

Respiration in Mollusca

The types of respiration found in mollusca are ① cutaneous ② branchial and ③ pulmonary

① Cutaneous or Pallial Respiration ◦ —

Respiration by moist integument or mantle is the simplest method in those mollusca which have no differentiated respiratory organ. Respiration occurs through the whole body surface of the soft skinned parts of the body. It must be very restricted when the body surface is covered with a shell, or when the body is thick and bulky. Cutaneous respiration may also take place through the skin of those molluscs having other respiratory mechanisms. In all bivalves, the inner mantle surface also contributes the oxygenation, although respiration is mainly branchial, through gills.

② Branchial or Ctenidial Respiration ◦ —

True gills or ctenidia — Most of the molluscs are aquatic and respire by means of gills or ctenidia. Gills are the most important of all the pallial organs in mollusca, the ctenidia are projections of the body surface or mantle. Most of the molluscs possess one pair of lamellar ctenidia. Near the ctenidia are found osphradia which test the nature of the incoming water current.

The blood purified in the gills reaches the heart through auricles, so that a close structural relation is found between the two.

Secondary or adaptive gills ◦ —

In certain molluscs, the true ctenidium is absent and other morphologically different structures develop, termed the secondary gills or adaptive gills.

O₂ adaptive gill. Accessory aquatic respiratory organs, O₂ adaptive gills are of different forms. They are —

(a) Anal gills — In Doris, a rosette of delicate feathered and retractile secondary gills surround the anus at the posterior end of the body.

(b) Cerata — In Aeolis, numerous simple or pinnately branched secondary gills or cerata are carried upon the dorsal surface of the body. They are richly vascular, present a variety of beauty and form, serve to protect by concealment are capable of breaking off easily and regenerated quickly. Diverticula of digestive gland open to the exterior at their tips, which also stores stinging cells with stinging capsules. Cerata may occur with the anal gills in polychaetes.

(c) Pallial gills :— In Patella, a series of adaptive gills occur in a row on each lateral side in the pallial groove. They may be found together with the true ctenidia in Pneumoduma and Lottia.

3. Pulmonary Respiration ◦ —

In terrestrial pulmonates, a true ctenidium disappeared and the mantle cavity is transformed into a pulmonary sac or lung for aerial respiration. The roof of the pulmonary sac is richly supplied with vessels. Pulmonate lungs are an adaptation for terrestrial existence. Alternate muscular contraction and relaxation of mantle floor, lower

O_2 raise it, causing the air to rush in and out of the mantle cavity. The air can enter or leave the sac through a small rounded pulmonary aperture on the right side provided with a valve. Compression of the mantle cavity increases the partial pressure of O_2 and facilitates its absorption. Some pulmonates derive O_2 from water in the mantle cavity and do not come to the surface to breathe. The majority of lower pulmonates is amphibious and their mantle cavity serves both for aerial and aquatic respiration. They are said to drown if prevented from coming periodically to the surface to fill the lung with air. In some forms the mantle cavity is divided by an incomplete septum into a left pulmonary chamber and a right sternal chamber containing a gill. The animal can breathe by its gill in the water and by its lung in the air.
