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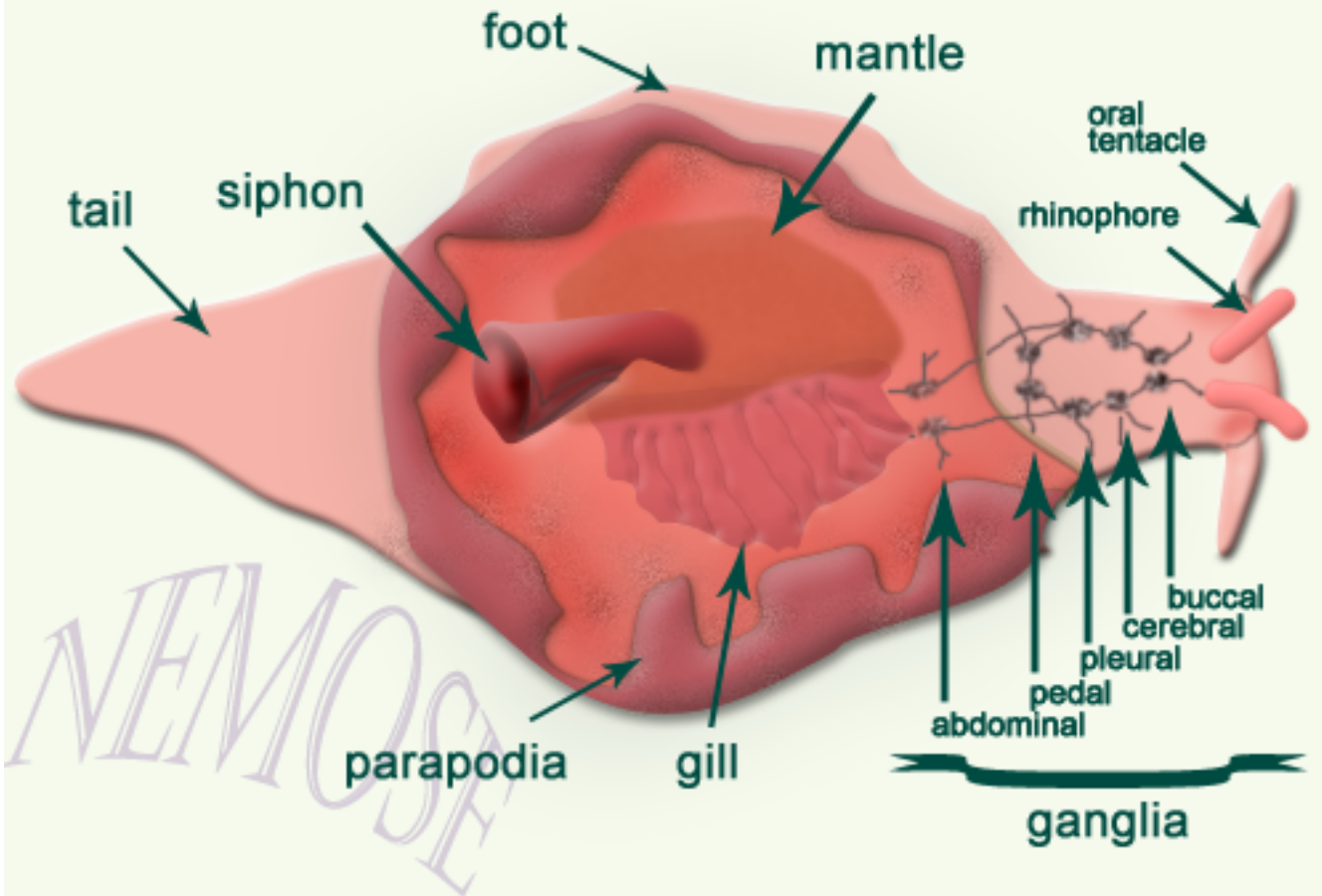
Aplysia californica, sea slug, sea hare

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Taxonomy

cellular organisms - Eukaryota - Fungi/Metazoa group - Metazoa - Eumetazoa - Bilateria - Coelomata - Protostomia - Mollusca - Gastropoda - Orthogastropoda - Apogastropoda - Heterobranchia - Euthyneura - Opisthobranchia - Anaspidea - Aplysioidea - Aplysiidae - Aplysia - *Aplysia californica*

Aplysia californica



Brief facts

- **Aplysia** is an **opisthobranch** (characterized by gills, a shell that is reduced or absent, and two pairs of tentacles) mollusk of the order *Anaspidea*. It is used frequently in studies of nervous system development because of its large identifiable neurons. Aplysiatoxin and its derivatives are not biosynthesized by *Aplysia*, but acquired by ingestion of *Lyngbya* (seaweed) species.
- Adult animal reaches up to 50-60 cm in length and weighs up to 3.5 kg (permanent growth during the life cycle).
- *Aplysia californica* inhabit coastal regions thick with vegetation and have few natural predators. Among them are the giant green anemone, *Anthopleura xanthogrammica* and the spiny lobster *Panulirus*.

***Aplysia* as a neurobiological model**

- Its nervous system has a relatively small number of nerve cells.
- Many of these cells are very large (up to 1 mm in diameter).
- Hundreds of neurons have been uniquely identified at the single cell level and have been linked to the animal's behavior.
- These neurons can be isolated and cultured *in vitro* and they form circuits which can be explored.

Life cycle

Under ideal laboratory conditions generation time of can be as short as 19 weeks.

- **fertilized egg MeSH**

Aplysia is a hermaphrodite; the animal receives sperm from another individual (allosperm) during copulation; the sperm is stored until egg-laying; mature eggs are fertilized in fertilization chamber inside the animal and then released from the reproductive system and deposited on the substrate by the weaving head movements

- **embryo**

movements of the embryos inside the egg capsules can be seen 4-5 days after laying and spontaneous hatching occurs 5-6 days later (at 22 °C)

- **post-hatching**

- **larval**

planktonic stage of post-hatching development; also called **veliger**; at room temperature this

stage takes a minimum 34 days; veliger swim by means of the coordinated beating of long velar cilia; veliger growth reaches plateau after approximately 25 days; at the end of this phase, the larvae settle preferably (debated) on the seaweed *Laurencia pacifica* and metamorphose

- **metamorphosis MeSH**

metamorphosis lasts about 3 days; at this stage major developmental and behavioral changes occur; transition from swimming to crawling (with first appearance of foot extension, or **propodium**) and shedding of the velar cilia marks the onset of metamorphosis; the change from ciliary to radular feeding signals the end of metamorphosis

- **juvenile**

animals develop the mantle shelf which grows over the shell, parapodia, siphon, gill, rhinophores and anterior tentacles; young juveniles acquire a red coloring which later becomes a mottled brown; logarithmic growth continues upto 90 days after hatching, then it tapers and sexual maturity is reached at approximately 120 days after hatching

- **adult**

reproductive maturity is reached at approximately 120 days after hatching

Tissues

- **parapodia**

bilateral extensions of the mantle, winglike flaps that

are used for swimming in some species of *Aplysia* (for example, *A. brasiliana* and *A. fasciata*); *Aplysia californica* is unable to swim and escape danger by "galloping away" and also, secreting brightly colored **ink** and **opaline** that are deemed to have different effects on different predators

- nervous system

- buccal ganglion

the symmetrical buccal ganglia are formed by a limited number of cells, some of which are of a large size; furthermore, they are involved in several definitive functions, i.e., the control of the buccal mass and of the first part of the digestive system posterior to the mouth

- cerebral ganglion

the cerebral ganglia of *Aplysia californica* play an essential integrative role for receiving, transmitting, and processing information originating from the pedal, pleural, buccal ganglia, and peripheral sensory sites such as rhinophores and anterior tentacles

- pedal ganglion

pedal ganglia motor neurons involved in pedal wave generation in the foot of *Aplysia*

- pleural ganglion

pleural ganglia contain sensory neurons which innervate tail

- abdominal ganglion

abdominal ganglia are fused in *A californica* (Kuenzi FM, 1994)

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