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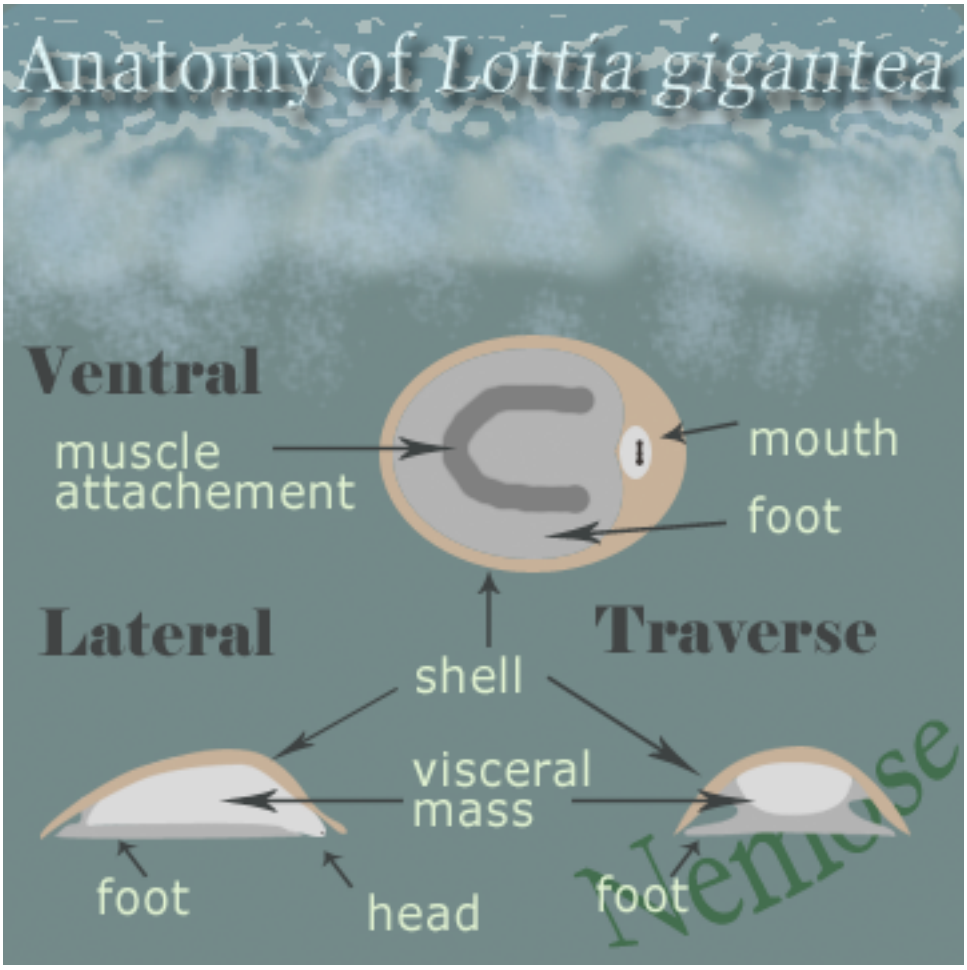
Lottia gigantea, Owl Limpet

Taxonomy

cellular organisms - Eukaryota - Fungi/Metazoa group - Metazoa - Eumetazoa - Bilateria - Coelomata - Protostomia - Mollusca - Gastropoda - Eogastropoda - Docoglossa - Nacellina - Acmaeioidea - Lottiidae - Lottia - Lottia gigantea



Brief facts

- Limpets inhabit wave-pounded rocks. They not only occupy one of the most physically stressful environments on earth but also have to undergo the heat and desiccation between tides.
- *Lottia gigantea* is common along the coast of North America from Washington state to Baja California. It can be found on vertical rocky shores firmly attached to the substratum with its muscular foot that fills most of the aperture area of its shell. Water currents apply huge multi-directional forces to inhabitants of the ecological niche. Still, limpets are very hard to dislodge. This ability of limpets was extensively studied. Secreted mucus as well as suction of the foot are believed to play a critical role in the attachement. Interestingly, it was found that in spite of millions years of evolutionary pressure the shell's shape is often is not optimal for withstanding the

water forces. This is because the shell's shape helps the mollusks in other aspects of their survival.

- *Lottia gigantea* is a solitary limpet (as opposed to aggregating limpets). Algae that grow on the rocks are its main food source. Distinct behavioral characteristics of the Owl Limpet is that it is aggressively territorial and uses its shell as a bulldozer to clean the space for the algae to flourish. Mytilid mussels, barnacles, and anemones are Lottia's primary competitors for space. When faced with other herbivores, competitors for food, such as *Acmaea*, *Tegula*, or other limpets, Lottia tries destabilize the intruder by pushing and hitting it in the foot to increase the probability of the intruder getting washed off by a wave.
- It was found that mucus secreted by some limpet species, including *Lottia gigantea*, stimulates growth of the microalgae. It also serves as adhesive traps for the algae.
- Because of their large size and strong adhesive tenacity, adult L. gigantea appear to be immune to predation by birds and crabs.
- When confronted with a predator, such as predatory sea star *Pisaster ochraceus*, oyster *Thais marginata*, or sea snail (angular unicorn) *Acanthina spirata*, Lottia responds by a behavior known as **mushrooming**, which consists of raising its shell up and rocking it in a menacing manner, and later bringing the anterior end of the shell down on the foot of the predator so that the latter retracts its foot. In consequence, Lottia manages to weaken the attachment of the predator, making it more susceptible to dislodgement by waves.
- The shell of the Owl Limpets reaches 4-8 cm (up to 9 cm) in length. The Owl Limpet was harvested by humans as a food item since pre-historic times. The exploitation of natural populations (mostly illegal) continues today. It is believed that the excessive harvesting plays role in diminishing of the size of sexually mature limpets. An analysis of the life history and natural history of this limpet suggests that two factors in particular may be responsible for

the species persistence: the small size at maturity and the pelagic dispersal stage.

Life cycle

- fertilized egg **MeSH**
- embryo
  - cleavage
  - gastrula

dividing egg

- larval
- metamorphosis **MeSH**
- juvenile
- adult

References

PubMed articles

- Connor VM, Quinn JF.Stimulation of Food Species Growth by Limpet Mucus.*Science. 1984 Aug 24* **PMID: 17801153**
- Denny MW, Blanchette CA.Hydrodynamics, shell shape, behavior and survivorship in the owl limpet *Lottia gigantea*. *J Exp Biol. 2000 Sep;203(Pt 17):2623-39.* **PMID: 10934004**

Websites

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- **Rojas J and Ojeda FP, "TERRITORIALITY" Pacific Science (1996)**

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nemose@live.com