
Scleroplax granulata

A burrow-dwelling pea crab

Phylum: Arthropoda, Crustacea

Class: Multicrustacea, Malacostraca, Eumalacostraca

Order: Eucarida, Decapoda, Pleocyemata, Brachyura,
Eubrachyura, Thoracotremata

Family: Pinnotheroidea, Pinnotheridae, Pinnotherinae

Taxonomy: The monotypic genus *Scleroplax* was erected for *S. granulata* in 1893 by Rathbun, but its systematic position was controversial until it was recently confirmed, elevated and separated from *Pinnixa* based on characters of the carapace and third maxilliped (Campos 2006).

Description

Size: Up to 11 mm (males) and 12.9 mm (females) in width (California, Garth and Abbott 1980). The illustrated specimen (female from Coos Bay) is 5.5 mm in width (Fig. 1). Males can be larger than females (MacGinitie and MacGinitie 1949), an unusual characteristic among pea crabs.

Color: The illustrated specimen is dark gray with light outlines and red eyes. Males are light tan and orange (Bodega Bay Harbor, CA, Garth and Abbott 1980).

General Morphology: The body of decapod crustaceans can be divided into the **cephalothorax** (fused head and thorax) and **abdomen**. They have a large plate-like carapace dorsally, beneath which are five pairs of thoracic appendages (see **chelipeds** and **pereopods**) and three pairs of maxillipeds (see **mouthparts**). The abdomen and associated appendages are reduced and folded ventrally (Decapoda, Kuris et al. 2007).

Cephalothorax:

Eyes: Oval and small. Eyestalks very short and thick with orbits small.

Antenna:

Mouthparts: The mouth of decapod crustaceans comprises six pairs of appendages including one pair of mandibles (on either side of the mouth), two pairs of maxillae and three pairs of maxillipeds. The maxillae

and maxillipeds attach posterior to the mouth and extend to cover the mandibles (Ruppert et al. 2004). In *S. granulata* the outer maxillipeds have 3-jointed palps where third article is joined to second proximally, not distally (Fig. 3). A winged extension is present on the merus (Rathbun 1918). Characteristics of the third maxilliped are taxonomically important for this species. The propodus of the third maxilliped extends to the end of the dactyl rather than in *Pinnixa* where the dactyl extends beyond the short propodus (Campos 2006).

Carapace: Rounded carapace. Oval, smooth, hard, convex and granular. Male carapace smoother than females. Carapace width almost 1½ x length (Kozloff 1974). Antero- and posterolateral edges are rounded and curve to meet gradually, without distinct angles (*Scleroplax*, Rathbun 1918).

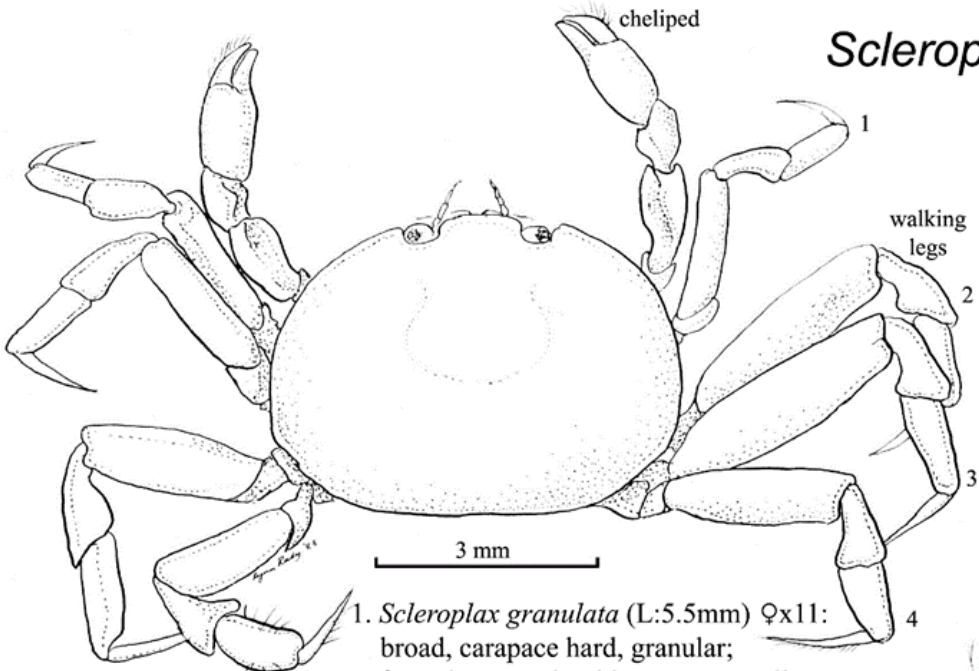
Frontal Area: Frontal area entire, blunt, slightly convex with no teeth between eyes.

Teeth:

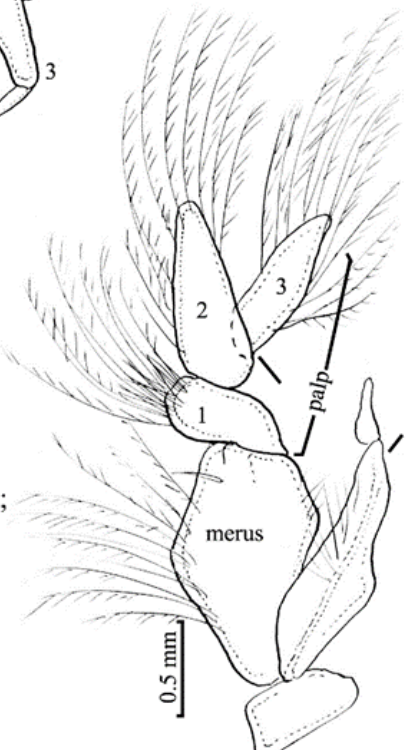
Pereopods: Legs 2–5 very short (Rathbun 1918), they are slender, somewhat rounded (Kuris et al. 2007) and with slender dactyls. First walking legs are smaller than second while the third is longest (slightly). The fourth walking legs are not greatly smaller than others (Figs. 1, 4).

Chelipeds: The chelipeds of females are small, feeble, with thumb horizontal, tip acute and fingers not gaping (Fig. 1). Male chelipeds, on the other hand, are prominent, large and very wide. Their dactyls are curved, smooth, gaping and their propodus is with granulate surface and convex margins.

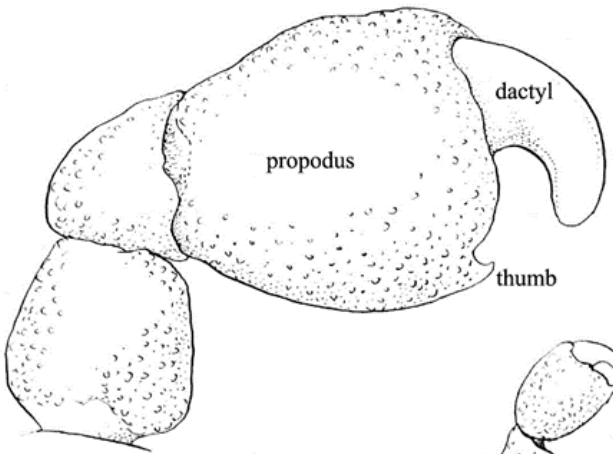
Scleroplax granulata



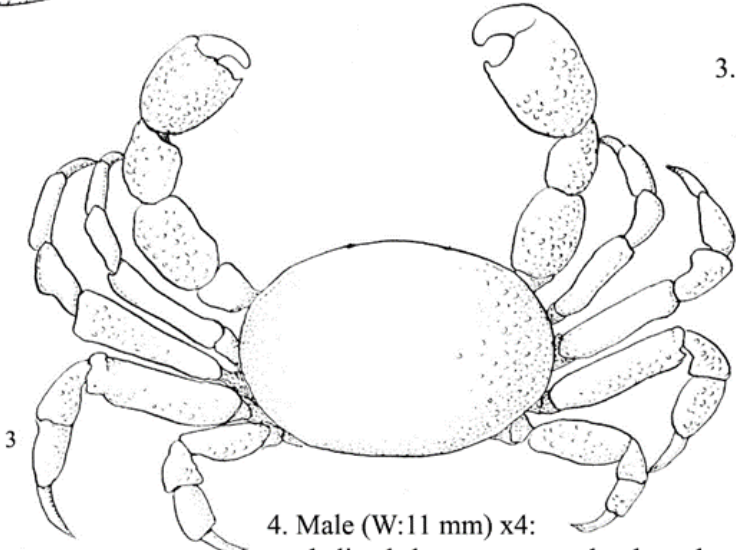
1. *Scleroplax granulata* (L:5.5mm) ♀x11: broad, carapace hard, granular; frontal area entire, blunt; eyes small; antero- and posterolateral edges rounded; chelipeds feeble, walking legs slender, rounded, similar.



3. Outer maxilliped x28: palp: 3rd article joined to 2nd proximally; winged extension on merus.



2. Cheliped ♂ x40: dactyl curved, fingers gape; propodus margins convex; thumb short.



4. Male (W:11 mm) x4: chelipeds large; carapace hard, oval, granular; 3rd walking slightly longest (from Morris et al 1980, Pl. 186).

Thumb is shorter than wide and bears one large tooth (Garth and Abbott 1980) (Fig. 2).

Abdomen (Pleon): Female abdomen is wide, smooth, fringed with hair and not reaching beyond sternum (Schmitt 1921). Male abdomen is narrow and tapering gradually (Schmitt 1921) (see *Pinnixa faba*, Fig. 5).

Telson & Uropods:

Sexual Dimorphism: Male and female brachyuran crabs are easily differentiable. The most conspicuous feature, the abdomen, is narrow and triangular in males while it is wide and flap-like in females (Brachyura, Kuris et al. 2007).

Possible Misidentifications

All members of the Pinnotheridae are small, have a wide, rounded carapace, small eyes, and short eyestalks. There are 15 pinnotherid species reported from central California to Oregon (Kuris et al. 2007). Pea crabs are very particular to a specific habitat and/or host (see *Pinnixa faba*). The genus *Scleroplax* is monotypic and characterized by a hard, subheptagonal and convex carapace. Additional characters include a third maxilliped with propodus that extends to the end of the dactyl (Campos 2006).

Pinnixa, *Opisthopus* and *Scleroplax* all have a large maxillipedal palps and a wide carapace. *Opisthopus transversus* has a carapace just a little wider than long and walking legs that are sub-equal, the second being slightly longer than the others. Its hosts are nearly always molluscan (Garth and Abbott 1980) and it has not been reported north of Monterey, California (Schmitt 1921).

Most local pea crab species are in the genus *Pinnixa*: *P. littoralis*, is often found in the clam *Tresus capax*; *P. longipes*, with exceptionally large third walking legs, is commensal with tube worms; *P. barnharti*, is commensal with a holothurian; *P.*

occidentalis, with cylindrical fourth and fifth walking legs, is found in echiuroid worm burrows and associated with *P. franciscana*, *P. tubicola*, and *P. schmitti*, species also found in worm burrows and tubes. *Pinnixa* species have third walking legs markedly longer than the others (not just slightly longer as in *Scleroplax* (Kuris et al. 2007)) and third maxillipeds with propodus shorter than dactyl (they are of equal length in *Scleroplax*) (Campos 2006). Their carapace is membranous, not hard, and it has a distinctive angle where the antero- and posterolateral carapace margins meet – in contrast to the rounded margins of *Scleroplax*. *Pinnixa franciscana*, a large (to 22 mm wide) crab, with a broad carapace with pointed sides, a sharp line of granules on the cheliped propodus and a widened merus on the third walking legs (Garth and Abbott 1980), are also found in *Neotrypaea* or *Upogebia* burrows with *Scleroplax*. The carapace has a granular cardiac ridge, curved teeth along the anterolateral margin and a conspicuous subhepatic tooth in *P. scamit*. Little is known about the final species, *P. weymouthi* (Kuris et al. 2007). *Pinnixa schmitti* (Rathbun, 1918) occurs from Alaska to San Francisco Bay (Garth and Abbott 1980). It lives in well-drained loose beach material, not with any particular host (Wells 1940), but in tubes, cavities or burrows within 5 cm of the surface. It has a low tooth on the inner margin of the cheliped dactyl (Kozloff 1974). The dactyls of its fourth walking legs are longer than those of the third pair (Kozloff 1974) and carapace is about 1¾ times wider than long, and tapers laterally, unlike that of *Scleroplax*, which is rounded.

The other local pinnotherid genera include *Pinnotheres* (symbiotic with oysters), *Parapinnixa* (symbiotic with polychaetes *Terebella californica* and *Loimia*), *Fabia* (symbiotic with bivalves, especially *Mytilus*) *Opisthopus* (symbiotic with various molluscs

including *Tresus*, and some holothurians). *Parapinnixa* is a southern California genus with a wide carapace, and legs that diminish greatly in size (unlike those of *Scleroplax*).

Ecological Information

Range: Type locality is Ensenada, Baja California, Mexico (Campos 2006). Range includes the north end of Vancouver Island, B.C. south to El Coyote estuary, Punta Abreojos, Baja California Sur, Mexico (Campos 2006; Campos and Campos 2012).

Local Distribution: Coos Bay distribution at several sites. The illustrated specimen is from Jordan Cove (North Spit). Distribution also includes other Oregon estuaries. Attempts to find *S. granulata* in Coos Bay have proven ineffective (Puls 2002).

Habitat: Sandy mud and mudflats of protected bays (Garth and Abbott 1980). Free-living in burrows with *Neotrypaea* (= *Callinassa*) or *Upogebia*, etc. (see **associates**), where it uses protection of burrow, and food and oxygen circulating there. Males migrate between burrows (Garth and Abbott 1980).

Salinity: Occurs with *Neotrypaea*, which is found at salinities from 35–30 (Coos Bay).

Temperature:

Tidal Level: Mid to low intertidal to 55 m (Garth and Abbott 1980; Jaffe et al. 1987).

Associates: *Scleroplax granulata* can be found in burrows of *Neotrypaea* or *Upogebia*. It is also found in the burrows and, sometimes, clinging to the body of the echinoid, *Urechis caupo* in the southern part of its distribution. *Scleroplax granulata* is among those pea crabs least intimately associated with its host (Wells 1940) where it is a commensal, not parasitic, species (compare to *Pinnixa faba*). Additional associates include the goby, *Clevelandia ios*, the polynoid polychaete, *Hesperonoe*, which clings to burrow walls to escape *Scleroplax*

(MacGinitie and MacGinitie 1949). Bryozoan *Walkeria* lives on legs of *Scleroplax* and bryozoan *Triticella elongata* is on its carapace, appendages and in gill cavities (Garth and Abbott 1980). *Scleroplax* has also been observed with *Mya arenaria* (Friday Harbor, WA, Rathburn 1918).

Abundance: Up to six individuals per burrow, but can also occur singly. *Scleroplax granulata* is the most prevalent of all commensals with *Upogebia* (Garth and Abbott 1980).

Life-History Information

Reproduction: All decapod crustacean females attach recently laid gelatinous egg masses to their pleopods. The outer embryo membrane thickens and a strand develops that attaches each embryo to pleopod setae (Decapoda, Kuris et al. 2007). Egg-bearing female *Scleroplax granulata* have been observed from January to March in California and Oregon (Jaffe et al. 1987). Most larval release occurs at twilight (Rasmuson and Morgan 2013).

Larva: The larvae of pinnotherids proceed through planktonic prezoaea, zoea (two stages) and megalopa stages. The zoea have large compound eyes and four spines: one each dorsal and rostral and two lateral (see Fig. 54.5, Martin 2014). The most definitive feature of pea crab zoea is the fifth abdominal segment, which is expanded laterally (see <http://invert-embryo.blogspot.com/2012/04/identifying-pinnotherid-larvae.html>; Puls 2001). The specific larval morphology of *S. granulata* has not been described.

Juvenile:

Longevity:

Growth Rate: Growth occurs in conjunction with molting. In pre-molting periods the epidermis separates from the old cuticle and a dramatic increase in epidermal cell growth occurs. Post-molt individuals will have soft shells until a thin membranous layer is deposited and the cuticle gradually hardens. Dur-

ing a molt decapods have the ability to regenerate limbs that were previously autotomized (Kuris et al. 2007).

Food: Ingests food that falls into burrow and particles brought by goby *Clevelandia*. Also screens material with second maxillipeds (Garth and Abbott 1980).

Predators:

Behavior: Males move around among burrows and are known to exhibit a "possum" posture for up to two minutes if disturbed (Garth and Abbott 1980).

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