mvtimes.com

Horseshoe crabs surveyed on Martha's Vineyard

by DON HINKLEPUBLISHED: JUNE 8, 2011

This story began a year ago. There were four of us volunteers in the moonlight, standing on a beach at Tashmoo under a full moon. With the tide at its highest the occasion might have been considered romantic, if one were not engaged in a serious scientific enterprise. Our eyes were fixed on the slow ripples coming to dissipate on the sand at our feet.

Then we saw her, a largish round object like a rock, gliding toward us across the bottom, totally intent on her purpose, which was to lay as many as 80,000 eggs. She was a horseshoe crab. And coming from a different angle was a smaller male, intent on spreading his sperm over those eggs. It's not "mating," it's spawning, and we were there to observe it.

Other males arrived a bit later, as the female beached and settled deeper into the sand, and the first male attached himself with special claws to the rear of her shell: he got dragged along as she laid five to six nests. The other males — not a bit discouraged at being also-rans — simply attached themselves as well. There were plenty of eggs for everyone: "who's your daddy" is not an insult among horseshoe crabs.

Soon they were joined on the beach by other spawning couples. There was no rush, but there was an evolutionary imperative at work. The horseshoe crabs have been performing this same ritual since time immemorial — in fact, for about 450 million years, give or take a few million. In that time they have changed very little, according to fossil records. After completing their duties, the adult crabs retreated into deeper waters.

A few weeks after researchers submitted our findings on carefully marked sheets, the fertilized eggs hatched into sand-grain-sized miniatures swimming in the shallows. Many became food for different shore birds, including the red knot, which migrates from Tierra del Fuego at the southernmost tip of South America to its breeding grounds in the Arctic and depends on eating enormous quantities of protein-rich horseshoe crab eggs as fuel for the long trip. In fact, the red knots have changed for their migration into a digestive system specifically to process the horseshoe crabs and cannot accept substitutes. However, the red knots usually stop to dine in Delaware Bay and rarely visit our Island.

That was the first story I heard about horseshoe crabs and so I left the research behind. I thought, let the mainland researchers take care of the red knot.

Here's the rest of the story.

The baby crabs grow through a series of molting cycles, leaving one shell behind and quickly hardening into another larger one. After about 10 years, they're at mating maturity and begin coming to shore to lay their eggs.

At that point, they are harvested and sold to two groups of humans. Fishermen use the horseshoe crabs as bait for the eel and conch fisheries, which owe much of their prosperity to the crabs. Pharmaceutical companies want the blood of the horseshoe crabs.

The crabs have blue blood, which contains copper rather than iron and is valuable for biomedical purposes. Despite its primitive immune system, the horseshoe crab can heal itself of even serious wounds. The companies use the crabs' blue blood in tests to stop bacterial endotoxins from entering our bodies. Amoebocytes envelop any potential source of infection, rendering it harmless until it's destroyed. The Food and Drug Administration (FDA) requires this test for injectable and intravenous drugs, as well as for screening prosthetic devices such as heart valves or hip replacements.

After being caught, the crabs are hauled to a testing center at Falmouth Association of Cape Cod. Here, up to one third of the crab's blood is drawn, and the crab is returned to the ocean. A significant percentage of those from which blood is drawn do not survive much longer, perhaps due to the stress of the procedure (videos show that they are not handled gently). Marks are made on the shell to stop frequent bleedings but we have no idea how many are bled; there is no publicly released information. Behaviors may change. There have been reports of bled females coming to nest without a male companion, and their eggs never hatch.

The blood is treated so that a precipitate forms, like a powder, which is purified and dried. This is LAL — Limulus Amoebycyte Lysate.

If the gene can be synthesized, horseshoe crabs will no longer be harvested for that purpose and, presumably, will increase in numbers again.

But until that time, the horseshoe crabs appear to be disappearing from our waters. The Massachusetts Division of Marine Fisheries, which regulates the commercial fishery, prohibits the harvest of the crabs during the height of spawning season. In May and June, fishermen are forbidden to catch horseshoe crabs during the peak five days of spawning seasons, which are at full and new moons and high tides.

There have been significant amounts of horseshoe crabs in Katama Bay and Tashmoo, so we counted here (until the closing of Tashmoo this year). On nights when the crabs should spawn, we slipped into appropriate garb and headed for the beach. Crabs tend to avoid the sunlit hours, and they avoid rough surf and high wind.

That is why the volunteers who wade out on certain moonlit nights are important, to gain a reliable estimate of the current populations.

Susie Bowman, point person on the Island for this program is a Mass Audubon teacher/naturalist who works at Felix Neck. She coordinates teams of volunteers, trains them to do the right thing and submits their data to the state Division of Marine Fisheries.

Ms. Bowman says: "Our surveys are conducted [entirely by volunteers] according to DMF protocol, to increase reliability of our reports."

We census-takers are excited each time we see a mating couple (or a three- or foursome). More volunteers are needed for this important project. If you are interested, phone 508-627-4850.

Don Hinkle, proofreader at The Martha's Vineyard Times, lives in Oak Bluffs.

Original URL:

http://www.mvtimes.com/marthas-vineyard/article.php?id=5994