Keeping The “Critters”:
or What do Bluefish, Jellyfish, and Seahorses Have in Common?

By Ken Kaumeyer
Curator of Estuarine Biology

Visitors to CMM’s estuary often ask what is involved in collecting the exhibit animals, and how difficult is it to maintain their health in captivity? They are often surprised when we explain the procedures employed under the general heading of public aquarium husbandry. Each exhibit is maintained differently, the various species of animals have vastly different dietary requirements, their behavior patterns require constant monitoring, and there are pumps, plumbing, and electrical systems to be maintained, which have a fascinating habit of breaking down at 4:25 p.m. on Friday afternoons. This article will present a brief overview of the collection and care of our exhibit specimens.

Unlike most public aquariums that focus on either freshwater or fully marine species, we feature the Chesapeake Bay estuary, which varies from fresh to highly saline waters. Maintaining exhibits of widely varying salinities has both advantages as well as several difficulties. Since estuarine animals have evolved the physiological ability to adapt to limited changes in the salinity and temperature of the bay, they are somewhat easier to take care of. Fully marine species are very intolerant of slight variations of salinity and require careful monitoring of aquarium water, whereas our fish can tolerate the gradual changes that occur here as a result of changing rainfall patterns.

One drawback to estuarine exhibits is that we never know from year to year what the salinity of the Chesapeake will be. In dry years the water is saltier and many different species migrate farther up the bay. In wet years, when the salinity drops, these species that prefer saltier waters move south. When the salinity of the water that we pump in for the aquariums becomes too low, we have to purchase large amounts of salt to keep the aquariums at the correct salinity for the species that require the more saline water.

As our aquariums are relatively small (3,500 gallons is the largest), the animals quickly outgrow them, and are released back to the habitat where they were collected. On the average we keep a fish for a year or two before releasing it. Each year, therefore, we must replace the animals that are released. Many years we are able to collect locally, but the large input of freshwater into the Chesapeake this past spring and summer required us to travel south, between Tangier Island and Cape Charles, Virginia, to collect new specimens. Our twenty-five-foot boat is outfitted with various types of gear for collecting fish. For specimens larger than three to four inches we employ an otter trawl which is towed along the bottom and hauled back aboard the boat with a winch. Trawling is always interesting as you never know what might come up in the net — everything from stingrays in the Atlantic, to bushels of unhappy blue crabs that attempt to remove our fingers while we untangle them from the net, to a boatload of catfish in the upper Patuxent. Catfish have sharp barbs that are almost impossible to remove from the trawl, so one can spend several hours clearing the net. Trees are also pretty exciting “catches,” sometimes requiring a diver to swim down and untangle the trawl. One quickly learns where to avoid trawling.

Smaller species and juveniles are usually collected with beach seines. We often anchor the boat just offshore and two people pull the thirty-foot seine through shallow water. A third person follows behind and dives underwater to untangle the seine when it gets hung up on branches or old crab pots. The net is dragged on the beach and the fish and invertebrates quickly removed and either released or placed in buckets. Beach seining can be a lot of fun, because of the variety of animals collected, although we did nearly lose the museum’s curator of paleontology once when he went beyond a drop off and vanished while helping pull a seine. There is a rule in beach seining that states that the tallest person gets the deep end of the seine, hence doing the most work, getting the most jellyfish around legs and arms, and ending up considerably colder. For some unknown reason, the museum’s curator of estuarine biology (who is somewhat vertically challenged) has been unfairly accused of only hiring people who are taller than he.

Once specimens have been collected, we must quickly move them to the museum’s quarantine tanks for treatment.

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FOSSIL FACTS: A MYTH AND A MAMMOTH

By Sandy Roberts

The myth of the unicorn originated in India some 2,500 years ago, perhaps from confusion with the Indian rhinoceros. By the time the story reached Europe in the eleventh century, the unicorn was pictured as a huge horse with split hooves and a brown, lance-like horn spiraling from its forehead. Known as "alicorn," this horn was thought to possess miraculous, curative powers.

The first recorded use of alicorn was for the detection of poison in food. It was said to sweat if touched by food or drink containing poison, or, powdered and mixed with wine, to counteract any poison already consumed. Alicorn soon became a universal cure-all. It was said to cure fevers, bites, worms, loss of memory, madness, sadness, leprosy, ulcers, gout, dropsy, consumption, convulsions, and impotence. It would prolong youth and, some claimed, even raise the dead.

Demand for alicorn reached a frenzy, and various fakes appeared. The Scots straightened walrus tusks and passed them off as alicorn. Antelope and blackbuck horns came to market. Scandinavian fishermen sold the long, spiraled tusks of male narwhals for thousands of gold coins. Around 1600, the fossilized remains of woolly mammoths were discovered in Europe, and "experts" identified the tusks as unicorn horns. Demand soared again as more mammoths were discovered. A thriving horn-straightening business arose. This would be grated a bit at a time for wealthier customers, to be mixed with wine and drunk or mixed with wax and used as a salve.

By the end of the seventeenth century considerable doubt had arisen in scientific circles about the existence of the unicorns. In 1700, however, a drive by church leaders to restore faith in the Bible, where an animal translated as "unicorn" is mentioned seven times, reinforced public belief for another century. Finally, in the early nineteenth century, with the discovery that the horn was really the tusk of a mammoth, and the claim of the French naturalist George Cuvier that the unicorn was a zoological impossibility, the demand for alicorn dropped. Cuvier's statement was generally accepted and the unicorn relegated to the realm of mythology. Woolly mammoths, however, were very real, and their tusks and other fossilized remains have been found in Ice Age deposits of northern Europe and North America.

MUSEUM BOARD IN 1997

The County Commissioners have appointed two new members to the museum's Board of Governors for 1997. Carl M. Loffler Jr., St. Mary's County businessman, and Margaret W. Reynolds of St. Leonard will replace outgoing board members Phillip S. Hughes and Carey O. Randall, both of whom have served with distinction during the past six years. Three present board members were reappointed: Donald L. Brown, J. Matthew Gambrill, and Sherry D. Reid.

Board members continuing to serve include: Karen H. Abrams, J. Ernest Bell, William B. Glascock II, Jodie Lee Marinelli, Michael J. Moore, Carmen Nance Sanders, John A. Simpson Jr., John C. Smith, George C. TIlghman, and John W. Williams Jr. County Commissioner Dr. Mark R. Frazer is an ex-officio member of the board as is CMM's director C. Douglass Alves Jr. C. D. Bare serves as board treasurer. Members of the museum's board also serve as directors of the Calvert Marine Museum Society, Inc., the non-profit corporation that raises funds for the museum.

Alice Viverette, who has served as secretary to the museum director for nearly fifteen years, will retire on January 31, 1997. Appointed in June 1982 after several years at the Chesapeake Biological Laboratory, Alice served with former director Ralph Eshelman, acting director Paula Johnson, the present director Doug Alves. She also has provided secretarial support to the museum's Board of Governors. Alice has the third longest tenure among museum staff members, exceeded only by former director Eshelman and woodcarver "Pepper" Langley.

Staff members, museum volunteers, and visitors have all praised Alice Viverette for her unfailing cheerfulness, helpfulness, efficiency, and knowledge of the museum's activities and history. She and her husband Ted, who retired from the Calvert Cliffs Nuclear Power Plant, live in Lusby and plan to remain in the area.
OF SPECIAL INTEREST TO MEMBERS . . .

NEW BI-MONTHLY MEMBERSHIP RENEWAL SCHEDULE BEGINNING JANUARY 1ST!

Members can now expect to receive renewal notices a little closer to their actual renewal dates. The Membership Office is sending notices bi-monthly rather than quarterly. If you’re a March renewer who’s wondering why you haven’t received your notice, the good news is you can relax — you’ll receive it in February.

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Reminder: When you send your renewal back to us, you may peel off your address label and use it for your return address label.

SOCIETY SNAPSHOT

Total Membership: 2,173
Corporate Members: 49
New Members: 58

WELCOME NEW MEMBERS! A hearty welcome to the 58 new members that have joined the Society this quarter! Special thanks to these new premium level members: Contributing: Mr. & Mrs. Arthur Reeves, Karen & Phillip Richardson, Warren & Sarah Robinson, Ray & Trish Schiele & Family, Jack & Nancy Schnell, Kathryn & Albert Simkins, Irene R. Trodahl. Bugeye Society: W. Alan & Thelma Raffensperger. Sustaining Corporate: G. Thomas Daugherty, Ctd. Corporate Associate: Chesapeake Systems Integration.

TAKING MEMBERSHIP TO A HIGHER LEVEL are these members who upgraded this quarter: Paul & Catherine Armitage, Mr. & Mrs. Donald Behrens, Mr. & Mrs. David Kefauver, Ms. Ethel Carlow, Ms. Helen Ciotti, Dr. & Mrs. George E. Clarke, Warren & Beth Davis, Mr. & Mrs. Horace Eltonhead, John & Laurie Ford, Mr. & Mrs. James Franklin, John W. Frazier IV, Mr. & Mrs. Donald Kilpatrick, Mr. & Mrs. Bernard Lietz, Col. & Mrs. Leonard Mason, Donald & Jean McDougal, Anne & George Mychalatus, Theresa Wiltermyer, Peter Worch, Mr. & Mrs. Leonard B. Zuza.

THE 1996 YEAR-END APPEAL

It’s Never Too Late to Give

Although a new year has dawned, Calvert Marine Museum’s 1996 Year-End Appeal is still very much under way. We still welcome your unrestricted gifts.

As the museum grows, so does the demand for flexibility and responsiveness in programming. Year-End funds raised this year will help to complete final construction of "Treasure from the Cliffs" and will supplement education programs. In the 1995 Appeal, 167 members contributed $12,000, all of which benefited museum exhibits and outreach directly.

If you weren’t able to send a gift by the end of calendar year 1996, feel free to send one now. It’s never too late. The 1996 Appeal continues until the last gift arrives, whenever that may be!

All gifts to the Calvert Marine Museum Society are tax-deductible. Contributors (through February) to the 1996 Year-End Appeal will be noted in the spring 1997 Bugeye Times.

COOK’S CONUNDRUM’S

Simple Math?

Arrange these three numbers in increasing order of size without using a calculator.

a. $13^{21}$  b. $47^{14}$  c. $3^{49}$

* * * * * * *

Win a prize! Send your diagrammed solution to Cook’s Conundrums, CMM P.O. Box 97, Solomons, MD 20688.

OUR WARMEST THANKS TO ALL WHO SUPPORTED THE CALVERT MARINE MUSEUM THROUGH MEMBERSHIP IN THE CALVERT MARINE MUSEUM SOCIETY IN 1996.
PATUXENT RIVER APPRECIATION DAYS

This year's theme for Patuxent River Appreciation Days, October 12 and 13, was the centennial of the Cedar Point Lighthouse, recognized at the opening ceremony by U.S. Senator Paul Sarbanes and officials from the Naval Air Station Patuxent River. This lighthouse was part of the official PRAD poster, and was featured in a museum exhibit. Many other activities also interested the thousands of visitors who attended this annual event on the museum's grounds.

Celebrating the centennial of the Cedar Point Lighthouse — cake cutting by (left to right) Senator Paul Sarbanes, CMM Director Douglass Alves, and the commanding officer of the Naval Air Station Patuxent River, Capt. Elmer Standridge.

CMM photo by Leslie Scher Brown

Racing of radio-controlled models was a popular event for the Solomons Island Model Boat Club.

CMM photo by Richard Dodds

Harbor cruises were offered during PRAD on the Wm. B. Tennison and the Lady Patty, pictured here. This 1935 M.M. Davis-built ketch has been restored by Capt. Michael Richards and is now carrying passengers out of Tilghman Island.

CMM photo by Richard Dodds

The replica row galley of Commodore Joshua Barney's 1814 Flotilla visited the boat basin during PRAD. Mark Meadler explained the vessel and its history to visitors.

CMM photo by Richard Dodds

Harbor cruises were offered during PRAD on the Wm. B. Tennison and the Lady Patty, pictured here. This 1935 M.M. Davis-built ketch has been restored by Capt. Michael Richards and is now carrying passengers out of Tilghman Island.

CMM photo by Richard Dodds

The Bugeye Ball on September 20 drew many museum supporters for an evening of dining and dancing.

CMM photo by Debra Yory

Jimmy Langley is shown here installing the skull of the Great White Shark in the new paleontology exhibit, due to open to the public in March.

CMM photo by Bob Hall
LIGHTHOUSE UPDATE

There have been significant changes during the past three months for two of the local lighthouses described in an article in the previous Bugeye Times: the Cove Point Lighthouse will be turned over to Calvert County, to be managed by the Calvert Marine Museum, and the Cedar Point Lighthouse is no more, except for the top floor now being dismantled by CMM.

On October 23, an impressive ceremony was held on the grounds of the Cove Point Lighthouse to mark the pending transfer of this very historic landmark, dating from 1828, from the United States Coast Guard to the Calvert County government. The United States Congress approved this transfer, also voting to appropriate $90,000 to the Coast Guard to repair the seawall that provides essential protection. United States Senator Paul S. Sarbanes sponsored both the transfer and the funding for repair, supported by Senator Barbara A. Mikulski. During the months ahead, CMM will make plans for the use of this two-acre site, installing a small interpretive exhibit and arranging for public access. These plans, however, will not be complete until early 1998, so visitors will not be able to see the lighthouse until then. Under the transfer agreement, the Coast Guard will continue to maintain its automated aids to navigation at the site.

Cedar Point Lighthouse no longer exists in the bay off St. Mary's County, but parts have been saved. On October 17, a contractor for the United States Navy used a large crane to lift the wooden third floor of the lighthouse onto a barge, towed it to an area of the Calvert Marina on Mill Creek, and placed it on land. During the past two months CMM staff members and volunteers, headed by maritime curator Richard Dodds and registrar Robert Hurry, have worked to dismantle the structure and store it for possible future use by the museum. Although the structure suffered from exposure for many years to the weather on Cedar Point, particularly the framing where the lantern tower was removed in 1981, there were still salvageable beams, roof slates, and shingles on the sides. A number of interesting architectural details, including the sunburst ornamentation of the gable ends (see accompanying photo), were saved. The museum also received a number of the bricks from the lighthouse, significant because of their origin in Calvert County.

These two lighthouses, and twelve more from the Southern Maryland area, are part of a special lighthouse exhibit now on view in both the upper and lower changing exhibit galleries, with a hundred photographs and documents from National Archives, Coast Guard, and museum sources, as well as lighthouse-related memorabilia. The “Lighthouses of Southern Maryland” exhibit was created largely by a core group of volunteers, including Deborah Walker, Beth Davis, John Hurley, Tom and Mary Konrad, Kay and Buck McClellan, Jim Robinson, and Marilyn Ruark.
Keeping The “Critters”

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In calm weather we place them on the boat in holding tanks with compatible species and return to Solomons, changing the water along the way to ensure that the level of ammonia (excreted by the fish) in the tanks does not become toxic. If the weather is rough or they must be transported a long distance, we place the animals in heavy plastic bags, inject oxygen, and drive the sealed bags to the museum. We have made trips of up to five hours and never lost a fish with this method.

Collecting with nets often removes some of the fish’s scales and protective slime layer. The overall stress associated with capture also suppresses their immune systems, and the fish become very vulnerable to infections or parasites that would normally not cause problems. Infections can spread so rapidly that, if untreated, a fish can be overwhelmed in a matter of days. On arrival at CMM, newly collected specimens are immediately placed in a bath of antibiotics and are isolated from other animals for approximately seven to ten days. This prevents infections from developing while their scales grow back and stress levels are lowered. Depending on the species and salinity where captured, they will then spend up to three months in quarantine. During this time, we attempt to rid them of parasites that could infect other fish, acclimate them to captivity, and get them to eat the diet of smelt, squid, clams, and shrimp that most are fed.

Eliminating parasites is relatively easy in either fresh or full-strength seawater. In freshwater the fish are placed in a weak formaldehyde solution for a period of time. In seawater, they are dipped in freshwater and then placed in a tank containing copper salts for a month or so. When the parasites reproduce, the free-swimming young (called tomites) are destroyed before they can locate a new host. Unfortunately, neither procedure works well with the salinities found in estuaries. If the fish collected here are treated with copper, it destroys their gills, and the freshwater dips and formaldehyde treatments are not always effective. The only way to use copper is to raise the salinity to that of seawater, but many fish will not tolerate the high salt. Our approach is to give them a series of freshwater dips and formaldehyde treatments over time, which works reasonably well.

Most fish easily adapt to feeding in captivity but others require very specialized diets, or only make the adjustment if caught at an early age. Bluefish are an example of the latter category. These fish are very high-strung and difficult to transport, unless they are placed in large round tanks. If caught over about three to four inches in size, they usually will not feed and must be released to avoid starvation. The small blues will, however, quickly start feeding and do well, provided that they are not moved in a net. They are so high-strung that the stress of netting often kills them. When moving them from quarantine to an exhibit tank, we lower the water and dip them into a tub, which is then lowered into the new tank.

This year we were not able to collect any juvenile bluefish. As one was needed for the Chesapeake Bay tank, we decided to try a larger one which was collected with the hook-and-line method. True to form, the fish responded well to antibiotics, but refused to eat. We reasoned that one thing a bluefish understood well was a feeding frenzy, which is essentially what happens whenever we add food to the 3,500-gallon bay tank. We hoped that the bluefish’s competitive instincts would cause it to go after the food when all the rest of the fish did. Before placing the bluefish in the bay tank, we gave it anesthesia so that we could remove the gill parasites which most larger ones have. As the fish came out of the anesthesia, we rolled him into the tank and he woke up in a new world. We were partially right about competitive instincts — the other fish attacked the groggy bluefish and bit deep gashes in his back and tail. This went on for two days before they left him alone. The new bluefish, now nicknamed Slash, healed quickly due to its high metabolism, recognized the feeding frenzy, started eating, and is now growing and doing fine. We may try this procedure with other species, such as spotted seatrout, which also refuse to feed in captivity when caught above a certain size.

Other species, such as seahorses, sea anemones, and jellyfish require specialized care, and a great amount of time and effort to exhibit. We raise most of our seahorses in captivity. After the males give birth, the young must be quickly removed and placed in a holding tank to prevent them from being eaten. They will soon starve unless provided with the correct sized microscopic organisms necessary for their early growth. We maintain pure cultures of algae in our laboratory that are used to grow another pure culture of microscopic zooplankton called rotifers. The young seahorses feed on the algae/rotifer mixture for a short period of time. They then require a larger food size and switch to enriched brine shrimp and copepods that have been fed a mixture of algae and fatty acid supplements to enhance their nutritional value to the seahorses. The young seahorses make the transition to a larger prey size very quickly, and will starve if not presented with the correct diet. Eventually the seahorses are large enough to go in the exhibit tank and eat a mixture of algae-fed adult brine shrimp, copepods, and mysid shrimp.
The procedure that we use to grow the brine shrimp seems somewhat drastic, but gets rid of the egg cyst which can cause the death of a young fish. We take the brine shrimp eggs and pour them into a bath of concentrated sodium hydroxide and bleach. After a few minutes they are rinsed and placed in a bath of hydrochloric acid. They are rinsed again and are ready to incubate and hatch in about a day. By eating away the egg cyst with sodium hydroxide, bleach, and acid, the now rubbery eggs have a much higher rate of hatching. Of course, if we time the hydroxide/bleach treatment wrong, we end up with no eggs at all.

Other species, such as the sea anemones, barnacles, jellyfish, and comb jellies, also require that we culture various diets of rotifers, brine shrimp, copepods, and diatoms. To feed these species, we have a whole laboratory of bubbling jars and tanks of microscopic life growing under high intensity lights. Growing the algae requires sterile culture techniques to prevent other micro-organisms from contaminating and destroying the entire culture.

Sometimes we have mysteries that take time to figure out. We once had a large red drum which blacked out and went belly up every time he was fed. It started getting old having to pull the fish out of the tank after feeding and hold it upright while moving water over the gills until it recovered. We tested a bunch of theories until I recalled reading once that a dietary deficiency of a certain amino acid interfered with the transport of oxygen to blood during stress. Sure enough, our diet turned out to lack the amino acid, and the stress was caused by the fish’s attempts to feed as rapidly as possible while competing with all the others. We checked nutrition texts and discovered that porterhouse steak was very high in the desired amino acid. I suspected that the county’s purchasing department would not go along with a 100-pound order for steak, since they had questioned my need for 100 pairs of No-Nonsense panty hose a week earlier. When further homework determined that eels had some of the necessary amino acid, we added them to the diet, and the fish was fine from then on. By the way, we use panty hose to bag carbon inside the aquarium filters.

Each aquarium has its own separate biological and mechanical filtration system, and each requires weekly monitoring of water chemistry and salinity, water changes, and mechanical maintenance. We pump in water from the harbor, filter it, sterilize it with an ultraviolet sterilizer, and mix salt in or dilute it with freshwater to achieve the desired salinity for each tank.

The process of field collection, quarantine treatment, disease and parasite treatment, dietary provision, culture of specialized foods, predation control, and chemical and mechanical maintenance keeps the aquarium staff and numerous outstanding volunteers quite busy seven days a week, 365 days a year, even on Christmas Day!

In the title, I asked the question, “what do bluefish, jellyfish, and seahorses have in common?” The answer is very little, except that they all require careful attention to ensure their survival in captivity. Keeping the “critters” is a challenging, but interesting task, and if they could talk, I’m certain they would have some interesting tales to tell others when they are released.

Behind the scenes in CMM’s estuarium; CMM photos by Bob Hall

Apparatus for testing used by the estuarium staff and volunteers. CMM photo by Bob Hall.
Dorothy Ordwein Accepts State Volunteer Award

At an impressive ceremony in Annapolis on November 6, CMM volunteer Dorothy Ordwein was honored by Maryland’s Governor Parris Glendening as one of “Maryland’s Most Beautiful People,” a state-wide program recognizing outstanding volunteer efforts. A note in the fall issue of the Bugeye Times mentioned that Dot had been chosen for this honor as Calvert County’s representative for 1996, based on her long service at the Calvert Marine Museum and with other programs that help the state’s young people.

At this tenth annual awards ceremony, volunteers chosen from Baltimore City and each of the twenty-three counties were presented to the governor and Comptroller Louis Goldstein, with a brief citation read by mistress of ceremonies Donna Hamilton of Baltimore’s WBAL-TV11. Each recipient was given a large certificate and a bronze paperweight copy of the state seal in an appropriate mounting. Most recipients were accompanied by a county official—in Dot’s case, County Commissioner Mary Krug.

In her brief remarks of acceptance, Dot Ordwein stressed her philosophy of helping young people through educational programs, as exemplified by her volunteer work at the museum and through a broader program in Maryland for her church. Dot’s volunteering at CMM dates back to the early 1970s, making her one of the very few volunteers from that period still active here. She was featured in the “Volunteer Spotlight” in the fall 1993 issue of the Bugeye Times, and was also recognized with the museum’s first Volunteer Achievement Award.

The awards ceremony included music provided by the University of Maryland Studio Orchestra and a large choral group from Dorchester County. A number of Dot’s friends from Calvert County were on hand to applaud her honor on November 6.

A Note of Thanks

The color printing provided on the cover of the fall issue of the Bugeye Times was donated by HERITAGE PRINTING AND GRAPHICS, to celebrate their ten year partnership with CMM producing this award winning newsletter. The museum appreciates this kind of support from our members.