## Filter Feeding in Vertebrates

**T**he baleen, or whalebone whales, include the humpback and gray whales. These are the largest living animals on earth, and because they lack teeth, they have evolved a different approach to feeding. A full-grown blue whale exceeds 30 m in length and weighs as much as 120,000 kg. What food could support the life of such a large animal? The answer is krill. **Krill** (Norw., *kril,* fry or young fish) are small, shrimplike crustaceans.

Baleen whales are named for the fringes of baleen, or whale bone (not true bone), that hang down in "mustachelike" sheets inside their mouths. Baleen is nothing more than hardened, shredded sheets of the gum epithelial layers. When these animals feed, they swim through dense schools of krill, straining huge amounts of water through the baleen meshwork. A large whale's expandable mouth holds 60 $m^3$, or 60 tons, of water, which it filters in a few seconds. The filtering process allows the smaller plant life (phytoplankton) to escape with the seawater while the krill is retained to be swallowed at leisure. A whale can eat tons of krill in a short time.

Flamingos are also filter feeders. They have fringed filters hanging from the upper bill and a deep-sided, curved lower bill. This bill represents a similar evolutionary adaptation to the same problem—removing small particles from a dilute medium.

Flamingos are commonly misportrayed as denizens of lush tropical islands. In fact, many dwell in one of the world's harshest habitats—shallow, hypersaline lakes. Few animals can tolerate the unusual environments of these saline lakes. Those that can, thrive in the absence of competitors and build up their populations to enormous numbers. Hypersaline lakes provide these predators with ideal conditions for filter feeding on small molluscs, crustaceans, and insect larvae.

Flamingos pass water through their bills either by swinging their heads back and forth, permitting water to flow passively through, or by an active pump that a large, powerful tongue maintains. The tongue fills a large channel in the lower beak. The tongue moves rapidly back and forth, up to five times per second, drawing water through the filters on the backward pull and expelling it on the forward drive.