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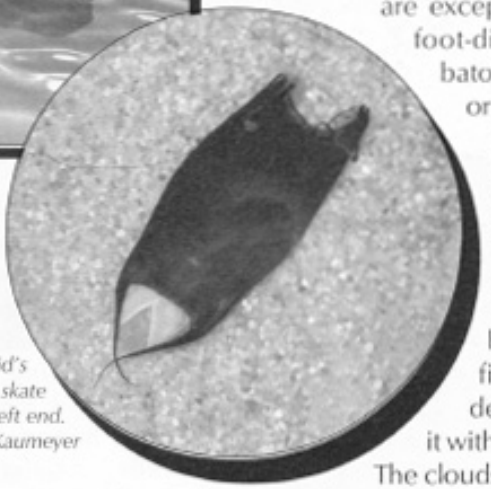
SECRETS OF THE MERMAID'S PURSE

Skates & Rays of the Mid-Atlantic

By Ken Kaumeyer, Curator of Estuarine Biology

The museum recently opened its latest changing exhibit that focuses on the skates and rays of the region. This exhibit contains a twelve-foot-diameter shallow tank that allows visitors to examine these fascinating creatures closely. We have attempted to teach visitors about the interesting life history, reproduction, and differences that exist among the various species occurring along the Mid-Atlantic coastline and in the Chesapeake Bay.

Visitors to the opening of the exhibit on October 23, 2004, enjoyed the live specimens in the large tank that is the central attraction. CMM photo by Rachel Reese



An egg case - "Mermaid's Purse" - with a tiny skate hatching in the lower left end. CMM photo by Ken Kaumeyer

Skates and rays are collectively referred to as batoids, which are fish (yes, they are fish!) that are closely related to sharks. In fact, their internal organs and physiology are almost identical to sharks. The major difference is that skates and rays have evolved a more flattened appearance since they split from a common shark ancestor in the late Jurassic. They also have a round or diamond-shaped body because of greatly enlarged pectoral fins. These large pectoral fins are the batoids' primary method of propulsion, as opposed to sharks, which use their powerful tails for swimming. Most sharks also need to keep swimming in order to pass water over their gills to breathe. The skates and rays have evolved away from this, and can lie motionless on or buried in the bottom. This saves energy and is useful in avoiding predators. They accomplish this by drawing oxygen-rich water in through their spiracles located behind their eyes, then closing them and pushing the water over the gills and out the gill slits.

Skates, rays, and sharks are all members of the group referred to as elasmobranchs, which are cartilaginous fish. Having cartilage instead of bone for a skeleton has many advantages and allows them to adapt to a wide variety of habitats. The low-density cartilage and an oil-filled liver (as opposed to a swim bladder in bony fish) allow them to achieve neutral buoyancy and dive to and rise from great depths quickly and with ease. The physiological mechanism by which they accomplish this without getting the "bends" is complex and still poorly understood. For many years cartilaginous fish were thought of as primitive, but research has demonstrated that they are highly advanced with many exquisite sensory organs that have evolved well beyond the more "advanced" bony fish and mammals. For example, they have relatively large brains and complex social interactions. They also have highly evolved sensory organs for sight, sound, smell, and electroreception, all of which have allowed them to be very successful survivors in a hostile environment. As predators they have evolved complex electrosensory organs – called Ampullae of Lorenzini – for finding food. Although there are exceptions, such as the twenty-foot-diameter manta rays, most batoids feed on invertebrates on or buried in the bottom. The prey gives off very weak electric fields that can be detected by the Ampullae of Lorenzini of the skates and rays, even when the prey is hidden well into the bottom. When the electric field of the unseen prey is detected, they then excavate it with their pectoral fins or snouts. The clouds of sediment observed near schools of rays in the summer are often the result of them digging out razor clams to feed on in this manner. Males also use these same electrosensory organs to locate females during the breeding season. In addition, the sense of smell of the skates and rays is also very acute – they can detect extracts from prey at concentrations as low as one part per ten billion parts of water. Again, they are highly advanced, and not at all primitive, as previously thought.

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