

WILSON MUSEUM BULLETIN

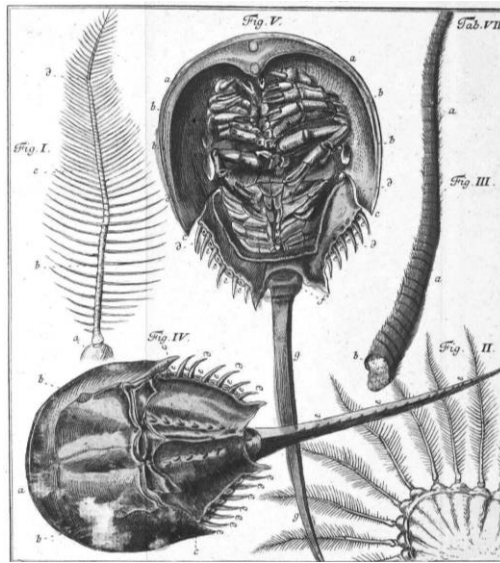
Fall 2020

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Ancient and Armored: The Horseshoe Crab

by Sue Hazlett



Horseshoe crabs are very ancient indeed. When the first green plants began to grow on land over 400 million years ago, the ancestors of horseshoe crabs were swimming in the Devonian seas. They witnessed the rise and fall of the dinosaurs, the rise of mammals, and survived major extinction events. If we were to somehow transport ourselves back in time millions of years, the horseshoe crab would be easily recognized on the seashore of some extinct continent.

As one might expect from the length of time they have spent on this planet, horseshoe crabs are not true

crabs at all (which evolved a relatively short 90 million years ago) but are more closely related to scorpions and spiders. When looking at it from above, perhaps the most distinctive feature of the horseshoe crab is its shell, or carapace, which makes it look like a cross between an armored tank and a Roomba vacuum. This carapace is divided into three parts, the larger, forward part known as the prosoma, which protects the bulk of the body, and the spiny back part, or opisthosoma, which protects the gills that allow the horseshoe crab to breathe. These gills, called book gills because they resemble the pages of a book, can also be used as paddles to aid in swimming and during breeding to fan sperm over eggs laid by the female. The third part of the carapace is the sword-like, spiky structure extending from the end of the body called a telson. The carapace of a horseshoe crab might look fairly smooth at first glance, but a closer look will reveal some rather unique features. As you peer closer, the horseshoe crab is in fact looking back at you with five of its ten compound eyes, which are located on the prosoma. Two other eyes are located on the underside

MISSION

Building on the legacy of its founding family, the Wilson Museum uses its diverse collections and resources to provide learning experiences to stimulate exploration of the history and cultures of the Penobscot Bay region and world.

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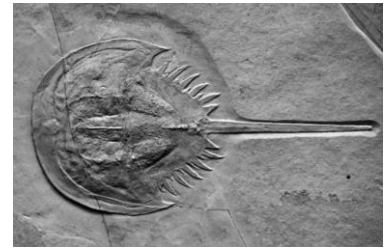
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and one on the telson, while the final two are invisible to human eyes, giving the horseshoe crab a unique visual perspective on the world.

If the horseshoe crab is flipped over, one can see the mouth, which is flanked by two small appendages ending in tiny claws called the chelicerae, and used to capture food (mainly worms, mollusks, and crustaceans) and bring it to the mouth. The next four pairs of appendages are for walking and called pedipalps. All of these end in claws, but in the male, the first pair have a modified claw that is used for grasping the female during mating. These legs also have bristles near the base and next to the mouth that help direct food towards the mouth. The final set of legs are used for locomotion and end in claws on the male, but are modified in the female into an array of four leaf-like features that aid in burrowing when the female is laying eggs.



On the east coast of the United States, the Atlantic horseshoe crab (scientific name *Limulus polyphemus*) can be found from Maine to Florida. One of the most iconic sightings of horseshoe crabs is on the beaches of Delaware Bay under the full and new moons of May and June when thousands of crabs come ashore to spawn. The spawning process is a free-for-all as one male will attach himself to the female with his modified claws while other males will surround the female trying to get in on some of the action. A single female may be surrounded by five or six males all trying to get as close as possible as she digs a burrow into the sand and lays her eggs. Horseshoe crabs are broadcast spawners, so instead of the males copulating with the female, they send clouds of sperm into the water around the eggs, which will (hopefully) settle onto and fertilize the eggs. A female will lay around 4000 eggs at a time and will spawn repeatedly on different nights laying up to 100,000 eggs total!

The eggs will hatch two to four weeks later. The larvae, which resemble tailless adult horseshoe crabs, enter the water and spend their first years in the tidal flats, moving into progressively deeper water as they age. Because of their hard shells, crabs must molt or shed their shells in order to grow. The horseshoe crab prepares to molt by growing the new shell as soft pleats underneath the old shell. When it's ready to molt, it sucks in water and expands, while at the same time the underside of the shell softens and then splits from the water pressure, which allows the pleats to expand like a balloon and push off the old shell. The new shell is soft, but will harden over the course of a few days. Young horseshoe crabs will molt around six times in their first year and at least annually until they reach sexual maturity at around ten years old, meaning that they spend about half of their twenty-year life span as juveniles. Females will continue to molt once a year after maturing, but males stop molting at around ten years, with the result that females, who continue to grow, may be much larger than their male contemporaries. With other species, being a large male is advantageous, but for horseshoe crabs, being a smaller male may actually be an asset, as it allows them to squeeze in closer to the female in the mating scrum.

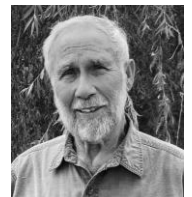
Board Members Elected at 2020 Annual Meeting

On September 3, 2020, the Board of Trustees met for its Annual Meeting and election of officers and Board members (see side bar for complete list). Two Trustees were re-elected: Temple Blackwood and Robert Kilpeck. Two new Trustees were elected: Barbara Cooper and Steve Shea, each for a three-year term.

Barbara Cooper - has been an active supporter of the Museum's programs for many years. She and her late husband, Justin, discovered Castine in 1988. Now she divides her time between Austin, TX, and Castine where her children and grandchildren enjoy spending their summers.



Steve Shea - spent his career working at his family's business, E.L Shea Inc., until his retirement in 2016. He has served on the Museum's Building and Grounds Committee since 2015. Steve and his wife Jane live in Ellsworth.



Officers elected for a one-year term:

President Temple Blackwood ♦ Vice President David Wyman
Treasurer Donald Small ♦ Secretary Kay Hightower

Since a single female can lay up to 100,000 eggs per year for ten years as an adult, how is it that the seas are not dominated by horseshoe crabs? As it turns out, most eggs never survive long enough to hatch. The eggs are eaten by at least eleven species of migratory shore birds. The timing of female horseshoe crabs laying their eggs coincides precisely with the arrival of up to 1.5 million shore birds on their way to summer breeding grounds in the north. In fact, a small shore bird called the red knot relies exclusively on horseshoe crab eggs during migration. Small fish, crabs, and shrimp also eat horseshoe crab eggs and small juveniles. So important is this bounty of eggs in the spring, some scientists speculate that without horseshoe crabs the shoreline ecosystem along the eastern seaboard would collapse. Once horseshoe crabs mature, their hard shells make them a difficult meal to digest and their few predators are sharks and sea turtles although gulls will prey on any overturned horseshoe crabs that they find on the beach.

When the first Europeans arrived on the east coast of America, they observed the Natives using various parts of the horseshoe crab, such as the spiked telson for a fishing spear, and the carapace for everything from bailing a canoe to holding water. What they particularly noted was that if a couple of horseshoe crabs are planted along with the corn crop, the yield is significantly increased. Between the mid-1800s and the 1920s when chemical fertilizers appeared, between one and four million horseshoe crabs were harvested every year for use as fertilizer. These alternate fertilizers were not only more effective, but the farms certainly smelled better without the miasma of rotting crab hanging over the fields!

As the harvest of horseshoe crabs for fertilizer was waning, a commercial fishery for eels and whelks was becoming established, and the ideal bait was horseshoe crabs. Horseshoe crabs were no longer being buried in fields, but sunk to the ocean floor in pots. Then in the 1960s another use for horseshoe crabs was discovered that

has likely saved the lives of millions of humans. Horseshoe crab blood contains a primitive clotting agent called coagulogen. The discovery of this clotting agent led to the Limulus amoebocyte lysate (LAL) test for the presence of gram-negative bacteria. The LAL test is used on anything that can be swallowed as medicine, implanted in the body, or injected, to determine if bacteria, which can cause infections and death, is present. Obtaining the coagulogen requires captured horseshoe crabs to be bled while they are alive. Up to 30% of the blood is removed and the crabs are released back into the ocean. It is estimated that up to 30% of the crabs may die as a result of the bleeding.

Horseshoe crabs are currently listed as a vulnerable species on the IUCN Red List for endangered species. Conservation efforts are underway to reduce the harvest of horseshoe crabs for bait and bleeding for biomedical purposes, and the good news is that the coagulant used in the

LAL test can now be synthesized. However, development, shoreline degradation, pollution, and the introduction of invasive species still threaten the survival of horseshoe crabs. How sad it would be to be part of the generation that witnesses the extinction of a species that has survived almost 450 million years and seen 90% of the species ever to exist on our planet come and go.

Although the majority of horseshoe crabs can be found in Delaware Bay, they are common along the beaches of Maine and can be seen right here in Castine. Mating season coincides with the opening of the popular eatery Bagaduce Lunch in nearby Penobscot, where locals and tourists alike chow down on fried clams and ice cream while

observing the mating rituals of horseshoe crabs. Watching a horseshoe crab plough its way along a sandy beach is a humbling experience as one contemplates the 400 million year history of this humble animal.

IN MEMORIAM

We remember the following members of the Wilson Museum who believed in the Museum's mission and gave of themselves to further its outreach.

Their legacy will live on:

Robert Gray (1943-2020)

Patricia Higgins (1933-2020)

David Mathiasen (1936-2020)

Anne Parsons (1937-2020)

Additionally, the Museum has received generous donations in memory of the following:

Jean Gillette Baker

Fred & Helen Connor

Robert Downes

Harold Hatch

Alice Wilson Trowbridge

Sue Hazlett discovered Castine in 2011 and immediately decided she wanted to live here. She had previously lived in Alaska for over 25 years where she studied marine biology and worked as a naturalist and a park ranger.

References:

David R. Smith, H. Jane Brockmann, Mark A. Beekey, Timothy L. King, Michael J. Millard, Jaime Zaldívar-Rae (2016) *Conservation status of the American horseshoe crab, (Limulus polyphemus): a regional assessment*. Available online at:

<www.fws.gov/northeast/fisherycenter/PDF/Smith_et_al_2016_Reviews_in_Fish_Biology_and_Fisheries.pdf>

Anthony D. Fredericks (2012) *Horseshoe crab: Biography of a Survivor*. Ruka Press: Washington, DC.

Additional information can be found at the following websites:

U.S. Fish and Wildlife Services <www.fws.gov/northeast/pdf/horseshoe.fs.pdf>

<www.fws.gov/northeast/pdf/horseshoecrabs_redknotsFINAL.pdf>

Ecological Research and Development Group <www.horseshoecrab.org/nh/hist.html>

100th WILSON MUSEUM

ANNIVERSARY

November 1st – 10th



Some Plans for the 100th Anniversary in 2021

Friday, April 9: Kick-Off Celebration falls on the birthday anniversary of the Museum's founder Dr. John Howard Wilson, born April 9, 1871. The evening will include the presentation and signing of an updated history of the Museum. To augment this presentation, Executive Director Patty Hutchins will offer some "tidbits" that didn't make the cut into the booklet.

Sunday, June 20: Members' Reception marks the anniversary of the founding of the Wilson Museum – 100 years ago. The Board of Trustees invite members and friends to view a new exhibit, hear of the many celebratory plans for the summer, and enjoy delicious hors d'oeuvres and wine.

Saturday, July 3: Open House for the public where the Board, Committee members, and staff will join together to provide a picnic utilizing the very popular outdoor pit and bake oven. Part of the festivities will include the presentation and signing of a cookbook dedicated to Phebe Perkins (1744-1811) and her nine daughters and featuring some of the foods cooked on their hearth during our living history days over the past 45 years.

AUCTION

Registration open now!!

www.charityauction.bid/WM100th

Bidding starts at noon on Nov 1

Closes 6 p.m. Nov 10



~Patty's Treat of the Week~

Each week Patty will offer one of her delicacies for bidding. The bidding on these items will open at noon on Wednesdays and close at noon the following Tuesday.

Please give one week's notice for the winning bid to be picked up or delivered within a 20 mile radius of Penobscot.

Apple Pie Oct 21-27
Mincemeat Pie Oct 28 - Nov 4
2 Dozen Yeast Rolls Nov 5-10
Or your favorite goody



July 29-August 2: Wilson Family Reunion is being organized to welcome descendants of Dr. Wilson and his wife Georgia. Additionally, during this time, the public is invited to the special and on-going events: to hear keynote speakers Dr. Alan Schechter and Dr. Frank Portugal speak on the background and important work of science and research during Dr. Wilson's time; to attend the Collecting Castine 2021 fundraising event; and to engage in expanded living history activities every Sunday and Wednesday during July and August.

September:

100th Anniversary of Maine Maritime Academy's schooner *Bowdoin*. MMA and the Museum will collaborate on an exhibit of the history of the *Bowdoin* in the Museum's Boat Shop, host a lecture and related hands-on activities, and arrange a sailing venture for 30 guests.

Saturday, September 11: Retirement Party for Executive Director. The Board invites the public to a picnic to bid farewell to Patty Hutchins. Together we will toast the Museum's amazing first century and set sail into its next century with a new Executive Director.

Collections Conversations

By Abby Dunham

The John and Phebe Perkins House is, in itself, a collection artifact at the Wilson Museum and is fully furnished with period pieces. Museum staff use the historic home and the history of the Perkins family to help tell the story of early Castine.

John and Phebe began construction on their home in 1763, expanding the building twice within a twenty year period as their family grew, business prospered, and the community that would later be called Castine became established. Between that time and the 1960s when the Museum acquired the building, there were few updates made to the house. This was valuable to the Museum's



restoration process, aiding in returning the house to a state that would make John, Phebe, and their ten children feel at home. Last year the Museum celebrated the 50th anniversary of the Perkins House being placed on the

National Register of Historic Places; a designation that highlights the importance of the home in Castine's history.

This spring, the Museum made the decision that while other exhibit spaces would be safe to open for the summer season with appropriate precautions, the same would not be feasible in the historic home. Fortunately, the Museum had already started the process of creating video tours of the Perkins House. During the Members' Reception, held via Zoom in July, we were able to premier the first video tour



of the John and Phebe Perkins House. This debut showing was well received, with one viewer saying "That's a fabulous video with so much good info..." and another calling it "... a true gift to future generations." The video focuses on the architecture of the house and the incredible work done in the 1960s and 1970s to move, restore, and furnish the historic home. Narrated by

Sherman Hutchins, who helped his father Hoyt Hutchins with moving and restoring the house, and Grace Tarr, who led tours through the house for several years (interpreting from the Revolutionary War era through the Civil War), the video showcases footage of the home in its current fully furnished state and historic pictures of the house from the Museum's archives. It captures both the flavor of a guided tour, filled with historic tidbits, as well as rare, behind-the-scenes glimpses into the restoration project through the last 50 years.



Through August and September, fascinated Museum visitors watched the video tour with rapt attention in the Perkins Gallery. We are overjoyed that this video project came together when it did, allowing us to provide this experience when traditional tours became impossible. Special thanks to Jim Picariello (director), Kyle Chick (videographer), Sherman Hutchins (narrator), and Grace Tarr (tour guide) for their wonderful work on creating this amazing account of the Perkins House.

Another video tour focusing on the story of the Perkins family and their life in Castine is currently in the editing process. We look forward to sharing it with you soon.

New Pump House Underway

During this past season, many volunteers worked each Sunday and Wednesday to construct the new building designed by Don Small to house the Museum's Erickson-Rider Hot Air Water Pump. Don led the volunteers using traditional methods and tools for the post and beam, mortise and tenon construction. These pictures show the amazing project in action. Among Don's group were: Ric Berger, Donovan Bernard, Steve Brookman, Barbara Cooper, Brenda Graminski, Stephanie Gualtieri, William McLean, and David Wyman. To the right, Donovan can be seen using a shaving horse made to fashion round oak dowels which were then cut and used for treenails. Special thanks is extended to Darren Carlow for his generous donation of shingles.



Executive Director Position Posted

In anticipation of the retirement of our Executive Director in September 2021, the Board of Trustees is accepting applications for this position, with appointment beginning in October 2021.

The Executive Director reports to the board and works to provide strategic planning and to maintain sound financial status, staffing, facilities, programs, and collections. In addition to providing long-range visioning, immediate projects for the incoming Executive Director would include completion of an archival storage area and implementation of an internship endowment.

Many of our exhibits emphasize the relationship of individuals and families to collections and research. In addition to embracing these traditions, the Executive Director must have the ability to maintain the Museum's strong connection to the local community.

Qualifications: A minimum of two years' experience that includes personnel management, training or experience in education, and familiarity with the culture and history of coastal New England. A graduate degree is strongly preferred.

Applications for this position are being accepted from September 2020 through February 2021. Please direct inquiries to: Temple Blackwood, 872 Castine Road, Castine, ME 04421 or templehwt@gmail.com.



Education Department

By Haley Blake

Snaking its way through time and across cultures, the story of money connects to everyone's daily lives. Currency was also of anthropological interest to Museum founder Dr. John Howard Wilson, and the Wilson Museum Collection features several artifact currencies. In the coming year, the Education Coordinator, Haley Blake plans to develop a series of programs around the topic of money ranging from its origins to modern times. The program will cover trade and the development of monetary systems as well as compare currency across cultures. For these programs, the Museum would love to receive donations of foreign or historic bills and coins for the Education Collection. Contact Haley Blake if you have coins to donate or suggestions for the program. The Museum staff is very excited for this upcoming program series!



Mainely Maine Trivia

In recognition of Maine's bicentennial year, the Wilson Museum developed a trivia game to take into the local schools and to use with homeschoolers. Below are ten examples. See how well you can do! The first five people to correctly answer the questions will receive an uncirculated Maine coin and postal stamp. Email your answers to: info@wilsonmuseum.org with subject line of 'Mainely Maine.'

1. Maine author E. B. White captured the hearts of young and old with his book *Charlotte's Web*. What character in this story loved a great smorgasbord of treats found at the county fair?
2. The American Tree Farm System (ATFS) was founded in 1941 and is the oldest and largest forest conservation, certification, and advocacy program in the United States. The first two Maine Tree Farms were dedicated in 1952. One of these farms was owned by Samuel Condon, located in which town: Brooksville, Castine, or Penobscot?
3. The Wilson Museum has been given special permission to possess and exhibit a sample of the Maine State fossil found in Baxter State Park. What is the name of this fossil?
4. After graduating from Bowdoin College, this man, who later became governor of Maine, served as principal of Castine High School in 1909 and 1910?

5. There is a huge difference in the rise and fall of Maine's coastal tides. The average rise in Brunswick is 3.5 feet; the rise in Calais is 20 feet. What is the rise in Castine?
6. When Hancock County was established in 1789, where was the county seat located?
7. What Governor said: *We live in Maine despite the hardships, despite the challenges, despite the burdens. We're hardscrabble people, resilient, resourceful. And that is our strength.*
8. Fort Knox was built on the western side of the Penobscot River between 1844 and 1869 for the purpose of protecting the area from British Naval attack. The fort was constructed of what local material?
9. It takes a quart of delicious Maine blueberries to make a pie. If each quart costs \$3 and you only have \$10 bills in your wallet, how many bills would you need to pass to the farmer to make four pies?



10. Castine is the homeport for the schooner *Bowdoin*, Maine's official state vessel designated by the Governor and Legislature on August 4, 1988. Who is the current captain of this fine sailing vessel?

WILSON MUSEUM
P.O. Box 196
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WOOD SHOP DEMONSTRATIONS**
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July & August

**New Administrative
Assistant Hired**

Executive Director Patricia Hutchins is pleased to announce that Heather Rose Martinez has joined the staff of the Wilson Museum as the Administrative Assistant.



Heather Rose has over 12 years of experience in finance with emphasis on consumer lending and credit counseling. She recently relocated to the Blue Hill Peninsula from Utah where she was pursuing a degree in Philosophy. She spent the majority of her free time exploring the deserts of the Southwest and is now looking forward to embracing the very different beauty of the East Coast.