

[From Spring 2001]

Ancient Survivors

A relic of ancient times lives among us. Over 360 million years old, living 250 million years before the age of dinosaurs, the Horseshoe Crab is a living fossil, relatively unchanged since the Devonian era. The horseshoe crab is not a crab at all though, but rather is more closely related to spiders, ticks and scorpions.

Beachgoers are familiar with the brown tank-like bodies of Horseshoe crabs washed up on the beach, and many are frightened by the sight of the long spiky tail that looks as if it could impale a foot or hand. Although they are formidable looking, horseshoe crabs are no threat to humans. The dagger-like tail is used only as a rudder when swimming and pushing through sand and mud. If the crab finds itself upside down on the beach, the long tail is stuck into the ground to right itself. Often the horseshoe crabs that litter the beach are mere shells of their former lives. Horseshoe crabs shed, or molt, in order to grow. The shell splits in a predetermined spot along the front rim of the bottom shell. The crab emerges and crawls away, one quarter larger than the empty shell it leaves behind.

Examine a horseshoe crab closely and its many adaptations become apparent. Two large compound eyes located on the top of the shell, or carapace, are sensitive to polarized light and can magnify sunlight ten times. Two simple eyes, which sense ultraviolet light from the moon, are located on the front of the carapace. Other eyespots, located under the carapace and the underside of the tail, may have been used more in ancient times. These are helpful when the crab is swimming upside down.

Legs and gills are the main features on the underside of the horseshoe crab. Four of the five pairs of legs are used for walking. The fifth pair of legs is modified to act like the disk on a ski pole with flaps that spread out to push against sand without becoming stuck. A claw-like appendage on this pair of legs is also used to clean the gills that are right behind the legs. The gills are folded like pages and known as book gills. They are so versatile that the crab can use them for propulsion when swimming upside down. Chelicerae, a pair of appendages located in front of the legs, gather food and bring it to where the legs can crush it and funnel it to the mouth. Horseshoe crabs feed primarily on burrowing mollusks and worms and will also scavenge for detritus.

Mating among horseshoe crabs is a spectacular phenomenon on the beaches of the Delaware and Chesapeake bays of the east coast. On a spring high tide, near a full moon in May and June, massive numbers of horseshoe crabs come ashore to begin the next generation. The smaller male hangs onto the larger female with a pair of special hooks on his first pair of legs. She crawls up the beach and digs a hole about 6 to 8 inches deep in which to deposit some of the 88,000 eggs she is capable of carrying. Eggs are laid in clusters about the size and shape of a flattened golf ball, each containing about 4,000 eggs. As the eggs are laid, the male fertilizes them. Although soft and sticky when newly laid, the eggs harden in contact with sea water. They require about two weeks to develop and are ready to hatch when the next high spring tide returns. Waves break the eggs open and wash the young crabs back to the sea. It will be nine years before the surviving young of this event reach maturity.

Millions of shorebirds, gulls, and terns depend upon this abundant food source for their own survival. Shorebirds, traveling from the Antarctic and South America to breeding grounds in North America and the Arctic, time their arrival to coincide with the horseshoe crab mating season. In fact, the Delaware Bay hosts the second largest population of migrating shorebirds in North America. Each year, the birds arrive to gorge themselves on the protein-rich food supply of horseshoe crab

eggs. Before they leave, they will have doubled their weight in less than two weeks by eating thousands of eggs per bird. For many, this food source means the difference between death and survival. Once refueled, the birds continue their journey north.

Commercial uses of horseshoe crabs are many. Crabs were once gathered and crushed for fertilizer and chicken feed, and are still used commercially as bait today. Medicinally, horseshoe crabs are quite valuable. Most of what we know about human vision was the result of a Nobel Prize-winning scientist's work with cells in horseshoe crab eyes. Research using horseshoe crab cells has added much to our understanding of arthritis, cancer, arteriosclerosis, schizophrenia, AIDS, and Alzheimer's. Lysate, an extract from the copper-based blood, which turns blue when oxygenated, is used in cancer research and as an indicator of spinal meningitis.

Populations of horseshoe crabs were once much greater in number than they are today. Habitat loss and increased harvest are contributing factors to their decline. An ancient evolutionary survivor, the horseshoe crab is valuable to both wildlife and humans. It's up to humans to make sure they continue to thrive for another million years, or more.

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