

are always raised above the level of the sea-floor, the one being for supplying food and water, and the other for voiding excrements. The Spatangids get their nourishment down in the sand by means of their remarkably shaped mouth-feet, and through the rapid vibrations of the spines, some of which are specially adapted for the purpose, they keep the water circulating in the holes where they lie, and so obtain oxygen for breathing. *Astropecten* has a row of small spines along its arms, which vibrate in similar fashion, and cause a circulation of water round its body. The tubes of the worms are almost invariably directly connected by an opening with the level of the sea-floor.

Among the higher crustaceans inhabiting the sandy bottom

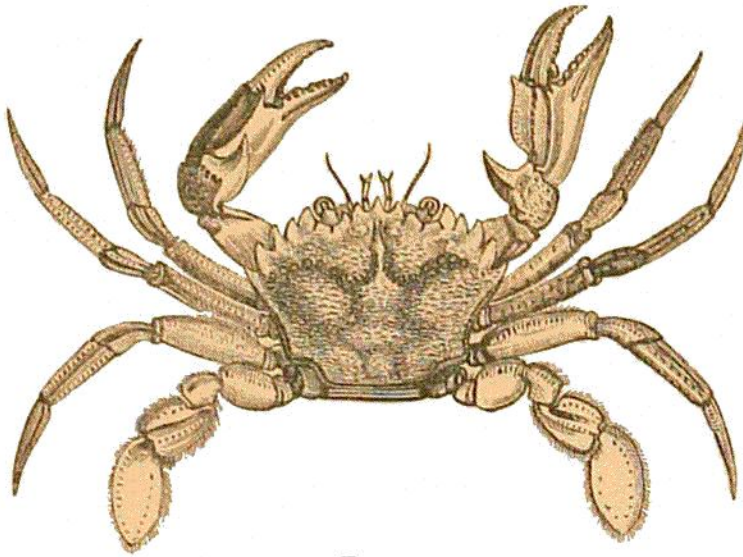


FIG. 339.
Portunus depurator, L. (After Bell.)

we get one or two species of swimming crabs (*Portunus*, see Fig. 339). They harmonise in colour with the variations in the colour of the bottom, and are thus enabled to escape notice when motionless. Their name is derived from the terminal joint of the fifth pair of swimmerets, which is expanded and paddle-

shaped, so that they are able to swim upwards. During the cruises of the "Michael Sars" in the North Sea one of these swimming crabs (*Portunus depurator*) was found hanging in the drift-net, and numbers of young crabs of the same species were captured in the plankton net. These forms must, nevertheless, be regarded as genuine bottom animals; I have observed that they can even burrow down into the sand for a short time, but never remain there long.

One of the most characteristic forms of the littoral zone is the common edible crab, *Cancer pagurus*, which is not so particular as the lobster regarding the nature of the bottom, being as much at home on sand as on rocks. *Cancer pagurus* goes farther up the fjords than the lobster does, but they both are undoubtedly littoral animals, occasionally found close up to low-tide mark, and occurring exceptionally below the lower limit of the littoral zone.