

SUSPENSION FEEDING IN INVERTEBRATES AND NONVERTEBRATE CHORDATES

Most suspension feeders are marine rather than freshwater animals because seawater contains an abundance of microscopic food particles. Suspension-feeding invertebrates and some nonvertebrate chordates generally consume bacteria, phytoplankton, zooplankton, and some detritus. To capture food particles from the environment, suspension feeders must either move part or all of their body through the water, or water must be moved past the feeding structures. Relatively few suspension feeders (some ciliate protozoa, certain bivalve molluscs, many tunicates, some large crustaceans) use true filter feeding because driving water through a fine-meshed filter is energetically costly. An analogy would be moving molasses through a fine-meshed filter. Thus, most invertebrates utilize one of the following less energetically costly methods of capturing food particles from the water.

Among some aquatic arthropods, such as the sessile barnacles, certain thoracic appendages are modified with rows of feather-like cirri adapted for generating water currents across parts of the body and removing food from it.

A second method is called "scan and trap." The general strategy here is to move water over all or part of the body, detect suspended food particles, isolate the particles in a small parcel of water, and process only that water by some method of particle extraction. Many copepods, ectoprocts, and a variety of invertebrate larval forms employ this method.

A third suspension-feeding device is the mucous bag or mucous trap. In this method, patches or sheets of mucus trap suspended food particles. A classic example is seen in the annelid worm *Chaetopterus*. This invertebrate lives in a U-shaped tube in sediment and pumps water through the tube and through a mucous net. As the net fills with trapped food particles, it is periodically manipulated and rolled into a ball. The ball is eventually passed to the mouth and swallowed.

A fourth type of suspension feeding is the ciliary mucous mechanism. In this mechanism, rows of cilia carry a mucous sheet across some structure while water is passed through or across it. For example sea squirts (ascidians) move a continuous sheet of mucus across their sievelike pharynx while pumping water through it. They secrete fresh mucus from one side of the pharynx, while ingesting the food-laden mucus at the other side using the esophagus.

A fifth type of suspension feeding is tentacle or tube feet suspension feeding. In this strategy, a tentacle-like structure captures larger food particles, with or without the aid of mucus. This food-gathering mechanism is most commonly encountered in the echinoderms (e.g., many brittle stars and crinoids such as the sea lily) and cnidarians (e.g., some sea anemones and corals).