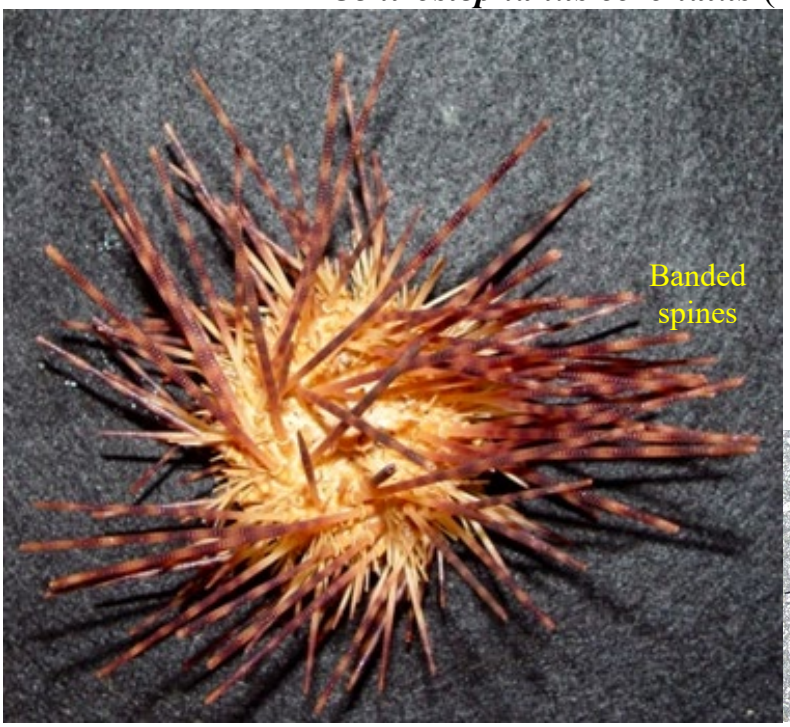
Description
This is a relatively large regular-shaped urchin with fine, short spines. The spines are light green, the tube feet purple, and the test pink. Diameter to about 10 cm.
Similar species
Strongylocentrotus pallidus has longer, pale green or white spines and pale green or white tube feet. *Spatangus californicus* is heart-shaped, has a darker test, long ambulacral plates, and very short spines.
Distribution
Arctic Ocean to Washington 20-150 m.

Lytechinus anamesus (White Sea Urchin)

Description
This small, round urchin has short spines. And the test is white or pale green, often with brown blotches. Diameter to 7 cm.
Similar species
Strongylocentrotus fragilis is pink in color and usually larger. *Strongylocentrotus pallidus* has longer spines, does not have brown blotches, and is found in very shallow water.
Distribution
Southern California to Mexico, 5-300 m.

Regular or Proper Urchins

Centrostephanus coronatus (Crowned Sea Urchin)



Description
This large urchin has very long spines composed of concentric bead-like segments. The test can be dark purple or light, and the spines are banded brown and purple. Diameter to 18 cm, spines to 12 cm.

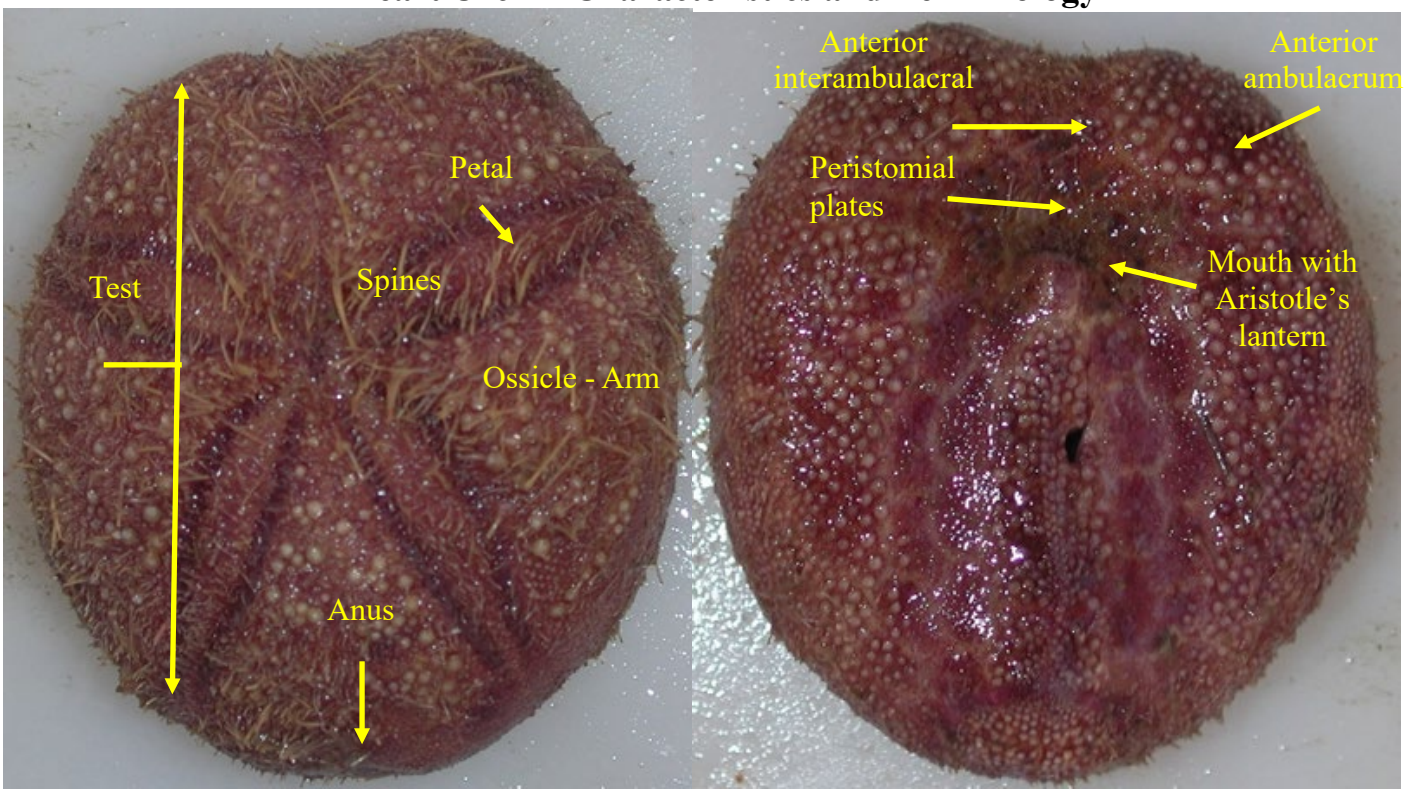
Similar species
The very long spines with concentric banding pattern distinguish this species.

Distribution
Southern California to Ecuador, 1-125 m.

Heart Urchins

Irregular, Spatangoid, Mud Urchins

Heart Urchin Characteristics and Terminology



Heart Urchins

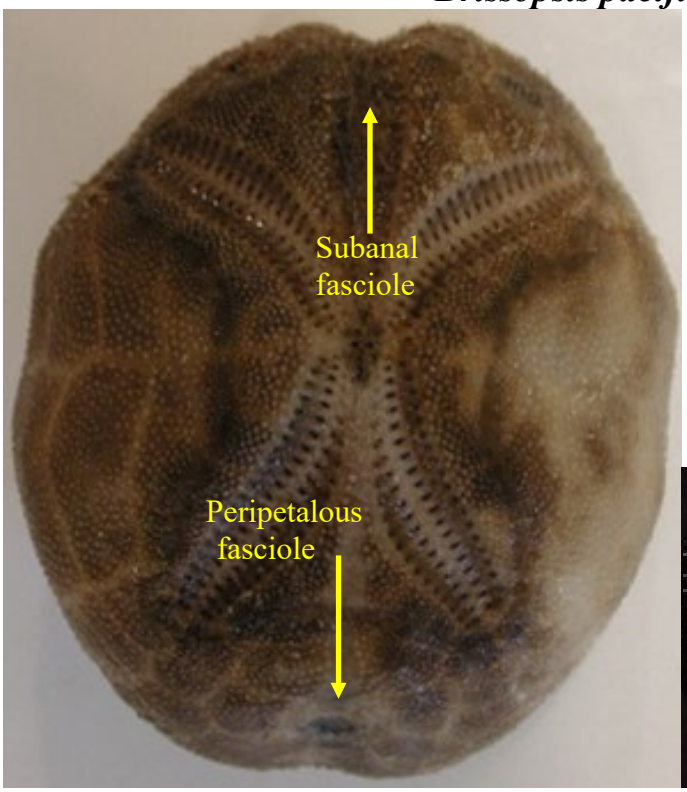
Brisaster latifrons

Description
This urchin has deeply indented ambulacral plates. There are three large anterior plates and two smaller posterior plates, forming a "flower shape." The two posterior plates are less than 1/3 the length of the anterior. There is a ring of spines around the peripetalous and subanal fascioles. The test is tan, brown, or green with light brown spines. Length to 5 cm.

Similar species
Brisaster townsendii is now considered a synonym of *Brisaster latifrons*. *Brissopsis pacifica* lacks the rings of spines around fascioles and ambulacral plates are less indented.

Distribution
Alaska to California, 50-900 m.

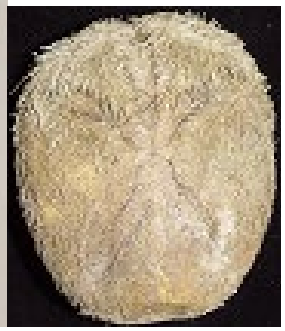
Brissopsis pacifica (Oval Sea Biscuit)



Description
This small green, brown, or tan urchin has ambulacral plates of equal length and appear to curve the entire length. There are subanal and peripetalous fascioles (rings around the anterior and posterior) that lack a ring of spines around or below. Length to about 5 cm.

Similar species
Brisaster latifrons has deeply indented ambulacral plates and a ring of spines around or below the fascioles.

Distribution
Central California to Panama, 10-400 m.



Heart Urchins

Spatangus californicus (Giant Mud Urchin, Giant Sea Biscuit or Green Sea Biscuit)

Description
This large urchin has short, sharp spines. There is a subanal fasciole (ring around the posterior of the test) and an anterior indentation. The test (shell) is purple with green spines. Length to 11 cm.
Similar species
Brissopsis pacifica has subanal and peripetalous fascioles, a more fragile test, and is tan or brown.
Distribution
Point Conception, to Baja and the Gulf of California, 100-350 m.

Lovenia cordiformis (Heart Urchin)

Description
This small urchin has 2 types of spines. The first are scattered, long, curved, sharp and needle-like. The others are more densely packed short, curved, needle-like spines. Color is varies but usually white, brown, tan, red or purple. Length to about 7 cm.
Similar species
The elongated shape and very long, curved spines distinguish this species.
Distribution
Southern California to Ecuador, 0-150 m

Sand Dollars

Dendraster excentricus (Sand Dollar)

Description
This disc-shaped sea urchin is covered with very short, velvet-like spines. The ambulacral plates are short and of two different lengths. Color of test when alive is black or gray with green spines, and when dead test is pale green or white. Diameter to about 8 cm.

Similar species
Not likely to be confused with other urchins.

Distribution
Southeastern Alaska to Baja California 0-50 m.

Crinoids Crinoidea

Most extant crinoids have numerous arms extending from the calyx, each with two rows of pinnules (jointed appendages). The pinnules bear triplets of podia (tube feet) that have mucus-secreting glands and function in capturing food. Crinoids are unique in using tube feet solely for food collection and having the oral surface on the upper half of the body. The two species listed here are not stalked, and are free-moving. Cirri extend opposite the arms and are used to anchor the animal to substrate, while the arms are used to swim and crawl.

Florometra serratissima (Feather Star)

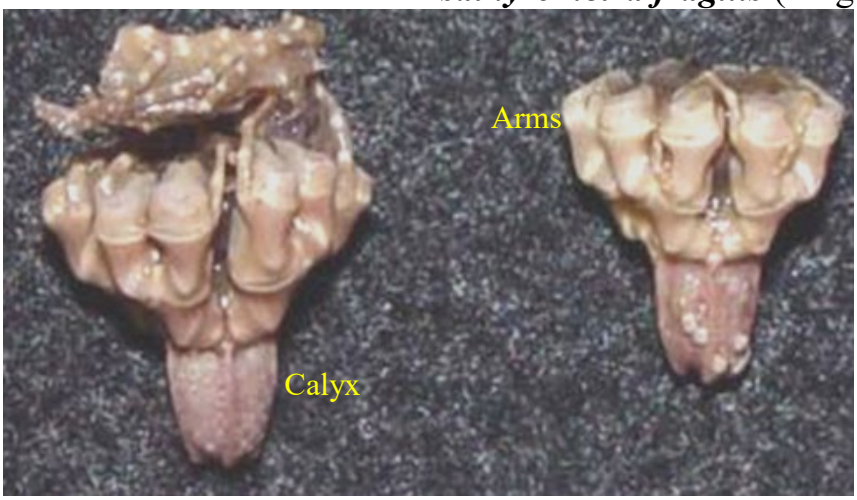
Description
This is the most common crinoid caught on the continental shelf and slope. It has 10 arms that may be caught in the net or torn off. It is yellow, orange, or brown. Height to 15 cm.

Similar species
The calyx of *Psathyrometra fragilis* is long and conical, that easily sheds its arms.

Distribution
Alaska to Mexico, 20-1200 m.

Crinoids

Psathyrometra fragilis (Fragile Crinoid)



Description
This crinoid is uncommon. It has a long, conical calyx from which the arms and cirri extend. Often only the calyx is seen, and it is brown and tan. Height to about 12 cm.

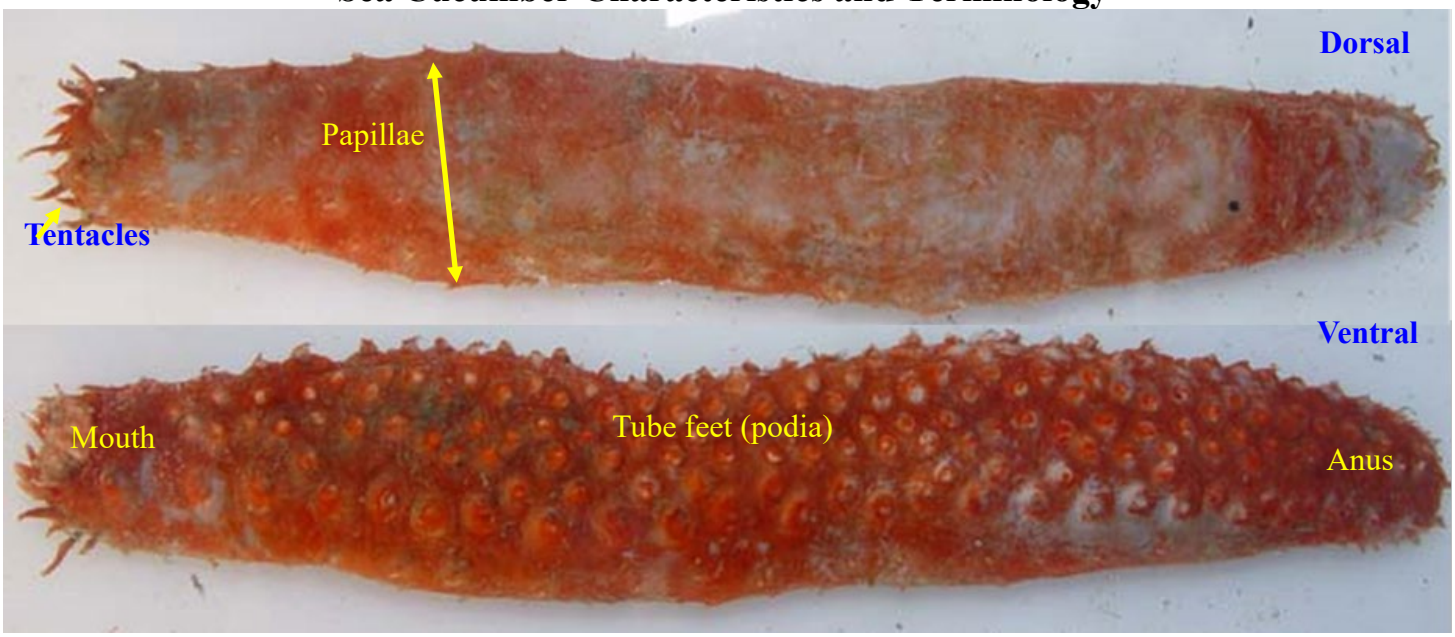
Similar species
Florometra serratissima lacks the conical calyx.

Distribution
Alaska to Baja California, 500 m and below.

Sea Cucumbers Holothuroidea

Sea cucumber morphology is greatly modified from the general Echinoderm body plan. There is a loss of rays, spines, pedicellariae, Aristotle's lantern, and a lengthening of the body between the oral and aboral surfaces. The oral tube feet are modified into tentacles, which may be dendritic (branching) and are not often seen in dead animals. Most sea cucumbers are deposit feeders, but some (i.e. *Psolus squamatus)* use the tentacles to capture suspended food particles. Under stress or as a defense mechanism, many sea cucumbers eviscerate the digestive tract.

Sea Cucumber Characteristics and Terminology



Sea Cucumbers

Benthodytes spp.

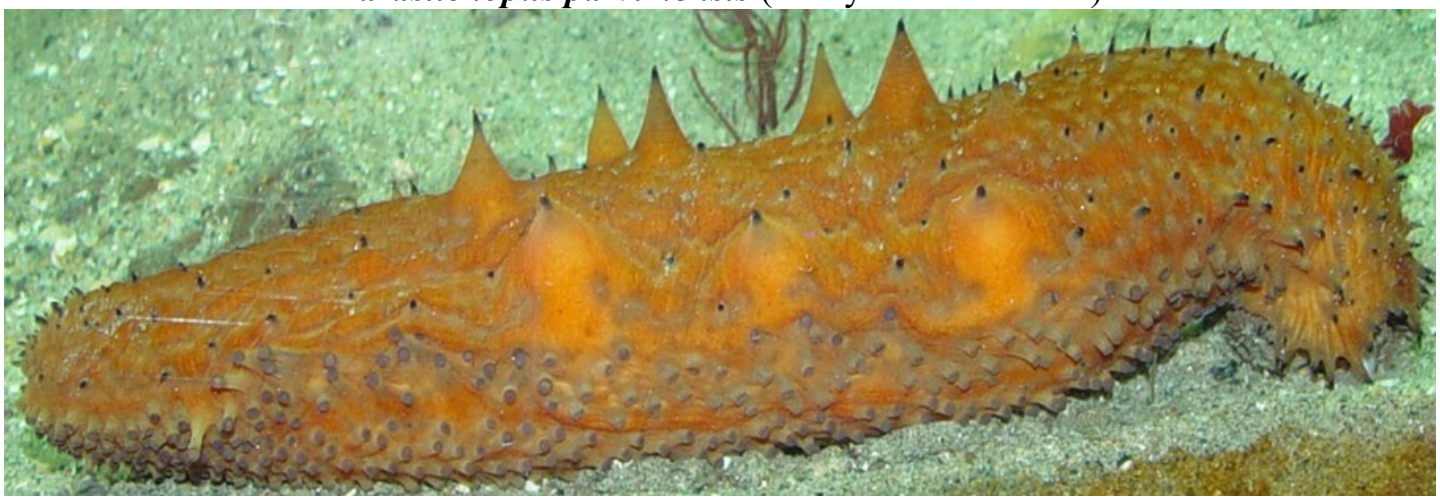
Description
This large dark purple cucumber has tough thick skin and is covered with variously sized conical papillae. Length to about 25 cm.
Similar species
Colors and tough skin should distinguish it from other deep water cucumbers.
Distribution
Encountered in southern California waters at depths 500 m and below.

Parastichopus californicus (California Sea Cucumber)

Description
This is a large, soft or rigid cucumber with various sizes of prominent, stiff, conical papillae not in a definite pattern. The ventral side is usually lighter than the dorsal, and it has many rows of rigid tube feet. The body is mottled, often red, tan, orange, or brown. Length to 40 cm.
Similar species
Parastichopus parvimensis has small and large black-tipped papillae. Synallactidae papillae are in longitudinal rows and are much more numerous.
Distribution
Alaska to Baja California, 0-200 m.

Sea Cucumbers

Parastichopus parvimensis (Warty Sea Cucumber)



Description

This sea cucumber papillae is covered with small, and a few scattered, larger, stiff, conical black-tipped papillae. Length to about 25 cm.

Similar species

Parastichopus leukothele, Parastichopus californica and Synallactidae lack the black-tipped papillae.

Distribution

Monterey Bay, California to Baja California, Mexico, intertidal to 50 m.

Parastichopus leukothele (Giant Soft Cucumber)

Description

This is a common sea cucumber, and it has a very soft, fleshy body. There is a blunt anterior end with twenty feeding tentacles. It is yellow, pink, and red with scattered white papillae and four bands of white tube feet. Length to 40 cm.

Similar species

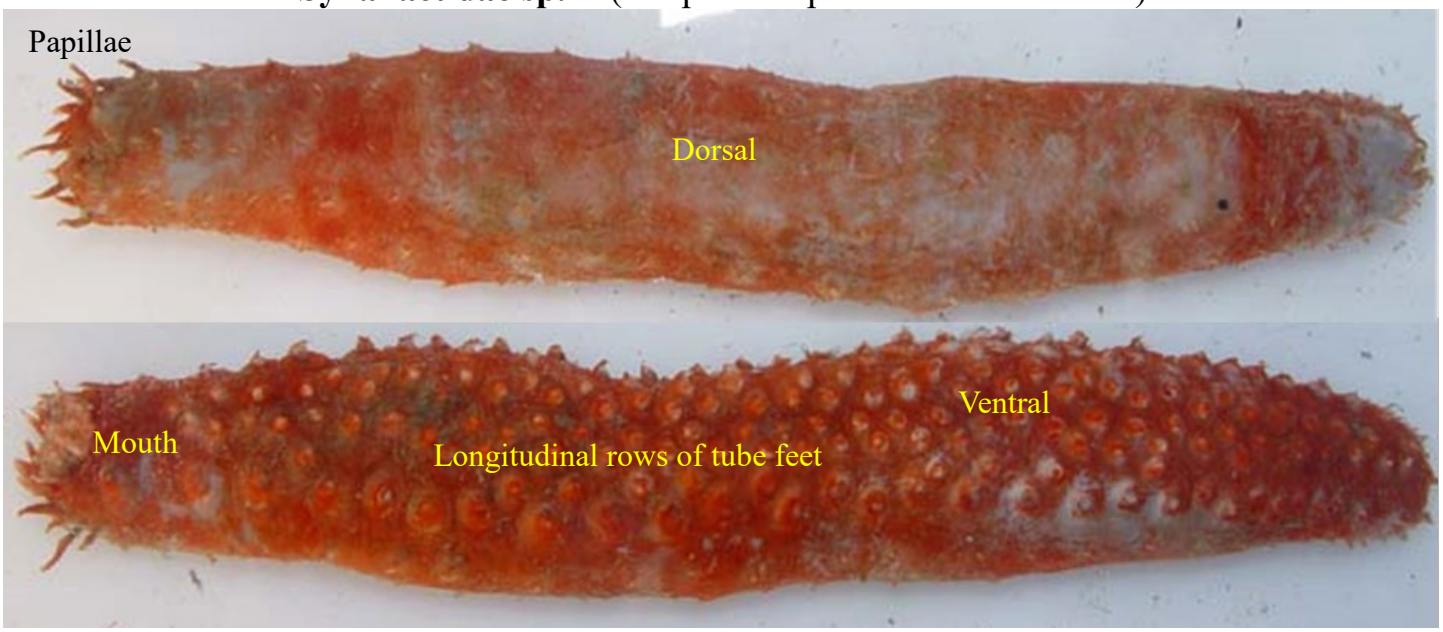
Parastichopus californicus has large papillae on the dorsal surface, thicker skin, and is often rigid when brought up in the net. Synallactidae has longitudinal rows of papillae on the ventral surface.

Distribution

Southeastern Alaska to southern California, 30-500 m and below.

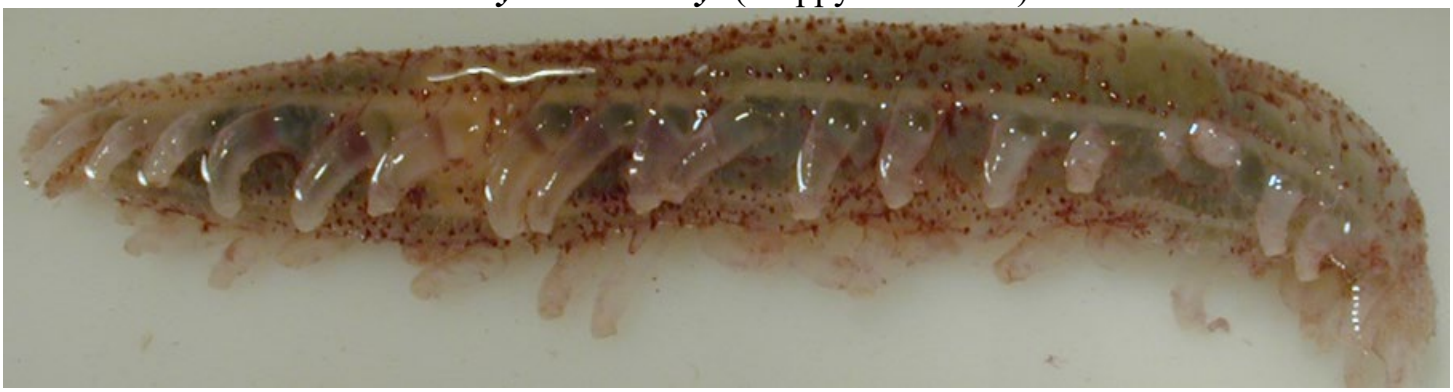
Sea Cucumbers

Synallactidae sp. A (Deep-sea Papillose Sea Cucumber)



Description
This is a large, red, or brown cucumber with longitudinal rows of small, fleshy papillae on the dorsal side, and similar rows of larger, papillae-like tube feet on the ventral side. Length to 50 cm.
Similar species
Parastichopus spp. dorsal papillae are not in rows and are much less numerous, and most species are found in shallower water.
Distribution
Southern California to Baja California, 1000 m and below.

Pannychia moseleyi (Sloppy Cucumber)



Description
This is a very soft, flexible sea cucumber with large tube feet. It is purple or gray. Length to 25 cm.
Similar species
Not likely to be confused with other sea cucumbers in this guide.
Distribution
Washington to Mexico, 500 m and below.

Sea Cucumbers

***Scotoplanes* spp.** (Sea Pig)

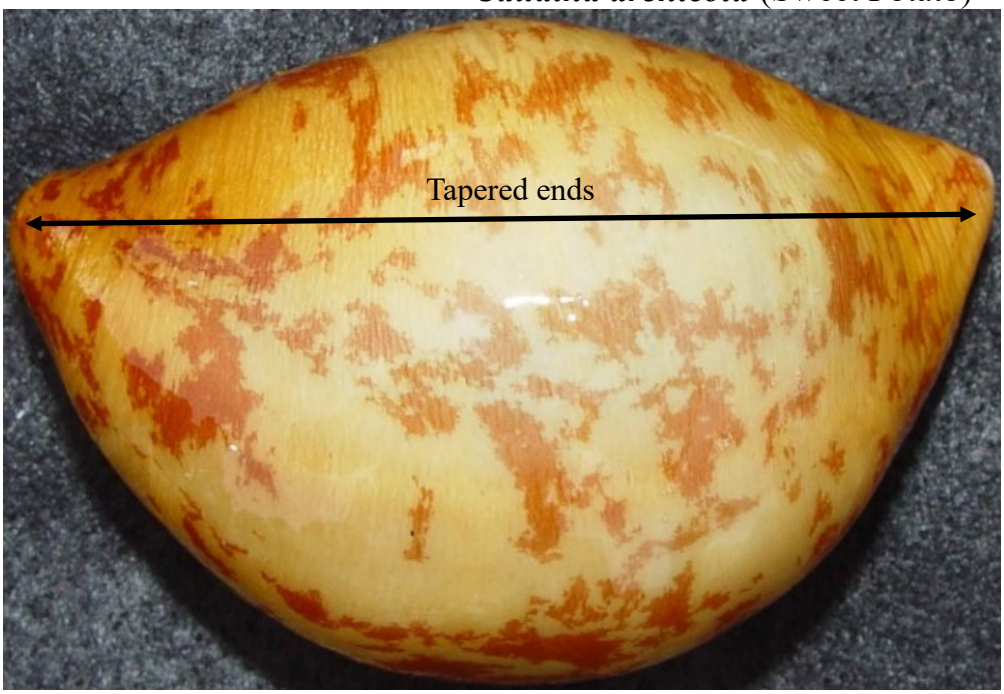
Description
This is a small, soft, oval sea cucumber with fleshy appendages. It is gray, tan, or purple. Length to 6 cm.
Similar species
Species of the genus *Scotoplanes* are very closely related and similar in appearance making field identification difficult.
Distribution
Alaska to Mexico, 800-5000 m.

Pseudostichopus mollis (Sandy Sea Cucumber)

Description
These cucumbers are usually firm and transparent brown, with visible internal organs. The dendritic tentacles are not usually extended. There are often with sand grains on the ventral surface. Length to 20 cm.
Similar Species
Not likely to be confused with other sea cucumbers in this guide.
Distribution
Alaska to Mexico, 100-5203 m.

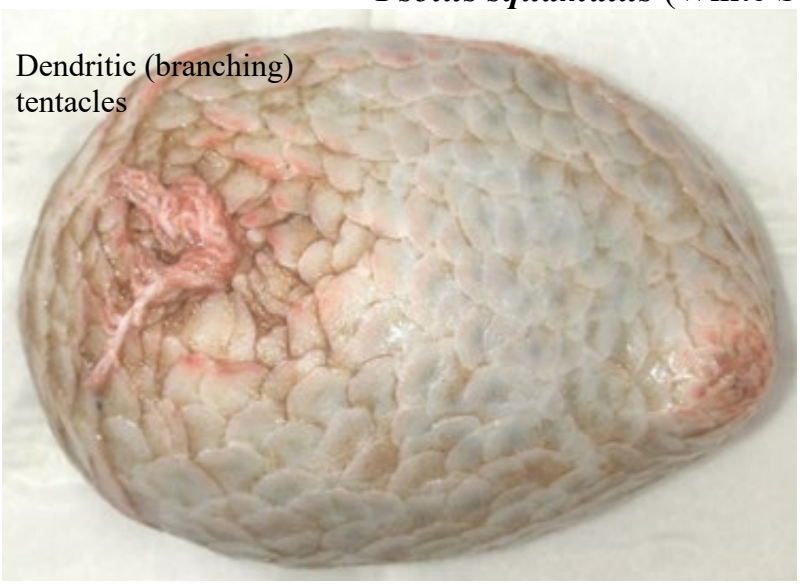
Sea Cucumbers

Caudina arenicola (Sweet Potato)



Description
The oral and anal ends of this sea cucumber are tapered. The dorsal surface has distinct plates, and are often adhered to rocks or substrate. They are mottled orange, tan, and brown. Length to about 25 cm.
Similar species
The tapered ends and color of this sea cucumber should distinguish it.
Distribution
Southern California to Mexico, 1-40 m.

Psolus squamatus (White Scaled Cucumber)



Description
This is a small, inflated sea cucumber usually found in canyons or on deep ridges. The dorsal surface is scaled, and the ventral surface flat and transparent. It is often white or pink but can be discolored. Length to 7 cm.
Similar species
Psolus chitonoides has larger scales and is red. It also occurs 0-50 m. The scaled dorsal surface is a distinguishing characteristic from other sea cucumbers in this guide.
Distribution
Alaska to California, 200 m and below.

Psolus chitonoides

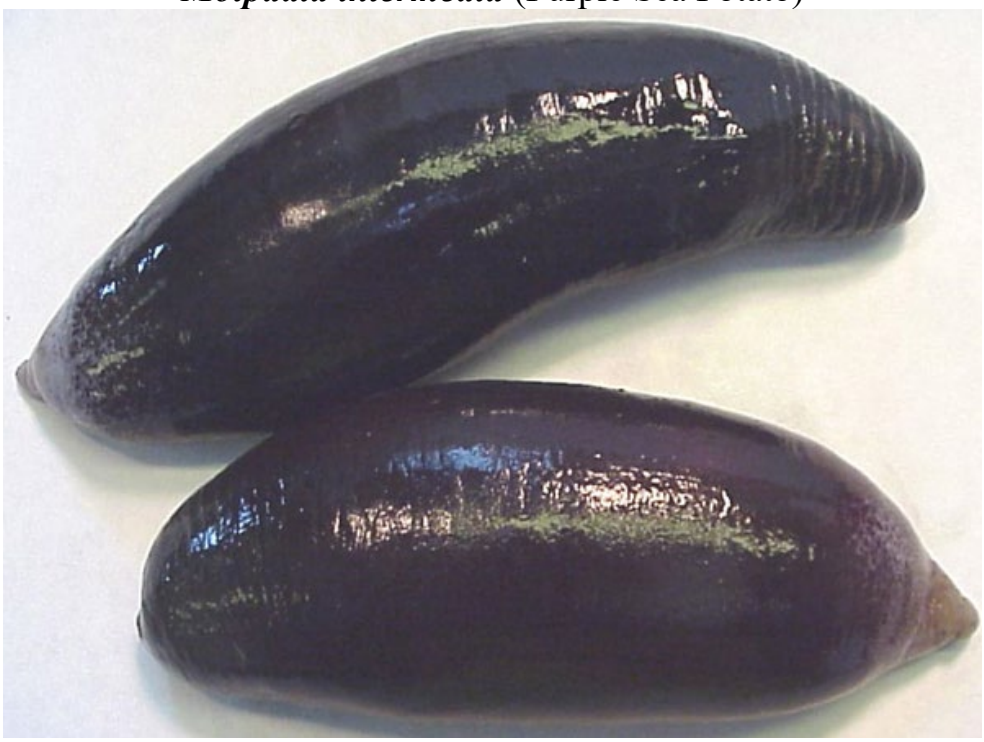
Description
The dorsal surface is covered with overlapping reddish orange calcareous plates. The orange ventral side is soft and without plates. The mouth is on the dorsal surface away from the anterior end and is surrounded by 10 bright red, equal length, retractable tentacles. Length to 7 cm.
Similar species
Psolus squamatus is white to pink with a translucent ventral side.
Distribution
The Pribilof Islands and the Gulf of Alaska to Baja California, intertidal to 247m.

Sea Cucumbers

Pentamera spp. (Crescent Sea Cucumber)

Description
This is a sea cucumber with a distinctly bent or crescent-shaped body and five rows of tube feet. The tentacles are dendritic (branching) and the body is white or pink. Length to about 8 cm.
Similar species
The bent shape of *Pentamera* spp. is a distinguishing characteristic.
Distribution
Alaska to Baja California, intertidal to 500.

Molpadia intermedia (Purple Sea Potato)



Description
The smooth body of this cucumber tapers abruptly to a short tail-like structure that can be a quarter the body length. The color varies from dark purple to purplish brown to purplish gray sometimes with brown patches. There are no tube feet. A tight ring of 15 small (2-3 mm) tentacles with a single pair of lateral branches just below the tip surround the mouth. Contracted length to 14cm.
Similar species
Not likely to be confused with other species due to the purple color, smooth body and tail-like structure.
Distribution
Alaska to California, 50-2800 m.

Sea Cucumbers

Paelopatides confundus (Deep-sea Swimming Sea Cucumber)

Description

This is an oval, dorso-ventrally compressed, sea cucumber with two rows of reduced, pale papillae on the dorsal side. It is dark purple in color. Length to about 25 cm.

Similar species

Not likely to be confused with other species.

Distribution

Bering Sea, Alaska to southern California, 1500 m and below.

Salps Thaliacea

Thaliaceans are free-living, planktonic animals that are colonial or solitary. There is an external polysaccharide body covering, or tunic, giving these animals a rigid texture. Solitary salps have partial muscular bands that contract to create water flow for filter feeding as well as locomotion. Reproduction can be sexual or asexual, and some species alternate between colonial and solitary forms between generations.

Pyrosoma atlanticum (Sea Tongue)

Description

Pyrosoma spp. are colonial cylinder-shaped Thaliaceans with one open end. They are compressed dorso-ventrally when dead. Water flows in through the colonial zooids and out through the buccal siphon (open end). The color is brown or purple. Length to about 20 cm.

Similar species

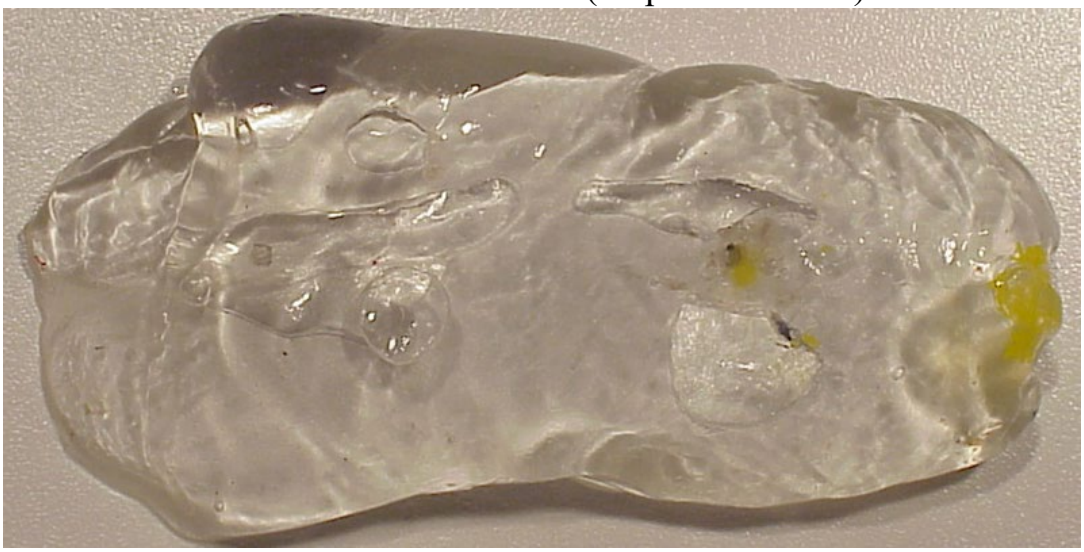
The compressed, colonial shape should distinguish this animal.

Distribution

Cosmopolitan, warm to temperate seas, pelagic 0-750 m.

Salps

Thaliacea unidentified (Salp unidentified)



Description

This solitary Thaliacean is firm and gelatinous with a yellow spot. Length to 8 cm.

Similar species

There are many species of salps. Salps may be confused with jellyfish, but are firmer and have a definite shape.

Distribution

Bering Sea to Mexico, pelagic, 0-300 m possibly deeper.

Thetys vagina (Rabbit-eared Salp)

Description

This solitary salp, the largest on the US West coast is transparent except for the two appendages and gut which are, green, purple or black. Length to 24 cm.

Similar species

Not easily confused with other species.

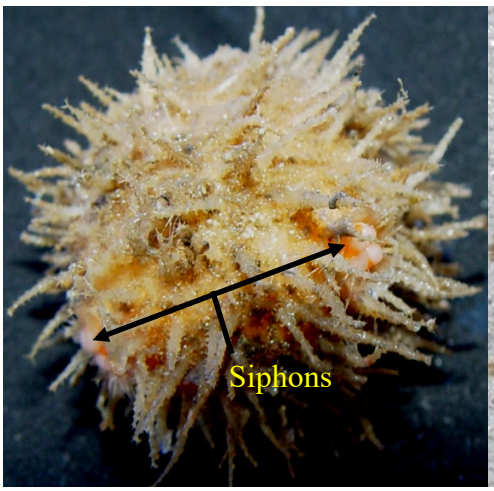
Distribution

California to Panama, 0-250 m.

Tunicates Tunicata

Ascidiaceans (tunicates) are usually sessile as adults and covered by a secreted layer of epidermal cells, or 'tunic.' There are two siphons, the incurrent siphon marking the anterior region, and the excurrent marking the dorsal region of the body. The water current created by these siphons brings in food particles that are captured by cilia and transported to the stomach. Ascidians are solitary or colonial and have pharyngeal gill slits, which classifies them as chordates.

Halocynthia igaboja (Spiny Tunicate)



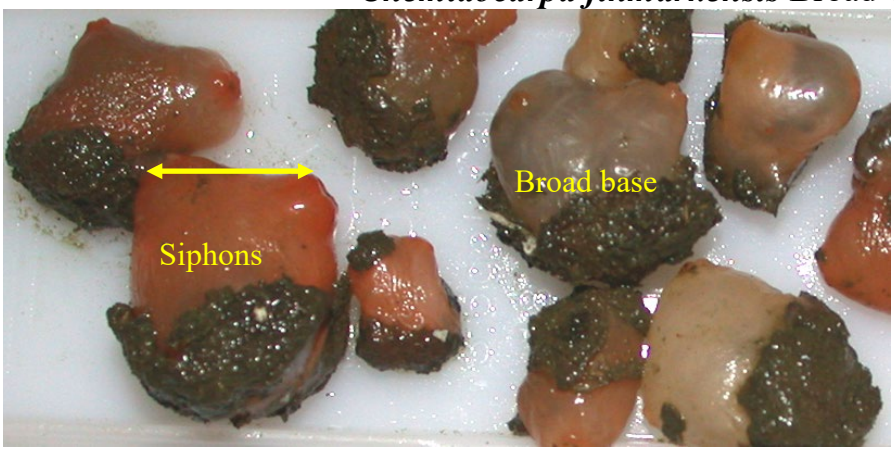
Description
The tunic (outer epidermis) of this small, firm tunicate bears long setae. The tunic is brown, green, or yellow with orange or pink siphons. Diameter to 5 cm.
Similar species
Ball sponges lack setae.
Distribution
Alaska to Oregon 30-400 m.

Halocynthia aurantium (Sea Peach)

Description
This firm, inflated tunicate has two distinguishable siphons narrow base and a long, wide orange, pink, or peach body. Diameter to 5 cm.
Similar species
Cnemidocarpa finmarkensis are short with a broad base.
Distribution
Bering Sea to California, 1-100 m.

Tunicates

Cnemidocarpa finmarkensis Broad-base Tunicate



Description
This firm, inflated shiny red to orangeish red tunicate has two siphons, a broad base and short body. Diameter to 5 cm height to 4-5 cm.
Similar species
Halocynthia aurantium has a small base and long wide body.
Distribution
Bering Sea to California, 1-100 m.

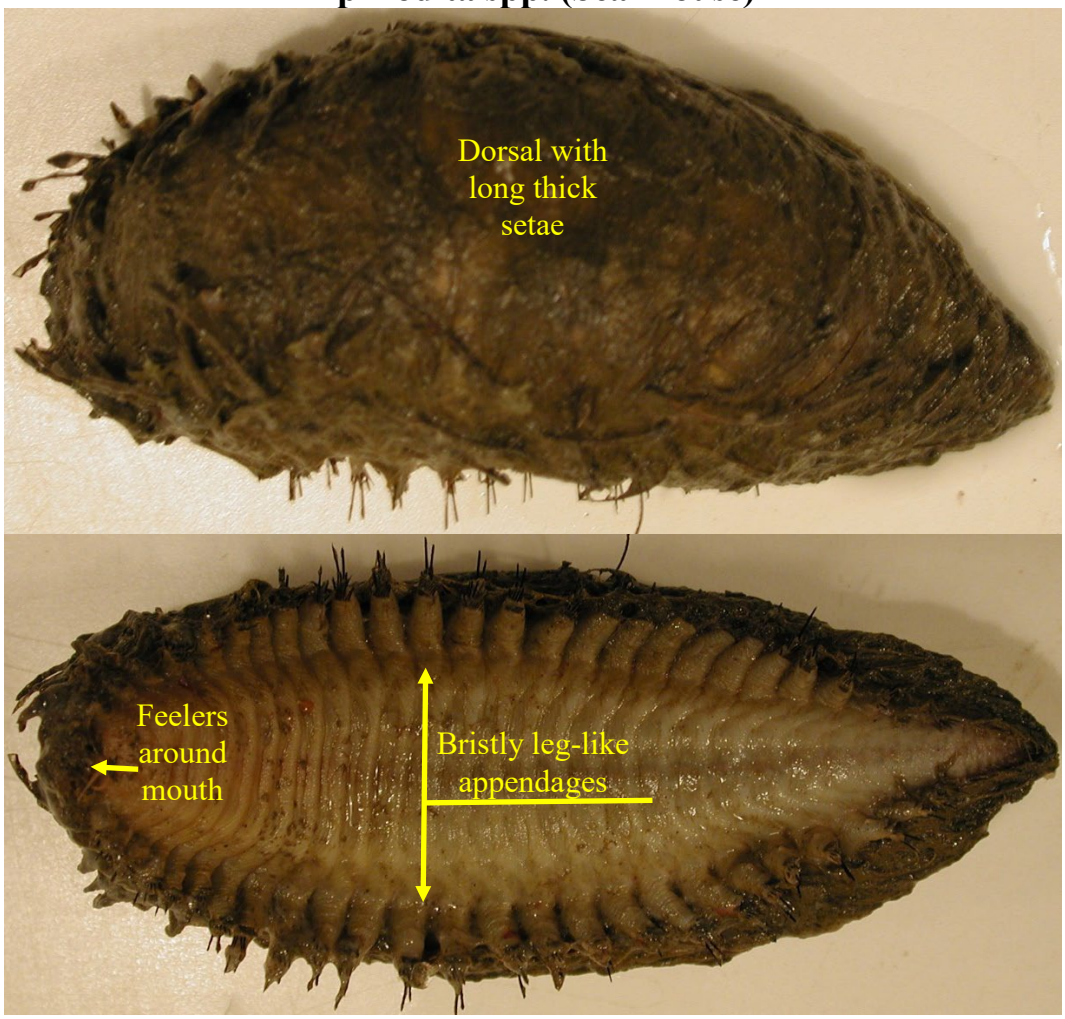
Ascidiacea Unidentified

Description
These social or colonial tunicates are clusters of cylinder shaped animals attached to the substrate and connected by tubes called stolons. Individuals in the cluster range from approximately ½ to about 5 cm. The color is generally a yellowish green but ranges from green to orange. Identification in the field is highly problematic.
Similar species
Many closely related genera and species of solitary and colonial ascidians exist in the area making field identification problematic.
Distribution
Found in all intertidal to deep sea marine environments.

Culeolus spp. Stalked Tunicate

Description
This tunicate is often caught in large numbers hanging off the net. The body has a rough texture and is white or clear in color, with rows of pustules. The stalk which anchors it to the seafloor is up to 50 cm long. Body to 20 cm diameter, overall up to 70 cm long.
Similar species
There are several closely related species of *Culeolus* making field identification problematic.
Distribution
800 m and deeper.

Worms
Segmented Worms Annelida
Aphrodita spp. (Sea Mouse)



Description
Found on soft and/or sandy substrates often with its head buried in the sand. The body tapers to a point posteriorly. The rounded and slightly arched dorsal surface is covered with a dense mat of long (up to 2.5 cm) hair-like setae. There are 2 pairs of feeler-like appendages near the mouth. Locomotion is by small bristly leg-like appendages. Length to 30 cm.

Similar species
What's in a name? The name of the genus, *Aphrodita*, is derived from Aphrodite, the Greek goddess of love and beauty. The common name sea mouse comes from its mouse-like appearance. Either way it's not likely to be confused.

Distribution
The Arctic, North Atlantic and North Pacific Oceans, 1-3000 m.

Index

Index

C

Index

Index

Index

Index

Index

Index

Index

Index

Index

Index

Index

Index

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