

Jewels of the Chesapeake: Our Simple but Amazing Jellyfish

By Ken Kaumeyer, Curator of Estuarine Biology

Flloating through the water trailing long graceful tentacles, the jellyfish is a thing of haunting beauty. But like many things in nature, the beauty carries a hidden sting, and that is primarily what our Chesapeake jellyfish are known for. But admire or abhor them, jellyfish are amazing creatures that play a vital role in the Chesapeake ecosystem. Without them we would have a very different bay.

Jellyfish are not really fish at all. They do not have brains, backbones, eyes, hearts, fins, intestines, or much of anything else for that matter. They are among the simplest of invertebrates, consisting of about 98 percent water, a little salt, and an infinitesimal amount of organic matter. Although a few freshwater species exist, jellyfish are primarily marine and have been swimming in the oceans for over 500 million years. Today they exist in all the oceans of the world, and at every level, from those that float on the surface to some that have been found in the cold darkness thousands of feet below the surface.



Most of us are familiar with the sea nettles that we see each summer (*Chrysaora quinquecirrha*). They invariably appear just as the water warms up enough to enjoy, and then disappear with cooler weather in the fall. So, where do these strange creatures come from and where do they go in the winter? What's their purpose, beyond giving swimmers a nasty sting? Until the 1960s these questions would have been impossible to answer. At that time researchers began studying the life history of jellyfish with the intent of eradicating or controlling them, and as a result we have a much richer understanding of their role in our ecosystem.

The Life Cycle of a Jellyfish

Scientists gradually discovered that a jellyfish spends most of its life as a tiny polyp attached to the underside of oyster shells

or other hard structures. These polyps, which are barely visible to the naked eye, resemble small anemones. As the water warms in the spring, the polyps begin to grow and feed on the increased amount of plankton. They then begin a fascinating transformation: deep grooves form horizontally in the polyp; small tentacle-like appendages develop along the edges, and the polyp begins to look like a pulsating stack of dinner plates. Over time the top "plate" breaks away, an asexual reproduction process called *strobilation*, making room for the next one beneath it. These plates, or *ephyrae*, are about 1/25 inch in diameter. Equipped with stinging cells to capture prey, the ephyra quickly grows into the *medusa*, or jellyfish with a bell and tentacles that we are familiar with. Each polyp can produce about forty-five jellyfish during the summer before settling down for the winter. Since there are millions and millions of polyps, it is easy to see why we have so many jellyfish. The onset of strobilation and the number of jellyfish produced in a season appears to be regulated by the timing and amount of spring rainfall and temperature. Cool wet springs tend to delay the appearance of jellyfish.

Jellyfish appear quickly because they are mostly water so do not require much food for rapid growth. The medusa stage of their life is directed towards sexual reproduction. They begin producing eggs when the bell diameter is about 1½ inches, and rapidly increase production as they grow. During the summer, each female can shed up to 40,000 eggs per day. When the eggs are fertilized by males, a small swimming larva called a *planula*, spends a few days as a component of the plankton community before settling on a hard structure and forming a new polyp. After a few months the medusae stop reproducing and die. If you see a small jellyfish late in the summer or early fall with no tentacles, it is probably not a young jelly. The adults shrink and lose their tentacles just before dying.

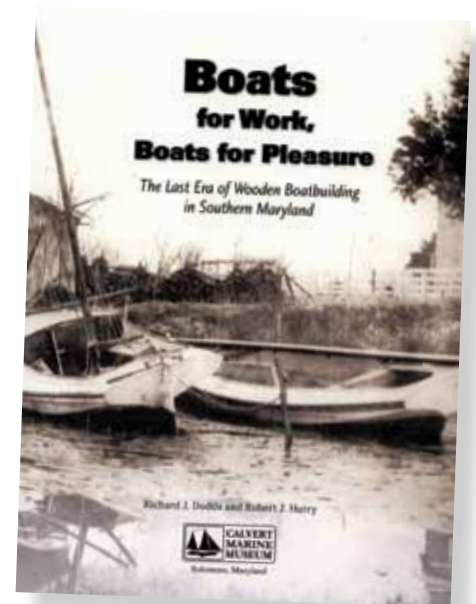
CMM PUBLISHES NEW BOOK

Early in September the museum issued a new book on the building and builders of wooden boats in Southern Maryland. Entitled *Boats for Work, Boats for Pleasure: The Last Era of Wooden Boatbuilding in Southern Maryland*, the 129-page book is the work of the curator of maritime history, Richard J. Dodds, and museum registrar, Robert J. Hurry. Although other books and articles have provided information about boatbuilding in the three Southern Maryland counties, this is the first systematic record of the extent of the local craft of the building of hundreds of wooden boats, with information about the large number of builders, but concentrating on the period since World War I.

From the beginning of the colony of Maryland in the seventeenth century, the residents of the Chesapeake Bay and its

local tributaries have depended on boats to provide access to the bounties of the local waters and to provide transportation. It is logical, therefore, that the craft of boatbuilding would develop in the three local counties, surrounded as they are by water. Although somewhat limited before the twentieth century, the building of small boats flourished after World War I. With the exception of the M. M. Davis & Son shipyard in Solomons, most of this boatbuilding was based in backyards and in a few marinas. The number of builders of wooden boats in Calvert and Charles Counties was relatively small, but the number in St. Mary's County was surprisingly large, due chiefly to commercial and sports fisheries on the Potomac River and its many tributaries.

The authors have written about the types of boats built and the craftsmen who produced them, working from records and interviews. They were able to document a large number of the boats and builders in photographs, many loaned by family members, but also aided by two special projects — the Patuxent River Folklife and Oral History



The new soft-cover book is for sale in the Museum Store for \$19.95 (discount for CMM members) and in several other locations.

Project carried out by the museum in the early 1980s, and an oral history project of Charles County historian John Wearmouth in the 1980s and 1990s, now housed in the Southern Maryland Resource Center of the College of Southern Maryland. 🚤

BUGEYE TIMES

Quarterly Newsletter of the
Calvert Marine Museum
(A Division of Calvert County Government)
and the
Calvert Marine Museum Society, Inc.
(ISSN 0887-651X)

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The bug-eye was the traditional sailing craft of the Bay, and was built in all its glory at Solomons, the "Bug-eye Capital of the World." Membership dues are used to fund special museum projects, programs, and printing of this newsletter. Address comments and membership applications to:

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FORMER TENNISON CAPTAIN DIES

From 1980 to 1984, five full seasons, the museum's tour boat *Wm. B. Tennison*, was captained by Lt. Comdr. James G. Tallant, then retired, a former hard-hat diver in the U.S. Navy and from 1967 to 1969 the commandant of the Naval Surface Weapons Center in Solomons. Jim Tallant was an excellent ambassador for the museum just soon after the museum acquired the *Tennison*.



He was noted for his unfailing good humor (and humorous comments) that added enjoyment to the trips taken by early visitors as the museum was developing. At that period the *Tennison* also made frequent visits to Baltimore Harbor events, St. Mary's City, and Chesapeake Appreciation Days at Sandy Point near Annapolis. Many years ago he and his wife moved to Florida where he died in July at age 84. 🚤

MEMBERSHIP AND DEVELOPMENT

Fundraisers Enjoy Success

As a member of the museum, you have either heard about, or attended, an outdoor concert at the museum. The shows this past summer, *Hank Williams, Jr.*, *Styx & 38 Special*, and *The Steve Miller Band* were very successful in raising funds for museum initiatives, thanks to the help of our community and especially, our members.

But what you may not know about the concerts is that nearly 200 volunteers are involved in the organization of the event; it takes two days to set up for a three-hour concert and two days to break down; the concert series began in 1985 and has been growing continuously for twenty-four years; over forty-two nationally known acts have graced our stage since 2005; and it takes the support of twenty-two local businesses sponsoring this event to help underwrite the cost each season.

The funds raised through these concerts constitute a critical part of our operating budget. We're glad you enjoy them, and we appreciate your support of the museum.

We will be announcing our indoor **winter concerts** shortly, so please look for information online and in your email blasts. The indoor shows are held in our auditorium that seats 200 people. The atmosphere is quite different from our outdoor concerts and so is your experience. The museum enjoys bringing quality music year round to Southern Maryland, and we will often try out a potential summer opening act during these winter shows. We hope you'll join us!

The 2009 Bugeye Ball Becomes a Winter Gala

The museum's annual fundraising event, The Bugeye Ball, is undergoing some changes. Historically the ball is held in October, but this season the ball will be held on Saturday, February 27, 2010. The Board of Governors has become actively involved and is putting their own touches on the event, starting with renaming it the "Winter Gala." So if you are a Bugeye Society member, or have attended in the past, expect the same great food, exciting entertainment, and fun, but look for some new and unique touches. For those members who have not attended in the past, the upcoming event will be an opportunity to treat yourself to a wonderful evening of food, fun, and friends while also supporting the Calvert Marine Museum.

The museum will begin collecting sponsorships and donations for the February 27 event during this calendar year, just in case you or your business need a 2009 tax-deduction. Proceeds from the event will benefit the final phase of renovations planned for Cove Point Lighthouse. If you would like additional information about the gala, or would like to speak with someone about the opportunity to support this event, please call Vanessa Gill at 410-326-2042, ext. 18. ▲



The Steve Miller Band performed to a sold out audience Friday, August 21, 2009. Hits like "Jet Airliner," "Swingtown," "Jungle Love," and "Dance, Dance, Dance" had the crowd on their feet singing and dancing all night long! Mr. Miller spent some time shopping in the Museum Store and going through the museum, and commended the museum for being a treasure in this community. (Photo copyright 2009 John M. Hartman.)

Hold Your Event Here



Did you know that the museum rents different spaces in the museum to hold special events, meetings, or even a small wedding? Spaces include the new Corbin Pavilion, the museum's auditorium, lobby, and conference room, as well as unique locations such as under the Drum Point Lighthouse and aboard the *Wm. B. Tennison*. So if you are looking for a memorable location for your next event, please call 410-474-5370. ▲

CMM photo by Rob Hurry

Remember the Museum Store for Holiday Shopping

Keep the museum's store in mind when you shop for the upcoming holidays. There are wonderful gifts there — jewelry, clothing, fashion accessories, books, posters, and many other things. Museum members receive a 10 percent discount at all times (bring your membership card), but this is increased to 20 percent during the Solomons Christmas Walk, December 4 and 5, and also during the Members' Yule Party on December 6. The store will provide free gift-wrapping from 10:00 a.m. to 4:00 p.m. on December 5. ▲

The Summer of 2009 at the Museum

Four summer camps and three Intergenerational Elderhostel Programs during the summer kept the education department staff and volunteers extremely busy. The season began on June 22 with the first of three Elderhostel programs, followed by two more in July, all with the theme of "Fossils, Fins, & Fun," and attended by sixty grandparents and grandchildren. The four camps for various ages began on July 13 with the "Shark Attack Camp," followed by the "Brownie Summer Camp" and the "Cardboard Boat Camp" on July 20, and ending with the "Chesapeake Indian Summer Camp" on July 27. The following are selected scenes from these various educational activities of the museum. ⚓



An intergenerational group operates radio-controller boats off the CMM pier.

CMM education department photo



A second intergenerational Elderhostel group assembles at Annmarie Garden for a group photo.

CMM education department photo



"Shark Attack" campers search for sharks' teeth.

CMM education department photo



Brownies study life in the CMM marsh.

CMM education department photo



Campers prepare for a cardboard boat regatta.
CMM education department photo



The Chesapeake Indian campers visit the Native Village at Jefferson Patterson Park and Museum.
CMM education department photo



The annual meeting of the Volunteer Council was held in the Corbin Pavilion on September 1. CMM director Doug Alves (left) thanked the volunteers for all their efforts on behalf of the museum. In the center of the photo is Peggy Hovermale, president. The volunteers present reelected Peggy as president, along with Sherma Munger, vice president, Harry Childers, treasurer, Anne Harrison, corresponding secretary, and Teddie Watts, recording secretary.
CMM photo by Bob Hall



The lineup of people attending the ever-popular Sharkfest! on July 11.
CMM education department photo



A free cruise on the Wm. B. Tennison during the First Free Friday in August, sponsored by M&T Bank.
CMM education department photo

Jewels of the Chesapeake (Continued from page 1)

During the summer sea nettles eat twenty-four hours a day. They mostly feed on small zooplankton, called copepods, but also feed on fish eggs and larvae, worms, and ctenophores. Each tentacle is covered with thousands of stinging cells called *nematocysts*; each nematocyst has a trigger that when disturbed opens a “door” that releases a barb containing a neurotoxin that paralyzes the prey. Feeding tentacles then pull the prey inside the jelly for digestion. Nematocysts can remain viable and cause a sting well after the jellyfish dies. This is why you can be stung by sitting on a dock where a jellyfish has died and dried up.

Sea nettles are ideally suited for life in the bay, and have few predators and only one main competitor for food — ctenophores, which are commonly called comb jellies or sea walnuts. However, jellyfish solve the issue of competition from ctenophores by eating them and reducing their population to near zero in the summer, a good thing as it turns out.

Ctenophores also have an interesting life history. Unlike true jellyfish they do not have stinging cells, but feed by capturing their prey with sticky substances. Most are hermaphrodites, which mean that they function simultaneously as both males and females, and they are capable of self fertilization. There is no larval stage with ctenophores and they do not form a polyp. Appearing like a spaceship from *Star Wars*, they propel themselves through the water by bands of cilia that drive them into the plankton for feeding. It is these bands of cilia that diffract light, producing the rainbow of color that is so spectacular to watch in aquariums. This effect is not to be confused with their bioluminescence, which produces a large green glow in the water when they are disturbed. Boaters often see this at night when their hulls or propellers hit them.

Ctenophores are voracious predators of zooplankton, including fish eggs and larvae, and oyster larvae. During the summer when oysters spawn they produce larvae that spend several weeks swimming as plankton before settling down as spat on oyster shells. If there were a large unchecked population of ctenophores, most of the oyster larvae would not survive. Without jellyfish to control the ctenophore population, the bay would not have developed the large oyster reefs of the past, and there would be little hope of restoring oysters in the future. Sea nettles also eat oyster larvae but spit them out unharmed. When ctenophores were accidentally introduced into European waters where there were no jellyfish to feed on them, the population explosion collapsed the commercial fisheries in the Black and Caspian Seas when they consumed the fish eggs and zooplankton that the fish relied on. Although jellyfish may be a nuisance to swimmers, they play a critical role in the Chesapeake ecosystem by controlling ctenophores.

Jellyfish at CMM

Jellyfish are fun to watch in aquariums, and our exhibit here is quite popular. Unfortunately, sea nettle medusae have fairly short life cycles and they often die during the winter, which makes exhibiting them year round difficult. When they are available we can substitute ctenophores, but often end up with an empty tank in the late winter. We decided, therefore, that the solution was to grow our own. In 2008 we began to consult with other aquariums that are successfully reproducing jellyfish and to develop procedures to grow them here.

The structure of jellyfish is quite simple, but culturing them in captivity is a fairly involved and time-consuming process that requires specialized aquariums, diets, and a bit of luck. To successfully raise jellyfish it is necessary to collect polyps from oyster shells and place them into small aquariums where we can control the temperature, salinity, light, and amount of food. Since jellyfish are predators, we grow small, live zooplankton (brine shrimp). We also grow algae to feed the brine shrimp so that they provide adequate nutrition to the polyps. This is the easy part. We now have to figure out how to stimulate the polyp to begin reproducing asexually and releasing ephyrae — those little dinner plates. This is not so easy, and it sometimes occurs naturally and we do not know why. Since we want to control the timing to ensure that we produce young jellyfish when we need them, we are conducting research on how to stimulate the polyps to reproduce. This involves manipulating light, temperature, food, and the addition of stimulants. We have had some success, but have still not developed a “recipe” to ensure consistent success.



Aquarist Lori Mason feeds the brine shrimp to jellyfish polyps attached to oyster shells.

CMM photo by Ken Kaumeyer



Volunteer Tom Younger finishes construction of an aquarium for young jellyfish in the CMM workshop.

CMM photo by Ken Kaumeyer

Once the polyps have produced ephyrae, they are transferred to a special customized tank to grow. Jellyfish are very fragile and are easily injured by bumping into tank edges, so we built curved trays for them. We also have to have screens so that they are not washed away and killed by the pumps and filters. At this stage we feed them rotifers and freshly hatched brine shrimp. Aquarist Lori Mason is the staff person who is responsible for most of the research and jellyfish culture, and she has been continuously refining the process. The ephyrae and small jellyfish are very sensitive, and she has found that even small changes in tank design and flow rates have a major impact on survival.



Lori Mason inspects a special aquarium that will be used to grow jellyfish to adult size.

CMM photo by Ken Kaumeyer

The ephyrae soon begin to resemble miniature jellyfish and need to be transferred to yet another specially designed aquarium. Here at the museum, we typically design and construct much of our own specialized equipment and exhibits, relying on the collective skills of staff and volunteers. This not only saves money, but also allows us to create exactly what we need to do the job. The next size aquariums were constructed by volunteers Tom Younger and Richard Rogers who are very talented acrylic fabricators. It is essential for jellyfish survival that these tanks produce circular water motion and keep the jellyfish tentacles from being washed through the water discharge, and we are very pleased with the way these tanks have performed. Tom and staff person Skip Edwards also constructed four stands that allowed us to position all the tanks and equipment in a very small workspace.

The final step is to transfer the small, one-inch-wide jellies to a larger cylindrical tank that has been specifically designed to grow jellyfish to adult size. We have designed these tanks and their life-support systems and we hope to have them operational this fall. At this point brine shrimp alone will not be sufficient to get the jellies to grow to adults, so we plan to grow a second species of jellyfish (moon jelly) to use as food for the sea nettles as they mature. We are proud to announce that all the jellyfish currently on exhibit were grown in our tanks — we are well on our way with this project.

Once these final tanks are completed we will be able to develop final procedures to culture jellyfish as needed. Since the Chesapeake ecosystem is a very complicated web of linked species and complex life cycles, it is always challenging to attempt to understand and reproduce small parts of it. As biologists we enjoy doing this and find it rewarding when we successfully recreate a bit of Mother Nature to share with you. We know that you will enjoy watching jellyfish year around. 🚤

Dominion Grant Helps Extend Our Reach

The museum's distance learning programs give teachers anywhere in the world the ability to bring real-time educational experiences right into their classrooms by using point-to-point video conferencing via the internet. Our distance learning programs take the museum's themes and expand them to fit a wider audience. We offer six programs: one on fossils, two programs about Captain John Smith and his historic exploration of the Chesapeake Bay, a program about lighthouses, one on the environmental importance of the estuary, and one on invasive species. Thanks to a \$10,000 grant from Dominion — an energy distribution company that operates Cove Point LNG north of our lighthouse — we are able to offer seventy-five free programs to schools in Dominion communities around the country at no cost to the school. What a terrific way to share our work here at the museum. Thanks, Dominion! 🚤

VOLUNTEER SPOTLIGHT

Education Programs Embrace Volunteer Partnerships

By Sherrod Sturrock, Deputy Director

This summer the education department had a banner season. We ran three Elderhostel programs, six summer camps, four overnights, three First Free Fridays, Sharkfest!, and a wide variety of public programs. It was a very busy summer; the museum welcomed 24,588 visitors from June 1 through August 31. You frequently read about our volunteers in this newsletter, and they have always played an important role in keeping the museum running smoothly. This summer marked a high watermark in the integration of volunteers into our educational programs. The photos on pages 4 and 5 illustrate the range of activities during the summer.

Due to financial constraints, we were unable to hire a college summer intern or high school camp aides this year. This, coupled with a very aggressive schedule, required us to think creatively about using our human resources. Working with Sherry Reid, the volunteer and events coordinator, we identified volunteers who have the skill, time, and energy to assist in the summer camps. Each museum educator was paired with a volunteer who worked every day, side by side, to make the camps run smoothly. These

people included two high school students, a college student, a consultant and his wife, a working mom, and a retired volunteer.

In addition to these dedicated folk, we worked with volunteers from the Solomons Island Model Boat Club, the Patuxent Small Craft Guild, and the Canoe and Kayak Club to provide terrific experiences with sailing model boats, making toy boats, and canoeing in the basin for all three of our Intergenerational Elderhostel Programs and our cardboard boat camp. The Elderhostel program, which is residential, requires help not only with programming, but also with meals. We had volunteer help with every lunch and dinner for three weeks.

To say that maintaining this level and quality of programming would not have been possible without volunteers is not hyperbole — it is fact. But more than that, the presence of so many committed and talented volunteers enrich our programs enormously. We are excited about this evolving partnership and look forward to finding more ways to use the amazing experiences and resources of our dynamic volunteer family. 🚤



Volunteers Al Suydam and Butch Garren, SIMBC members, assist with the intergenerational Elderhostel.

CMM education department photo



Volunteer Brescia Beckner (right) helps participants in the "Shark Attack" Camp identify fossils.

CMM education department photo



Long-time volunteer Al Lavish assists with boatbuilding instruction at an Elderhostel.

CMM education department photo



Volunteer Kim Zabiegalski (right) helps with this summer's Girl Scout Camp.

CMM education department photo

NATIONAL MODEL BOAT REGATTA, 2009

The Solomons Island Model Boat Club, sponsored by the Calvert Marine Museum, hosted the 2009 Vintage Model Yacht Regatta, September 10 to 13. The regatta, an annual event that takes place in different locations along the coast, featured races with skipjacks, schooners, and vintage-class models. Entrants ranged from the smaller class thirty-six-inch vintage boats to some over six feet long, racing on Back Creek just outside the museum's boat basin. Contestants included entries from Maine, Massachusetts, New York, Virginia, North Carolina, South Carolina, Ohio, and Illinois — some thirty in all.

A model boat represents an intricate combination of craftsmanship and engineering that takes at least two to three months to complete. Enthusiasts are a specialized group who take great pains to replicate full size vessels and to ensure accuracy and speed of their diminutive craft. Each bears the signature style

of its creator, complete with unique sails and markings.

The event began on September 10 and continued through the 13th, despite some less-than-ideal weather. On Saturday, the vintage models appeared in this event for the first time with the skipjacks and schooners, having previously had a regatta of their own. On Friday evening, Scott Todd, well-known waterman and model maker from the Eastern Shore, talked about his restoration of the full-size skipjack *Lady Katie*, docked in Cambridge, Maryland. 🚤



CMM photo by Bob Hall