SOUTHERN MARYLAND IN DEEP TIME:  
A Brief History of Our Geology  
Part I: Fathoming the Ocean of Time  
By Peter R. Vogt*

The Bugeye Times editor has invited me to lead readers on a brief tour through what the noted nature writer John McPhee calls “Deep Time,” or geological time, in our part of the world — Southern Maryland. After mulling over this assignment, I thought it best to divide my “newsletter lecture” into three parts. This first part will set the stage, using our famous Miocene-aged Calvert Cliffs fossil exposures as a point of departure before climbing into the time machine to descend deeper into the ocean of time. In the second part we shall visit the dark depths “below” the Miocene, covering our plate tectonic voyage away from Africa, the effects of two mind-boggling comet or asteroid impacts, and other happenings from long ago. In the third part we shall fast forward into the world after the Miocene, when our present landscape began to take form. Dramatic comings and goings of ice sheets far from here caused the repeated goings and comings of the bays we now call “Chesapeake.” I shall try to explain how Calvert County streams, once flowing into the Patuxent River, were “pirated” by the Chesapeake. And I will NOT resist the temptation to speculate on the future, for example the effects that global warming could have on our geography.

If there is one interval of geological time Bugeye Times readers and CMM visitors know, it is the epoch called the Miocene. All the fossils crumbling out of the Calvert Cliffs and those on display at the CMM date from this time — or more precisely from the middle of the Miocene. That fossil assemblages could be used to identify and correlate sediment strata from one area to another, even globally, was revolutionary when first put to use by William Smith in England about two hundred years ago. This led directly to the “naming” of time intervals: the “Miocene” (“moderately recent”) subdivision of the “Tertiary” period was named by Charles Lyell in 1832. The Miocene (“Marked by the appearance of man”) or “Carpenter’s Epoch” was named by Professor George Simpson in 1846. (The Miocene is the only geologic time interval that is named after a trait of a living organism.)

Shattuck’s numbering scheme for the separate “zones” in our cliffs is still in use today, to the consternation of modern geologists who would like to revise his scheme. Even as Shattuck was studying the Calvert Cliffs fossils, however, physicists a decade before had discovered natural radioactivity, making it possible by 1913 to “age-date” the stratigraphic time scale. We now know the Miocene epoch lasted from about 23.8 to 5.32 million years ago. While the exact time scale dates will continually be refined in the future, the refinements are becoming smaller and smaller, and for a relatively “recent” part of geological time like the Miocene, future changes of more than a hundred thousand years — a few percent of its length — are those that will be seen. (Continued on Page 6)
WARRIOR’S REST —
An Artist’s Perspective on Chesapeake Bay Ecology

The museum’s link to the ecology of the Chesapeake Bay area is through its theme of the estuarine biology of the Patuxent River and adjacent areas in Calvert and St. Mary’s counties. Our land and water resources have their origins in the area’s geologic history, the subject of the lead article in this issue, but our ecological concerns have arisen more recently and are quite diverse.

We usually think of the ecology of the Chesapeake Bay area in terms of preserving the habitats of both the water and the land. An exhibit at CMM, opening this December with the title “Warrior’s Rest – An Artist’s Perspective,” will demonstrate how conservation, land preservation, and the environment inspire the creative mind. Thirty professional artists have been invited to paint, sketch, and be inspired by the natural surroundings of Warrior’s Rest, a magnificent 230-acre site located at the mouth of Parkers Creek as it enters the Chesapeake Bay southeast of Prince Frederick. Until recently, this land was owned by Dr. Page Jett who named the property after returning from military service. It is now owned by the state of Maryland and is managed by the American Chestnut Land Trust, a local non-profit corporation celebrating its tenth anniversary of preserving land in the Parkers Creek watershed.

Hosted by the American Chestnut Land Trust and the museum, the exhibit will showcase the creativity of the thirty professional artists, and will also illustrate the evolution of the process an artist goes through in using photographs, notes, and sketches from the site. The exhibit will run from December 1 through January 26 and will be located in the changing exhibit area of the Exhibition Building. An artists’ reception will be held during the festive Solomons Christmas Walk on December 13 from 6:00 to 9:00 p.m.

Further information about the American Chestnut Land Trust or the exhibit may be obtained by calling the ACLT office at 410-586-1570.
Of Special Interest to Members . . .

SOCIETY SNAPSHOT

Total Membership: 2,234
New Members: 160

WELCOME NEW MEMBERS! We welcome 160 new members to the society! Special thanks to our new premium members:

TAKING MEMBERSHIP TO A HIGHER LEVEL are members who upgraded this quarter: Col. & Mrs. Lawrence Bowby; Mr. & Mrs. Paul W. Celmer; Ms. Marjorie Clark; Ms. Delia Danzig; Russell, Joan, and Gail Dean; Mr. & Mrs. Bernie Dove; Jeanne Engelhardt; Mr. & Mrs. Alfred Ercolano; Mr. & Mrs. Walter Ewalt; Doris & Fr. Fenderline; Mrs. Frances Fischer; Barbara & Michael Gardner; Mr. & Mrs. Joseph Gondolf; Hugo & Cynthia Gonzalez; Harry & Phyllis Hughes; Ms. Mary Keeley; Dr. Arvid Larson & Ms. Nicole Sours Larson; Dr. & Mrs. Glenn Marinelli; Mr. & Mrs. Myron Marlay; John & Phoebe Marshall; Skip & Carolyn Marvan; Marty Miller; June & George Mineur Jr.; Andrew Misovec & Dinata Moulton; Frank Moorshead; Mr. George O'Connell; Mr. & Mrs. Eric Porch & Family; Ken Reid; Susanne Rohrer; Mr. & Mrs. John Seitz; Mr. Samuel Shafer; Diane & Charles Shasky; Mr. & Mrs. William Shook; Mary-Stuart Sierra; Peggy Singleton; Col. & Mrs. Robert Soderberg; The Stout Family; Ms. Candace Sullivan; Chuck Tretow; Mr. John Ward & Family; Mr. & Mrs. James Warnock; Mr. Gordon Page Williams.

COOK'S CONUNDRUMS

The museum director, Ms. Heron, was interviewing Mr. Nettles for the position of aquarist.

"Do you have any questions, Mr. Nettles?" Ms. Heron asked.
"Yes," Nettles replied. "How old are your three sea turtles?"
Ms. Heron smiled. "The product of their ages is 1,800, and the sum of their ages is twice your age."

After several minutes of intensive calculation, Mr. Nettles said, "I need more information."
"Yes, of course," said Ms. Heron. "Moe is older than you are."
"Why, then, I've got it," Mr. Nettles answered, smiling. "How old are Mr. Nettles and the sea turtles, Myrtle, Yertle, and Moe? Assume that all ages are whole numbers.

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

FOR MEMBERS ONLY ...

MEMBERS' HOSPITALITY SUITE AT PRAD
Enjoy refreshments, a private rest area, and other treats. Visit our hospitality suite in the Museum Lounge located on the upper level of Exhibition Hall. Hours are noon to 4 p.m., October 11 and 12.

MEMBERS' YULE PARTY
Sunday, December 14, 5:30 - 8:00 p.m.
Join us again for a magical holiday celebration! Our annual members' yule party features holiday brass, Christmas carols, wagon rides, Rita Adams' famous Weems Steamship Line eggnog, and SANTA!

In the true spirit of the season, you are invited to share your favorite holiday treats. Your culinary specialty, sweet or savory, is a gift we always treasure.

The yule party's popularity means limiting it to members only. To treat family and friends to this event (and a full year of fun) consider a gift membership. See the enclosed gift membership flyer for details or call Sybol Cook, your membership coordinator.

We look forward to seeing you. Please RSVP by December 12 at 410-326-2042.

THE 1997 YEAR-END APPEAL
An Opportunity for Unrestricted Support
As Calvert Marine Museum approaches the end of another spectacular year, we again reflect gratefully upon the many ways you've shown your support. Foremost in our minds is the completion of our final permanent exhibit, "Treasure from the Cliffs," made possible in part by more than 200 members and donors who contributed to the 1996 Year-End Appeal.

Year-End Appeal gifts provide much-needed unrestricted funds for project expenses we cannot foresee during the annual budget process. The Year-End Appeal has, for instance, facilitated unexpected exhibit repairs, supplemented Young Salts and Camp CMM programs, and enabled us to add significant items to museum collections when those items were offered.

In the coming weeks you will receive your 1997 Year-End Appeal packet. It describes how your gifts in 1996 supported "Treasure from the Cliffs" and other museum projects and how your 1997 gift will help meet current needs. All gifts are 100% tax-deductible and benefit museum projects directly.

We thank you for your continuing graciousness and responsiveness to Calvert Marine Museum's Year-End Appeal. Be assured that your gift goes a long way to keeping CMM at the forefront of American maritime museums.
WATERSIDE RIVER ROMP

Calvert Marine Museum Society’s first annual Bayside Toyota Waterside River Romp played to host to over 1,500 people on August 31, raising over $11,000 for CMM education and programs. The festivities began early in the day and spread throughout the museum grounds with entertainment of steel bank Island Trio, the Calvert High Pipe Band with Scottish dancers, juggler Roderick Kimball, and magician Bill Gross. The triple-headliner River Romp concert was under way by 6:30 with an Irish music and dance extravaganza by Celtic Thunder, followed by singer Maura O’Connell, and closing with Rosie Ledet — “The Zydeco Sweetheart” — who played over an hour of hip-swinging Zydeco tunes.

River Romp’s success is a tribute to the high amount of volunteer and local business support, with special thanks to the fifteen sponsors: Bayside Toyota; 97.7 The Bay; DM Group; First National Bank of Maryland; Main Message Center; Calvert Marina; Carmen’s Gallery; Lighthouse Inn; Mom’s in the Kitchen; Jones Communications; Solomons Landing; Traditional Homes; New Bay Times weekly; Coors, Coors Light, and Samuel Adams (Bozick Distributors); and Holiday Inn Select Solomons.
Captain Jackie Russell (center) talks with Elderhostel visitors aboard the Dee of St. Mary's during their program at CMM in June. (Another Elderhostel group visited CMM in September.) Photo by Debra Yorty

Activities at the Members' Annual Summer Picnic in August ranged from face painting to fiddler crab races. Photo by Debra Yorty

There were many educational activities this summer, with the Young Salts programs and Camp CMM attracting various ages. Melissa McCormick, educational assistant, explains bay life to young participants. Photo by Bob Hall

CMM's business supporters gathered for a "Corporate Caper" under the Drum Point Lighthouse in late June. Photo by Debra Yorty

Young participants in the Revolutionary War Encampment at CMM in late June. Photo by Debra Yorty
were washed into the Miocene sea from the land areas to the west.) This that sometimes forms on the seafloor and then is entombed in the sediments with the shells and shark teeth. (Most of the clay in our cliffs is the Miocene fossils. The volcanic rock contains some minerals with trace quantities of radioactive isotopes such as potassium-40 (the number 40 is the mass of the atom). The amount of “daughter” isotope trapped in the mineral containing the potassium is a direct measure of the elapsed time, because the decay constants (half-lives) are well known. The potassium-40 isotope decays to argon-40, so the amount of that gas, trapped in the crystal, is measured. Say the age is twelve million years; then the sediments below the lava must be older. If sediments of the earliest Miocene age were deposited on top of a lava flow that gives an age of twenty-six million years, then the Miocene must be younger than that age. And so on, for many places around the world.

It is sometimes possible to date sedimentary rocks with radioactivity directly, and a few such ages have been measured from our Miocene sediments. There is a type of clay mineral, like mica, called glauconite, that sometimes forms on the seafloor and then is entombed in the sediments with the shells and shark teeth. (Most of the clay in our cliffs was washed into the Miocene sea from the land areas to the west.) This green “new” clay “scavenges” relatively high concentrations of a trace metal, rubidium, from seawater. One of the rubidium isotopes is radioactive, decaying to a stable isotope of the element strontium. The glauconite is buried, and its age, when exposed to geologists, will be given by the amount of the strontium created over the eons of decay.

It turns out that the absolute age of a fossil shell in the Calvert Cliffs can be obtained, but not from any radioactive isotope in the shell. Rather, it has been established that the strontium isotopic composition of seawater has varied through geologic time. The rubidium “daughter,” strontium, with the atomic mass of 87, has become more abundant relative to “regular” strontium (86), during the last 150 million years. It is thus possible, knowing this variation, to measure the strontium isotope in the shell and get its age! Shells are mainly calcium carbonate, of course, but strontium is chemically similar to calcium and thus precipitated as part of the shell. So, scientists know the age of the sediments in our cliffs very well indeed.

As a geoscientist I cringe when I hear or read that the Calvert Cliffs are “millions of years old.” Nothing could be further from the truth. Yes, the sediments and fossils one sees exposed in the cliffs were laid down millions of years ago, but the cliffs themselves are very young. In fact, we can see the processes that maintain these unstable cliffs at work before our eyes. If sea level were to fall (or the land to rise), the Chesapeake tidewater would stop chewing away at its shorelines. Other kinds of erosion would smooth the steep cliff faces to forested slopes. Even in a year’s time the cliffs would start to look quite different! (More on that in the third part.)

Even the question of the age of the stuff you see in the cliffs has many answers. Think of the age of your house: is it the time your foundation was laid, the time the last “sticks and bricks” were put in place, the age of the boards or when the trees grew that made the boards, or is it the age of the atoms in the boards? These same kinds of questions can be asked of any geological formation. That fossil shark’s tooth you found was buried on the Miocene sea floor at some specific time, but before that it may have been washed around by currents. The shark who lost the tooth lived some time before that. And the tooth got its gray color by chemical reaction with solutions trapped among the sediment grains, so in that sense the tooth is YOUNGER than its “geologic” age. The materials in the tooth have been kicking around in various shapes and forms ever since the earth condensed out of our solar nebula about 4.6 billion years ago, and the heavier atoms were blasted out of a local supernova not much earlier. If you really want to be technical, of course, all the matter and energy around us has the same age, the age of the Big Bang, about fifteen billion years according to astronomers. This is about a thousand times further back in time than our Calvert Cliffs fossils!

Some (maybe many) have trouble “fathoming” deep time, even the age of a shark’s tooth only twelve million years young. Yet we routinely read and hear about human populations or dollar figures into the millions and billions. Give every person in Pennsylvania one year and we have the age of that Miocene tooth. Even the entire universe is younger in days than the US national debt is in dollars (6 trillion, I have read). This fact might make the ocean of time more fathomable (or it might make our national debt seem more formidable).

In any case, measuring the age of the Miocene, the rest of the “stratigraphic” scale, the Earth, and the universe has to be ranked as one of the premier achievements of our century. We have come a long way since Archbishop James Ussher of Ireland calculated from the “begats” in the Old Testament that Creation occurred during the evening of October 22, 4004 BC. Ussher first published that figure, off by a factor of 1,500,000, in 1654, the year Calvert County was founded three thousand miles away. Since there is no year “zero” in our calendar, the six thousandth anniversary of “Creation” can be celebrated this 22nd of October, 1997! Spend that day sailing on the Ocean of Time, or along the Calvert Cliffs, to peer into our wonderful “window” nature has provided us into the world of Miocene Maryland.

Next, African Connections and the Big Impacts from outer space.

*Peter Vogt is a geophysicist at the Naval Research Laboratory in Washington, D.C. and a long-time resident of Calvert County.
CMM SHARK SENT PACKING TO SOUTH AFRICA

The museum’s partnership with the South African Museum (SAM) in Cape Town celebrated a significant milestone this summer when CMM shipped a duplicate reconstruction of our giant fossil “megatooth” shark skeleton to South Africa. This is the second megatooth reconstruction produced by Jimmy Langley and Skip Edwards at CMM, and an exact copy of the one currently exhibited in CMM’s fossil hall “Treasure from the Cliffs.” The skeleton will be assembled and displayed at SAM in conjunction with their centennial year celebration. As with the CMM shark, the SAM skeleton is sculpted out of very dense foam, which will be covered with epoxy resin, fiberglassed, and painted to match the appearance of fossilized shark cartilage.

The CMM/SAM collaboration began in 1992, during the planning phase for the new fossil exhibit. Funding for the research that went into the project was provided by a generous grant from the American Association of Museum’s International Partnerships Among Museums (IPAM) program, the first federal-level museum partnership between a U. S. and a South African museum. Research on shark skeletal anatomy that was needed to develop the reconstruction was carried out by SAM shark biologist Leonard Compagno and Mike Gottfried (CMM’s curator of paleontology through July 1997). CMM is proud to have initiated this international collaboration, and to have played a role in establishing stronger scientific and cultural ties between the United States and South Africa. We look forward to continued involvement with our friends and colleagues in South Africa.

The paleontology department was involved early this summer in a second filming effort, to appear this winter on a cable television channel. In this videotaping, Mike Gottfried narrated the search for Miocene fossil remains in the bay waters at the base of the Calvert Cliffs. (Mike Gottfried)

COVE POINT LIGHTHOUSE STATUS REPORT

Speculation is that the bulkhead repair work will be bid after October 1, 1997, with construction to begin in early spring of 1998. The county can accept the transfer after the bulkhead work is completed. Discussions with the Coast Guard indicate at this time that they will not be ready for an official transfer of the lighthouse to Calvert County until summer 1998, with a dedication most likely in the fall of 1998.

There is still a Coast Guard family living in the cottage at the lighthouse to provide on-site supervision and overnight security. The basic maintenance and lawn mowing of the site continues to come out of the St. Indigos USCG station. There will be no public access until the property is transferred to the county.

A grant for $15,000 has recently been awarded by the Maryland Historical Trust’s Historical and Cultural Museum Assistance Program for exhibit design and production. Work has begun on the research and design aspects for outdoor signs, and panel exhibits that will be in some of the buildings.
VOLUNTEER SPOTLIGHT —
Paxent Small Craft Guild
By George Surgent*

Fragile Craft
Wooden boats stir deep emotions. They are loved and they are hated, sometimes simultaneously. Their vulnerability and intolerance of neglect can evoke apprehension and fear. They can be objects of praise and adoration for their abilities to shoulder great seas and survive unrelenting tempests. Indeed, as the Bible would have it, all life on the planet is deeply indebted to the skills of the boatbuilder. Boats as cultural icons are nearly universal and represent the technology responsible for linking our continental and island culture in the formation of our present-day global society. Their involvement in human salvation is undeniable.

Yet for all these seemingly obvious attributes and importance, the craft of turning trees into boats is quickly disappearing. Despite all of the scholarly writings, glossy photographs, slick videos, intricate plans, and the documentation of their construction and existence, the once-common skills of the boatbuilder are dying. In fact, so obscure and fragile is this tradition that boats that once took only weeks to build can now take years, despite modern woodworking technologies and the involvement of historical and educational institutions. It is taking more to produce less. What is missing?

“Batter Up!”
As any young person in little league soon finds out, no amount of watching, reading, or collecting baseball memorabilia can make you into a good batter or fielder, nor does it do anything to perpetuate the game. There is no substitute for first-hand game experience and regular consistent practice. When an accomplished ballplayer is asked “Where did you learn to swing a bat?” the reply most likely will be “Coach Jones, Dad, Mom, or Uncle Bill,” NOT the Baseball Hall of Fame or The Complete Book of Baseball. There is no substitute for learning a skill in the physical presence of a teacher — show-and-tell, person-to-person.

What Does All This Have to do with the Patuxent Small Craft Guild?
The guild’s charter, adopted in 1981, states: “The purpose of the guild is to perpetuate the art of building traditional wooden boats....” The key word in the charter is “perpetuate”: to make perpetual or cause to last indefinitely. How does the guild perpetuate the art? By practicing the vital skills of cutting, shaping, and assembling wooden components into boats and sharing that experience with others on a first-hand basis. To date, the guild has built no fewer than eighteen full-size boats (three log canoes and fifteen skiffs of various types), has taken part in the stabilization and restoration of most, if not all, the boats in the museum’s collection, and has cut out model boat parts for literally thousands of young people to assemble during activities conducted by the guild at PRAD and Patuxent Family Discovery Day. Currently, the guild is involved with the construction of a thirty-six-foot draketail workboat and is planning the future expansion of the museum’s boatbuilding facility. The planned, all-weather facility will allow stabilization, restoration, and building projects to be performed year round.

Boats are among the museum’s largest artifacts, but the skills to create and maintain them are teetering on the rim of the abyss. Please support CMM and the guild’s mission to vitalize these arts and skills. If you are interested in learning more about the Patuxent Small Craft Guild or in participating in guild activities, contact the president, Bill Lake, on 410-586-1534.

*George Surgent is the past (and first) president of the guild.

CALVERT MARINE MUSEUM
P.O. Box 97
Solomons, MD 20688

Accredited by the American Association of Museums