
Littorina scutulata

The checkered littorine or periwinkle

Phylum: Mollusca

Class: Gastropoda, Caenogastropoda

Order: Littorinimorpha

Family: Littorinoidea, Littorinidae, Littorininae

Taxonomy: Although originally described as separate species by Gould in 1849, *Littorina scutulata* and *Littorina plena* were synonymized in 1864 and only became recognized as two separate species again in 1979 (Murray). Illustrations in this guide utilize the same figures for both *L. scutulata* and *L. plena*.

Description

Size: *Littorina scutulata* is generally larger than its morphologically similar congener, *L. plena*, with average height ~11.5 mm. Individuals can reach a shell size up to 17 mm; this specimen (from Coos Bay) is 9 mm in length (Fig. A1). At settlement, individuals are ~ 350 µm.

Color: Color and patterns can be variable but shell exterior is most commonly checkered, and can cover a range of colors including dark brown, purple, green, black and white. Other possible patterns include splotches, zig-zags, fine vertical and/or horizontal etched banding, or various combinations of these. Never with strong spiral sculpture and many specimens are eroded or encrusted with algae depending on the local habitat (e.g., protected shore vs. wave-exposed shore). The interior of the shell is nearly always purple (Keep and Longstreth 1935).

General Morphology: Shelled gastropods can crawl and burrow using a muscular **foot** and have a head with **eyes** and **tentacles**, a mantle (which secretes the **shell**) and a **radula** that is composed of many teeth for tearing and rasping algae. Gastropods are characterized by torsion, where the body rotates early in development such that the

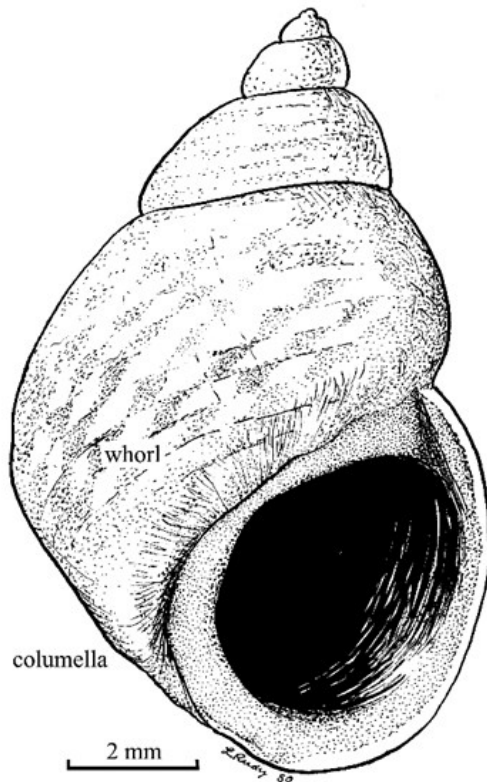
visceral mass (e.g., anus, mantle cavity) is directly above the foot (rather than posterior to) (McLean 2007). The Littorinoidea are small-shelled snails with a rounded peristome (see Plate 378, Reid 2007). Two local species in the family Littorinidae, *Littorina scutulata* and *L. plena*, are morphologically very similar and differentiating them requires examination of penis morphology (see Fig. B2, supplemental images on our website, and **Possible Misidentifications** in this text).

Shell: The pattern on a typical *L. scutulata* has blue-green checks with a brown undertone and larger checks as opposed to the smaller checks of *L. plena* shells. Individuals exhibit a range of shell patterns and colors including a solid purple/black, although to a lesser degree than *L. plena* (Reid, 1996). Other reported differences include the presence of a basal ridge and a distinct light-colored basal band in the body whorl of *L. scutulata* which is absent in *L. plena* (Rugh, 1997; Hohenlohe and Boulding, 2001). Shells should be wet to fully examine colors and patterns.

Shape: Shells are conical in shape, with four whorls, lacking a columellar groove (inner lip) or chink. The shells of *L. scutulata* are large and narrow, with a tall spire and narrower aperture (Hohenlohe and Boulding 2001) (Fig. A1). Shell shape is known to vary depending on local conditions; e.g., snails on wave-exposed shores have shorter, thinner shells with a larger aperture (allows a larger foot to help prevent dislodgment) whereas snails on protected shores have larger, thicker shells with a smaller aperture (reduces predation by crabs, Rugh 1997)

Figure A

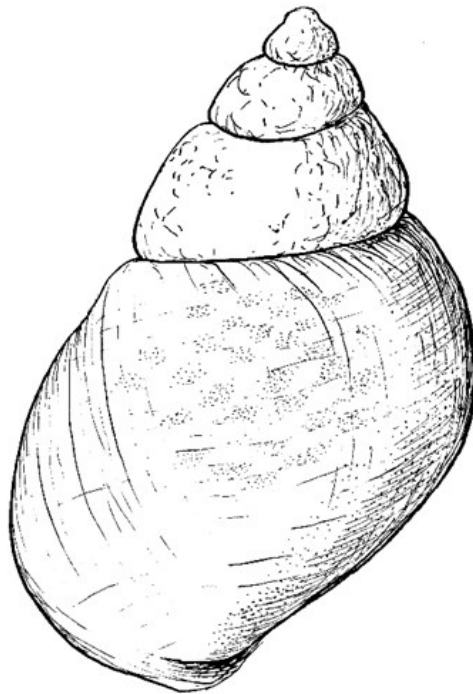
Littorina scutulata and *plena*



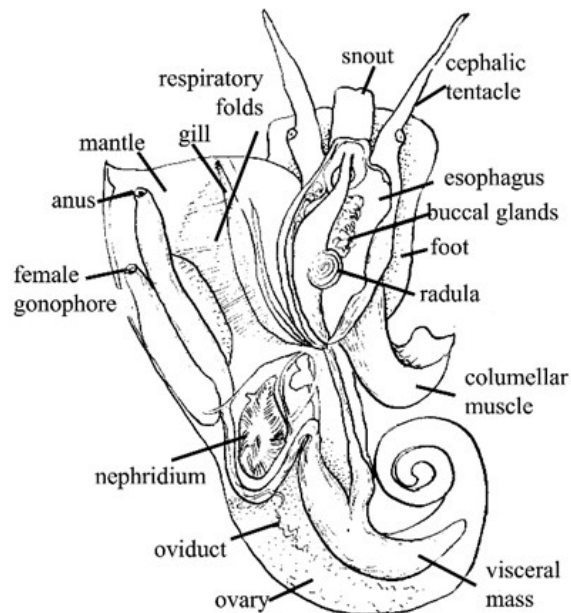
1. *Littorina scutulata* and *plena* (anterior view, H: 9mm) x12: conical, four whorls; no columellar groove; surface checkered, interior purple.



1a. Operculum.



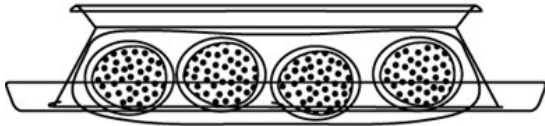
2. (Posterior view) x12.



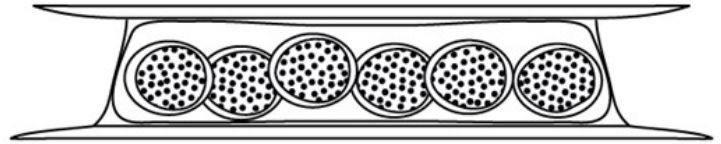
3. Dissection of female *Littorina* sp.: mantle cut, turned over (Hyman, 1967; Souleyet, 1852).

Figure B

Littorina scutulata and *plena*



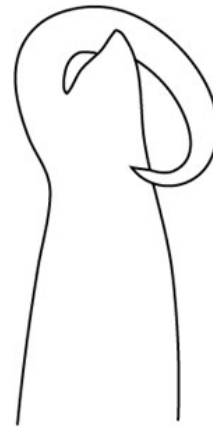
1a. *L. scutulata* egg case.



1b. *L. plena* egg case.



2a. *L. scutulata* penis.



2b. *L. plena* penis.



3a. *L. scutulata* tentacle.



3b. *L. plena* tentacle.

Illustration by Jenna Valley

Interior: *Littorina* spp. lack posterior or metapodial tentacles, having only cephalic tentacles (Carlton and Roth 1975) (see dissection, Fig. A3).

Exterior:

Columella:

Umbilicus:

Aperture:

Outer Lip:

Operculum: Solid, horny, and brown operculum with spiral lines originating in the bottom half (Fig. A1a).

Body:

Tentacles: The tentacles of *L. scutulata* have incomplete transverse bands (often alternating) with flecks (Fig. B3).

Eyes:

Siphons:

Radula:

Foot:

Possible Misidentifications

Snails in the genus *Littorina* (family Littorinidae) are very common members of the intertidal, however their variation in shell morphology renders species difficult to differentiate. Species level identification requires examination of the penis and pallial oviduct (Reid 1996, 2007, Fig. B2 and supplemental images on our website). A similar but smaller genus of another family is *Lacunana*, the small 'chink' shell, which has a groove, or chink, between the large whorl and the columella; *Littorina* lacks this groove. The Lacunidae are often found in eelgrass, (*Littorina* is not), and are never in the upper intertidal area, as *Littorina* often is (Kozloff 1974a).

There are seven species in the genus *Littorina* locally. Of those species, at least three have solid shell, and the absence of columellar groove found in *L. plena*. *Littorina planaxis* is an inhabitant of the outer intertidal rocks, although found in Puget Sound, and in more marine parts of

Oregon's estuaries (occasionally). It is stout and globose, and usually larger than *L. scutulata* (Brusca and Brusca 1978), with a broad, flat, polished columella (Keep and Longstreth 1935). *Littorina planaxis* is essentially a southern form, although it does occur occasionally in Puget Sound (Kozloff 1974b), and its niche is generally taken over northwards at about Cape Arago, Oregon, by *Littorina sitkana* (Ricketts and Calvin 1971). *Littorina sitkana*, a fat, globose littorine, has a rounded columella, strong spiral ridges on its whorls and can be white to black, but is often a yellowish brown (Keep and Longstreth 1935). A smaller variety was formerly called *L. rudis*. It can be strongly striped, or rough and striated. It is fairly common in salt marshes, and can be up to 15 mm tall (Kozloff 1974a).

Littorina (Algamorda) newcombiana (= *subrotundata*) is a small, rare, salt marsh littorine originally thought to be a freshwater snail. It is light-colored, with four rounded whorls, usually striped; the shell is smooth, thin and covered with a brown periostracum and the aperture is almost circular. It is only about 5 mm long, and has a simple gap, (not a groove) between the whorl and the columella (Keen and Coan 1974). It is found quite high in the intertidal area of the marsh.

Littorina littorea, is an Atlantic species introduced into California bays 100 years ago; it is quite thick-shelled, globose and colored brown to black, with fine dark spiral bands (Abbott 1968). This species has not yet been reported from Oregon (Carlton and Roth 1975).

Ecological Information

Range: Type locality is Puget Sound, Washington (Mastro et al. 1982). Known range from Sitka, Alaska to Cabo San Lucas, Baja California.

Local Distribution: Local distribution in outer coast and bays including Coos Bay, South Slough, and the Siuslaw River, near Florence

(Matthews 1979).

Habitat: Snails are often found on rocks and pilings on both the rocky outer coast and protected shores, however, *L. scutulata* is reported to be most abundant on the outer coast and is rarely, if ever, found in eelgrass (Kozloff 1974a). Individuals are very tolerant of near-terrestrial conditions (Brusca and Brusca 1978).

Salinity: Found near full sea water on the open coast, as well as in conditions of somewhat reduced salinity (Carlton and Roth 1975). This species does not penetrate upper (and fresher) parts of estuary (Coos Bay). The salinity tolerance ranges from 22–24 (Brusca and Brusca 1978).

Temperature: Occurs over a wide range.

Tidal Level: Individuals are not found more than a few feet above high tide line but are found at higher levels in salt marshes (Kozloff 1974b). *Littorina* spp. are "just above the reach of the waves, along the shores of the entire bay" (San Francisco, California, Packard 1918).

Associates:

Abundance: Individuals are relatively common in rocky areas (Brusca and Brusca 1978). *Littornia plena* and *L. scutulata* are probably the most common littorine in bays, as well, at least in more open coastal habitats.

Life-History Information

Reproduction: Dioecious (separate sexes) with internal fertilization and most copulation occurs in spring and summer, *en masse*, with a spawning season of April to early October. Sexual maturity occurs when shells are ~2–3 mm in height (by 1 yr of age) and produce negatively-buoyant pelagic egg cases, the morphology of which can be a reliable species indicator (Fig. B1 and supplemental images on our website). At 12–14°C, *L. scutulata* veligers hatch after 9

days with an initial size of ~145 µm. The planktonic period of the planktotrophic veligers can last 4+ weeks, although competency to settle can be reached by 3 weeks (Hohenlohe 2002). Fecundity reports vary but *L. scutulata* has been found to be capable of producing an average of 7,000 eggs over a two-week period (Murray, 1979; Hohenlohe, 2002). Egg cases contain pink embryos, although other colors in different regions have been reported (Buckland-Nicks and Chia, 1973) and random color variations within a region are sometimes encountered. *Littorina scutulata* capsules are smaller than *L. plena* at ~800 µm in diameter, with one rim noticeably larger than the other (the smaller rim often being upturned slightly), and have ~1–11 embryos (compared to up to 47 embryos in *L. plena*) (Fig. B, 1a and supplemental images on our website). A third egg case is also produced and exhibits a morphology with only one rim. The number of embryos per capsule may vary geographically (Hohenlohe 2002). The penis can be observed by grasping the spire of a submerged snail positioned aperture-up, providing a surface for the snail to grab onto (e.g., probe), and gently pulling away. The penis is orange-pink in color and is attached just behind the base of the right tentacle. The penis in *L. scutulata* gradually tapers with a very slight bifurcation at the tip (Fig. B2 and supplemental images on our website). The pallial oviduct in females is also distinctive but requires removal of the shell to be seen.

Larva:

Juvenile:

Longevity: The lifespan of *L. scutulata* is estimated to be at least 7 years (Behrens 1974).

Growth Rate: Under favorable conditions, *L. scutulata* can increase its bodyweight by 7% in 2 months (Behrens, 1974).

Food: Herbivorous. Littorines use their radula to rasp microscopic (e.g., *Endocladia*, unicellular green and blue green algae,

diatoms), and particularly macroscopic (e.g., *Cladophora*, *Pelvetia*, *Rhodoglossum*) algae from rocks (Castenholz 1961; Dahl 1964).

Predators: Crabs, fish, birds, and predatory gastropods.

Behavior: Individuals live in a "home territory", i.e., they stay in a small area near a certain pool and "emerge by night, and submerge by day." (Abbott and Haderlie 1980). Snails are generally active when submerged and are often found clustered in groups and/or in crevices during the low tide.

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