

**TEXAS A&M
SEA GRANT
COLLEGE PROGRAM**



Marine Education

DISTRIBUTED AS A PUBLIC SERVICE TO TEACHERS AND STUDENTS BY THE TEXAS SEA GRANT COLLEGE PROGRAM

Spring beach cleanup set April 23

The next major beach cleanup in Texas is scheduled for April 23, 1988, as part of an all-out effort to beautify the state. Volunteers from throughout Texas will participate in a joint cleanup of highways, rivers, lakes and beaches.

While most coastal states now plan beach cleanups in September, as part of the Coasts Weeks observance, Texas has two scheduled events and encourages volunteers to clean a segment of beach on at least one other occasion.

The Texas Adopt-a-Beach program was initiated in October 1986 by Texas Land Commissioner Garry Mauro to involve the public in a comprehensive campaign to rid the state's beaches and coastal waters of trash and garbage. This is a volunteer effort patterned after the successful Adopt-a-Highway program of the Texas State Department of Highways and Public Transportation. Like its predecessor, Adopt-a-Beach has been successful beyond original expectations. The 172



miles of accessible beach have been adopted by 130 groups. Adopters have also been found for 14 of the 111 less accessible miles. Since the first statewide cleanup conducted by the Adopt-a-Beach program, 10,800 volunteers have picked up 446.5 tons of garbage along the Texas coast.

A long-term solution to the beach garbage problems was to muster

support for ratification of Annex V of the MARPOL Treaty, the International Convention for the Prevention of Pollution from Ships (see accompanying story, page 2). This goal was met on Dec. 30, 1987, when Annex V, which prohibits the dumping of plastics in the ocean worldwide, was ratified by the United States. The U.S. Congress also passed implementation legislation for enforcement of the annex, to go into effect on Dec. 31, 1988. The Adopt-a-Beach program now adds education about the effects of the implementation of MARPOL Annex V to its educational goals.

Children will be a primary target of the public education program. Lucky the dolphin, the new Adopt-a-Beach mascot and symbol for the Texas Marine Mammal Stranding Network, will help spread the program's message to this audience. Lucky got his name because of his recovery from entanglement in a trawl net in the Gulf of Mexico. He was scarred and
(See Cleanup, page 2)

Symposium speakers include Mauro, Frank

Commissioner Garry Mauro of Texas' General Land Office, Dr. Neil Frank, former director of the National Hurricane Center, Ken Cross, Assistant Attorney General for the State of Texas, and Dr. William Merrell, President of Texas A&M University at Galveston, are just some of the featured speakers for the ninth annual Marine Education Symposium set for April 16, 1988.

This year's Symposium, co-sponsored by the Texas Sea Grant Program and Texas A&M University at Galveston, will be headquartered at Texas A&M-Galveston's Mitchell Campus, but the entire Galveston Island will serve as the site for a variety of field trips and workshops. Participants have an opportunity to experience the beach and bay environments, learn about water safety and ongoing research into sea turtles, marine mammals, oysters, octopi and squid,

and tour the historic Strand district.

The Symposium format includes three concurrent lecture sessions on either scientific research or more general topics during both the morning and the afternoon. Students will be divided into two groups, with half attending lectures and half participating in field trips or workshops in the morning, and switching their schedules in the afternoon.

Marine science is represented by a number of speakers who have been well-received in previous years, such as Dr. David Owens, who heads Texas A&M's efforts in sea turtle research; Dr. André Landry, who will discuss the manned underwater habitat, Hydrolab; Dr. Thomas Bright, who has spent a number of years researching the problems of Gulf coral reefs; Anthony Amos, who will offer a personal perspective of modern beachcombing; and Dr. Douglas Slack, who will

discuss Texas' coastal birds.

In addition, the Galveston location brings the expertise of that campus' faculty to the Symposium for the first time. Dr. Harold Alexander will talk about marine engineering; Dr. Donald Harper will offer a look at supposedly "barren" sandy beaches; Dr. Sammy Ray will discuss the need to protect Texas' estuaries; and Dr. Bill Seitz will provide a perspective of new shapes in oceanography.

The program also includes speakers from The University of Texas Marine Science Institute, the U.S. Navy, the Galveston Historical Society, Texas Water Commission, The University of Texas Marine Biomedical Institute, National Marine Fisheries Service Galveston Laboratory, U.S. Fish and Wildlife Service, and the Texas Marine Advisory Service.

Details of the Symposium are
(See Symposium, page 7)

MARPOL ratification bans ocean dumping of plastics

When President Reagan signed the law authorizing the U.S. government, through the Coast Guard, to enforce an international marine pollution treaty on Dec. 30, 1987, it triggered laws that will ban the dumping of plastics and regulate the disposal of garbage in the world's oceans.

U.S. ratification of Annex V of the Marine Pollution Treaty means the amendment will become effective on Dec. 31, 1988, the day that the International Maritime Organization was notified of the U.S. action. The amendment had required that a minimum of 50 percent of worldwide shipping sign the treaty, and the U.S. represented the final 5 percent of this total.

Two other sections of the treaty, dealing with petroleum waste and bulk shipments of hazardous wastes, have already been approved, and Coast Guard officials say they have seen a 98 percent compliance rate by ships in U.S. waters. The new amendment, Annex V, will do the following:

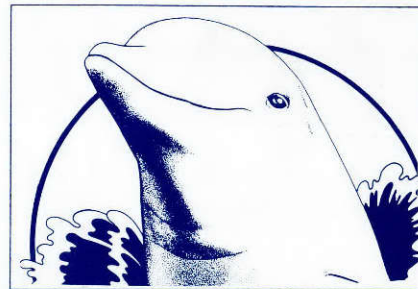
- Prohibits discharge of any plastics anywhere in any ocean.
- Prohibit discharge of other floating solid wastes closer than 25 miles to the nearest coastline.
- Require the provision of garbage reception facilities in ports.
- Set up special areas where only solid wastes from foodstuffs can be discharged.

Five bodies of water — the Mediterranean, the Red Sea, the Black Sea, the Baltic Sea and the Persian/Oman

Gulf — are designated as special areas where dumping of any substance, except food, is prohibited. The U.S. will now seek an amendment to add the Gulf of Mexico to this list. Much of the effort for this special designation is being spearheaded by Commissioner Garry Mauro of the Texas General Land Office, whose office is drafting the wording for the new amendment.

Among the countries that have signed Annex V are the Soviet Union, the United Kingdom, Japan, France, East and West Germany, Panama, Peru and Uruguay.

Most of the South and Central American countries have not signed the treaty, but formal talks with Mexico have begun. Mexican officials are particularly concerned about the need to provide garbage reception facilities in ports, because of the cost involved, but the Coast Guard is optimistic that an agreement can be reached.



Cleanup . . .

(Continued from page 1)

bleeding when he was turned over to Sea-Arama Marineworld and the Marine Mammal Stranding Network. Lucky eventually made a full recovery, and now resides at Sea-Arama. He will make appearances for the Adopt-a-Beach program in various places — in a coloring book for elementary schoolchildren, as the star of a puppet show, and in public service announcements.

Anyone interested in participating in the April 23 cleanup should call the Adopt-a-Beach toll-free number, 1-800-85-BEACH or a local county coordinator.

Adopt-a-Beach County Coordinators for April 23 cleanup campaign

Cameron County

Teresa Caldwell
Cameron County Parks Department
512/552-9242

Padre Island National Seashore

Bob Whistler
National Parks Service
512/949-8173

Kleberg County

Don Flint
512/949-8984

Nueces County

Ellen Trevino
Keep America Beautiful
512/884-0818

Ray Allen
Texas State Aquarium
512/851-2595

Aransas County

Steve Trevino
City of Rockport
512/729-2213

Calhoun County

Leroy Belk
County Commissioner, Precinct 1
512/761-5493

Matagorda County

Carol Allen
Matagorda Real Estate
409/245-4990

Brazoria County

Kim McAdams
Brazoria County Park Commission
409/849-5711 ext. 1541

Galveston County

Denise Heise
Bolivar Peninsula
409/766-2411

Lydia Miller
Clean Galveston
409/762-3363

George Koenig
San Luis Hotel
409/765-8888

Jefferson County

Scott Bernard
Bernard Oldsmobile-Cadillac
409/983-1626

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Marine Education is to inform elementary and secondary teachers about current research and activities in the marine environment. Amy Broussard, editor.

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P.O. Box 1675
Galveston, Texas 77553

Aquarium to break ground March 19

The Texas State Aquarium moves one step closer to reality at 10 a.m., March 19, when Aquarium Association honorees officially break ground for the multi-million dollar exhibit facility. The ceremonies will cap the efforts of thousands of South Texans to bring Corpus Christi and the State to the forefront of aquarium science and technology worldwide.

Following the groundbreaking, an Aquarium Beach Party will be held at the site with music from several bands, kite flying, a sand castle contest, a poster contest, and refreshments. Association sponsors are expecting thousands of visitors to view the groundbreaking and attend the beach party.

Once completed, the Gulf of Mexico and the Caribbean Sea will serve as the two primary exhibit themes for the facility. One exhibit will trace the flow of water from the Nueces River watershed into the marshes of Nueces Bay and, subsequently, into the Gulf of Mexico. Other exhibits will illustrate habitats such as coral reefs, hard bank reefs, communities around offshore rigs, and the pelagic Gulf and Caribbean.

All exhibits are being designed to enhance visitors' understanding of marine ecosystems and illustrate man's inseparable ties to the oceans. State-of-the-art techniques will enable the exhibits to create an impression that the viewer is in the ocean, and touch tanks will allow visitors to handle various marine animals.

Exhibit design will use existing knowledge of animals and habitat display. "We want to duplicate the natural environment as closely as possible," says Quenton Dokken, aquarium executive director. "Our first criteria is to meet the needs of the animals. To do this, exhibit designers need detailed knowledge of each animal's behavioral, spatial and physiological needs."

The aquarium site has direct water access to Corpus Christi Bay, and facility designers have incorporated bay water in the aquarium's saltwater system.



Galveston Marine Laboratory sets sandy beach workshops

The Texas A&M University at Galveston Marine Laboratory has announced a schedule of nine sandy beach ecology workshops, beginning April 22, 1988, and continuing through Dec. 10. These workshops, conducted by Dr. Don Harper, provide 15 clock hours of Advanced Academic Training for public school teachers, and are held at the Ft. Crockett campus in Galveston.

Designed primarily for high school teachers, the workshops are structured to familiarize educators with the biological and abiotic characteristics of sandy beaches, how these change with season and during natural events, and how the organisms are affected by man-made perturbations.

The workshops include a three-hour lecture, a five-hour field exercise, a six-hour lab workup, and a one-hour concluding session that includes a final exam. Field work includes collection of samples of beach fauna and sand, measurement of the beach profile, and

measurements of salinity and temperatures of water and sand.

Each workshop is limited to a maximum of 10 and will be cancelled if fewer than five participants have registered by one week before it is scheduled to begin. Workshops must be conducted on specific days, according to Harper, to ensure that a low tide occurs on Saturday, and the starting time for each varies according to the time of low tide.

Workshops for the remainder of 1988 are scheduled for April 22, June 11, June 25, July 9, Aug. 5, Aug. 24, Oct. 15, Oct. 29 and Dec. 10. The registration fee for each is \$15.00. If participants elect to stay at the Texas A&M-Galveston campus, the cost is \$8.00 for the dormitory room and \$20.00 for meals. Registration forms, and further information, are available by contacting Dr. Donald E. Harper, Jr., Workshop Coordinator, Texas A&M Marine Laboratory, 5007 Avenue U, Galveston, Tex. 77551.

Symposium

(Continued from page 1)
included in an *Experience Galveston* program that was distributed in late January. Registration is limited to 1,700 participants, with students in grades 9 through 12 being given preference. The cost is \$4.00 per person for preregistrations, while those received at the door, if space remains, are \$5.00.

A cash lunch will be available at Sea Wolf Park, at the opposite end of the island from the campus, at an estimated cost of \$2.50 per person.

Further information on the Symposium is available by contacting the Sea Grant Program, Texas A&M University at Galveston, P.O. Box 1675, Galveston, Tex. 77553, or by calling (409) 740-4460.

National Youth World of Water entries due by April 27

An April 27, 1988, deadline has been set for the fifth annual National Youth World of Water Awards sponsored by the National Marine Educators Association (NMEA). This awards program is open to students currently in grades 9 through 12 who are winners in local, state, national or international science fair competitions. Each entry must deal with a topic in marine or aquatic science or engineering.

World of Water Award winners will be invited to make poster presentations of their marine science projects at the NMEA Annual Conference at the University of California in Santa Cruz July 19-23, 1988. Up to 15 students will be selected for this special recognition by a team of eminent scientists and educators.

The supervising teacher for each award-winning student also will be invited to the NMEA conference.

Submissions must include:

1. A World of Water entry form, which includes a four- to six-page project summary (hypothesis, methodology and results).
2. Certification of an award from science fair officials at which the student received recognition.
3. A photograph of the science fair project.
4. For experiments on living animals, a letter from the supervising teacher to certify that the experiment was conducted under humane conditions. Or, for experiments involving anesthetic drugs, pathogenic organisms, ionizing radiation, carcinogens or surgical procedures, a letter from a biomedical scientist to certify that the experimenter followed proper procedures.

All entries must be postmarked by April 27, 1988, and should be mailed to the regional program coordinator (see box). Entry forms are available from science fair directors or by writing the National Marine Educators Association, in care of Sue Gammisch, Virginia Institute of Marine Science, Gloucester Point, Va. 23062.

Where to submit World of Water entries

Northeast Region
Peter Burn
c/o Biology Department
Suffolk University
Beacon Hill
Boston, Mass. 02114

Maine, Vermont, New Hampshire,
Connecticut, Rhode Island, Massachusetts

Mid-Atlantic Region (North)
Mark K. Masterson
45 Emerson Street
Carteret, N.J. 07008

New York, New Jersey, Pennsylvania

Mid-Atlantic Region (South)
Vicki Clark
Center for Math and Science
2401 Hartman Street
Richmond, Va. 23223

Maryland, Delaware, Virginia, North Carolina, West Virginia, Washington, D.C.

Southeast Region
Jay Calkins
Marine Extension Center
Skidaway Island
P.O. Box 13687
Savannah, Ga. 31406

South Carolina, Georgia, Florida, Puerto Rico

Great Lakes
Pamela Sears
Sea World of Ohio
1100 Sea World Drive
Aurora, Ohio 44202

Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio

Southern Mississippi Valley
Jean Pantell Sikora
Louisiana Department of Education
P.O. Box 74064
Baton Rouge, La. 70804-9064

Iowa, Missouri, Arkansas, Louisiana, Tennessee, Kentucky, Mississippi, Alabama

Northwest
Vicki Osis
OSU Marine Sciences Center
Newport, Ore. 97365

Alaska, Washington, Oregon, Idaho, Montana, North Dakota, South Dakota, Wyoming

Southwest
Diane Baxter/Pat Kampmann
Aquarium Museum
Scripps Institute of Oceanography
8602 La Jolla Shores Drive
La Jolla, Calif. 92093

California, Utah, Arizona, Nevada

South Central
Jack Clason
Galveston College
4015 Avenue Q
Galveston, Tex. 77550

New Mexico, Texas, Oklahoma, Kansas, Nebraska, Colorado

Oceanea
George Wilkins
Joint Institute of Marine and Atmospheric Research
1000 Pope Road, Room 312
University of Hawaii
Honolulu, Hawaii 96822

Hawaii, U.S. Trust Territories

Marine Facts

Snails are relatives of clams, squid

by Dr. William J. Wardle*

Snails, being molluscs, are relatives of clams and squids. Their bodies are usually (but not always) covered above by a coiled shell which varies greatly in color, texture and form from species to species, and is thus a primary means of identification.

The shell has a single large opening through which the snails' head and flat, creeping "foot" can be extended. Some snails have an "operculum," a "trap door" which protects the opening of the shell after the head and foot have been retracted. The body of a snail can thus be divided into three regions, the head, the foot and the visceral mass.

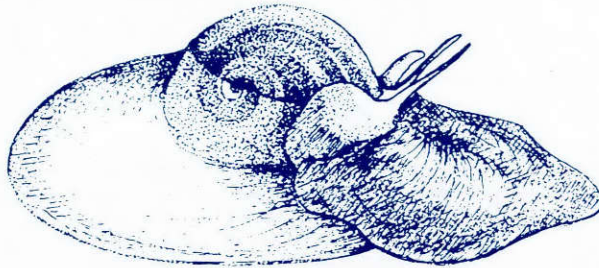
The head usually bears a pair of tiny black eyes which can not actually form a visual image, but can detect the direction and intensity of light and can sense the passing shadows of a potential predator. The head also bears a pair of sensory tentacles and a small inconspicuous mouth which opens on the bottom side of the head.

One of the most important and distinctive structures in snails is a tooth-bearing, tongue-like, feeding apparatus, known as a radula. The radula is kept coiled within the head when not in use, but is extended out of the mouth and applied to food during the feeding process. Herbivorous and detritus-feeding snails use the radula to scrape up plant material and to pull it into the mouth. Carnivorous and carrion-feeding snails use their radulae in rasp-like fashion to tear into and ingest the flesh of other animals.

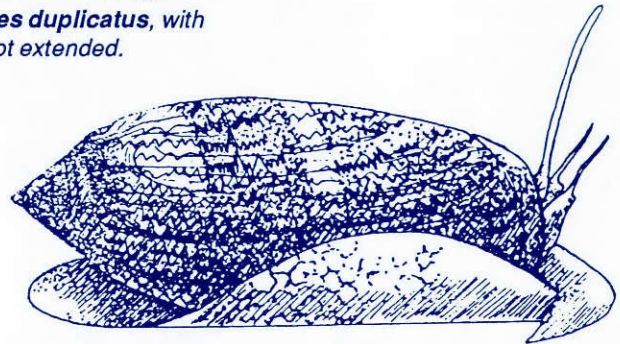
The "brain" of snails is also located in the head section and consists of a ring of nerve tissue which surrounds the esophagus.

The snail's "foot" is located just to the rear of the head and can also be extended from the protective shell when the snail is active. The foot is usually large and muscular and is coated with mucous which is secreted by the skin. The foot is used primarily for crawling, but is also used to hold and position large food items in carrion-feeding and carnivorous types of snails.

The rest of the body, the so-called visceral mass, is carried above the foot and is twisted and tapered to conform to the shape of the shell in which it is



The moon snail, *Polinices duplicatus*, with siphon, tentacles and foot extended.



The lettered olive, *Oliva sayana*, with siphon, tentacles and foot extended.

permanently confined for protection.

The forward part of the visceral mass contains a cavity located above the head which houses the feather-like gills and a water-quality testing organ. The interior of the visceral mass contains the digestive, circulatory and reproductive organs.

Some snails lay eggs on the sea bottom in gelatinous or leathery cases which hatch into tiny bottom-dwelling replicas of their parents. Other snails shed their eggs into the seawater where they hatch into microscopic swimming stages which look nothing like the adults. These swimming snail "larvae" behave as members of the plankton community, floating and drifting with the currents and feeding on suspended microscopic algae, for, in some species, up to several months. They then undergo a sudden metamorphosis and settle to the bottom in a distant environment as miniature snails.

A few species of snails have apparently "decided" (evolutionarily speaking) to remain as members of the plankton community for their entire lives and have thus reduced the weight of their shells and have developed flaps on the side of their feet for use in swimming.

More than forty different species of snails are known to inhabit the various marine habitats of the upper Texas coast. These range in size from the

giant (1' or more) horse conch, which occurs primarily offshore, and the six-inch flesh-eating whelks which can be found nearer to shore, to species which are so small as fully-grown adults that a hand lens is needed to see the distinguishing features of their shells.

Shell collectors walking along the beaches of the upper Texas coast are apt to see live moon snails (*Polinices*) ploughing through the sand, like moles, in search of small clams, which are their favorite prey. One is likely to encounter the lettered olive, a highly polished and ornate shelled snail, which, like the moon snail, is a carnivore. During late spring and summer, bright purple sea snails of the genus *Jantnina* can often be collected on the beach as they wash ashore and perish in great numbers.

Living along the jetties and groins of the beachfront one might expect to find oyster drills which are drab-colored carnivores, one to three inches in length. Attached to the rocks in the upper part of the tidal zone are thousands of tiny black and white zebra periwinkles and half-inch long brownish limpets of the genus *Siphonaria*. Both the limpets and periwinkles are herbivores, feeding on algae which grow on the rock surfaces.

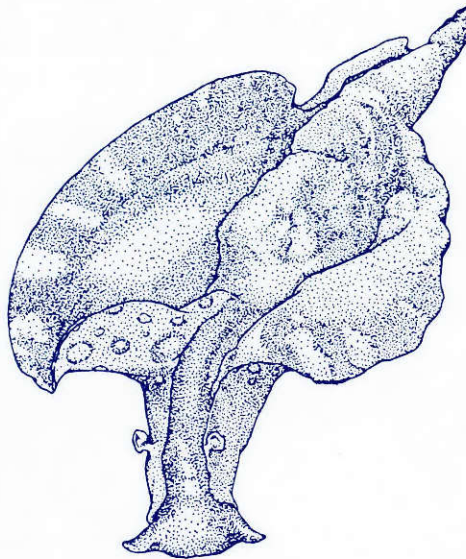
Living specimens of other snails as well as the dead shells of many other snails may be found washed up on the

*Vice President for Academic Affairs, Texas A&M University at Galveston

Marine Facts

beach and deposited on the "strand" line, which is a line of debris left behind on the beach by the receding tide.

The bays of the upper Texas coast also provide habitats for a rich variety of snails, many of which are not found along the beachfront or in the open ocean. The first snail one is likely to encounter while collecting in the marshes along the bays is the marsh periwinkle, a larger (1/2") chalky white cousin of the zebra periwinkle of the groins and jetties. The marsh periwinkle lives on the blades of the marsh grass, but does not eat the marsh grass itself. Instead, it feeds on microscopic algae and fungi which grow on the surface of the marsh grass. Looking in the mud at the base of the marsh vegetation, one may



occasionally find living specimens of the plicate horn shell (*Cerithidea*) which is greenish-gray in color and about one inch long. Also found in this habitat is the coffee bean snail (*Melampus*) which is usually less than half an inch long and comes in a variety of color and bonding patterns that have probably been evolved to confuse the marsh birds that habitually prey upon them. If one encounters the carcass of a dead fish or crustacean or a leftover piece of crab bait in the bay on the sand/mud surface, one is likely to see several small brown and white snails about 3/8" in length which have been attracted to the carrion. These are members of the genus *Nassarius*, a widely distributed scavenger with a keen sense of underwater "smell" (chemical reception) located in a tubular "siphon" which projects forward from the snails' head.

On the oyster reefs, in addition to the carnivorous oyster drill which is also abundant here, one may expect to find a tiny white snail of the genus *Boonea* crawling on the shells of live oysters near the opening of the shell. *Boonea* is a parasite, somewhat reminiscent of a mosquito in its feeding behavior. It waits patiently for the host oyster to open its shell to feed, whereupon *Boonea* crawls onto the oysters' "lip" and inserts a thin tubular proboscis which pierces the oysters' tissues without alarming the host. *Boonea* then sucks the oysters' blood and fluids to obtain its nutrition. When satiated, it quietly retrieves its proboscis and crawls underneath the host oyster or one of its neighbors to wait in safety to digest and await its next opportunity to feed.

Although Texas marine snails show no great promise for direct human consumption, they do provide an important source of nutrition for many species of fishes and birds of recreational, commercial and aesthetic importance. In addition a very peculiar large slug-like marine snail called the sea hare (*Aplysia*) is an important tool for medical research. The nervous system of sea hares is particularly large and complex and offers researchers an opportunity to perform neurological experiments which can help in the understanding of human nervous system as well.

Andrews, Jean. **Shells and Shores of Texas**. Austin: University of Texas Press, 1977.

Forthingham, Nick and Susan Brunenmeister. **Common Marine Invertebrates of the Northwestern Gulf Coast**. Houston: Gulf Publishing Co., 1975.

Idea for the classroom

Measuring snail locomotion

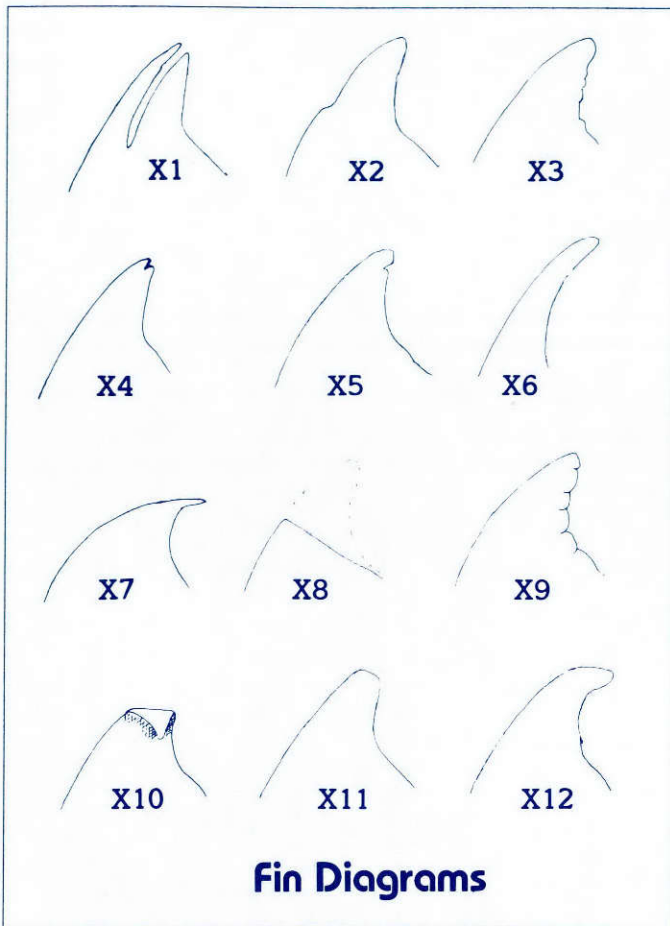
Locomotion is an important process in the marine world. The methods used are quite diverse; some organisms propel themselves by fins and others must crawl. Most marine snails must crawl to move from place to place. Snails belong to the group of molluscs called gastropods or "stomach-footed" animals. The marine snail moves around freely while being observed, with movement accomplished by rhythmic, wavelike contractions of the foot muscles.

Materials

- Live marine snail (*Thais haemostoma*, or oyster drill works well)
- Toothpick
- Plastic petri dish bottom
- Seawater
- Watch with second hand

Procedure

1. Place about 3 mm of seawater in the bottom of a clean petri dish and slide the dish on top of a premeasured grid-graph. Place a live snail in the center of the dish and allow it to adjust to the new environment.
2. What does the snail use to move itself from place to place? Describe the physical appearance of the structure of locomotion.
3. How do you think this animal will respond to a disturbance in its path? Take a clean toothpick and touch the structure of locomotion as the snail attempts to move forward. Describe the actual response generated by your touching the snail. Did the shape of the structure of locomotion change when it was touched? Describe.
4. Align the snail so it will move from one side of the dish to the other. Determine the time it takes for the snail to cross the dish. Several tries may be needed before you get a good time. How long did it take the snail? Use the leading edge of the snail for your measurement.
5. Compute the snail's speed by using the following formula:
$$\text{length of dish bottom in mm} = \text{speed in mm/s} \times \text{time to travel distance in seconds}$$
Record your snail's speed and those of other classmates' snails in a table. Average the data, and compute how long it will take the snail to travel one meter.
6. Pour off some of the water and watch the snail move from beneath the clean dish. Describe what you see from the underside of the snail.
7. Why is the foot important? Describe the snail's coordination attempts with its foot. Tap the snail on its shell with a pencil to get it to stop. Pick the snail up. What response does this generate? Describe.



Adopt-a-Dolphin program can aid future research

There has been an active Adopt-a-Whale program in the Northeast for several years, but now it is possible to Adopt-a-Dolphin along the Gulf coast. A \$15.00 donation to the Galveston chapter of the American Cetacean Society brings an adoption certificate, a photograph of the specific dolphin, information on the bottlenose dolphin, the handbook **Galveston's Dolphins** and a one-year subscription to the **ACS/Galveston Newsletter**.

According to ACS member Jackie Cole, adopting one of Galveston's dolphins helps the Galveston chapter fulfill its goals of conservation, education and research. Many of the dolphins seen in the Galveston area have been photographed and identified by the distinctive dorsal fin, but Cole says much more work needs to be accomplished.

The Galveston chapter is involved in research projects to identify local and migrating family groups or pods, support the marine mammal stranding network by collecting data on dead and live beachings of dolphins and whales, promote conservation efforts, and provide education about cetaceans in general.

Dolphins can be selected on the basis of the dorsal fin illustrations (see accompanying figure), or specific dolphins can be requested. Further information and adoption applications are available by writing Adopt a Dolphin, Galveston Chapter, American Cetacean Society, 6608 Stewart Road, Suite 169, Galveston, Tex. 77551.

Science Week kicks off April 24

Thousands of schools, community groups, science organizations, museums, government agencies, corporations and individuals across the country are preparing for the fourth annual National Science and Technology Week scheduled for April 24-30, 1988.

Begun in 1985 by the National Science Foundation, NSTW promotes the public understanding of science, engineering and mathematics through a variety of creative programs and activities largely conceived and implemented at the grassroots level. NSTW also encourages students to seek careers in these areas.

From Washington, the National Science Foundation develops educational materials, coordinates in-service teacher training workshops and

sponsors national activities such as "The Art of Science" competition for high school juniors and seniors.

"With most of today's scientific news coming from deep within the atom or from near the boundaries of space," says NSTW coordinator Mary Keeney, "it may be hard to believe that everyone has a role in progress. But unless we renew our nation's emphasis on education in basic, down-to-earth sciences and engineering, we're going to lose our traditional world leadership in research and technology. And the impact won't be in some distant galaxy, but right in our own communities."

NSF, with corporate support, serves as the clearinghouse for activities

throughout the United States. The Foundation maintains close ties with key scientific, professional and civic organizations in planning events, such as the State Academies of Sciences and State Science Supervisors, the American Association for the Advancement of Science, the National Science Teachers Association, the Association of Science and Technology Centers, the Triangle Coalition, the National Academy of Science, and the U.S. Chamber of Commerce.

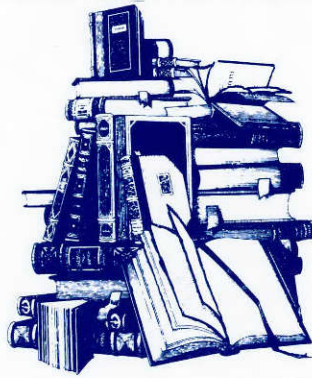
Inquiries for more information on National Science and Technology Week should be directed to Mary Keeney, National Science Foundation, 1800 G Street, Washington, D.C. 20550.

**NATIONAL SCIENCE &
TECHNOLOGY WEEK**



APRIL 24-30
1988

books



& things

"New Waves in Marine Education: Keeping Up with Ocean Discoveries" is the theme of the National Marine Educators Association annual conference July 18 through 22, 1988, at the University of California at Santa Cruz. NMEA President Rick Tinnin says the week-long schedule includes a science symposium, curriculum development break-out sessions, concurrent workshops and papers, a "sea and swap" session, and numerous field trip opportunities around Monterey and San Francisco Bays.

Further information about the program or registration is available by contacting Craig Strang, 1988 NMEA Conference, Oceanic Society San Francisco Bay Chapter, Fort Mason Building E, San Francisco, Calif. 94123.

Tinnin, who assumed the NMEA presidency at the 1987 annual conference, will be visiting chapters throughout the country in the coming months, with trips scheduled to Florida, New York and Vancouver. NMEA will hold its mid-year board meeting during the National Science Teachers Association conference in St. Louis in April, and will sponsor a four-hour technical session during the conference on April 8.

"We have planned a series of presentations about programs around the country," Tinnin says. "There also will be a reception during this time, where we will acquaint teachers with NMEA and unveil our re-designed journal, **Current, Journal of Marine Education**.

A science center museum, the Exploreum, offers opportunities for students and adults to touch and experiment, experience and discover with exhibits and demonstrations designed to stimulate and communicate about science, technology and the humanities. Visitors are encouraged to use problem solving and sensory exploration to learn scientific concepts.

The Exploreum, in Mobile, Ala., is part of a complex that includes the Toulminville School and the antebellum Bragg-Mitchell Mansion, both in the process of restoration. Information about educational programs is available by contacting The Exploreum, 1906 Springhill Avenue, Mobile, Ala. 36607.

The Maine/New Hampshire Sea Grant College Program recently published **Lobsters: A Guide to the Maine Lobster** by Robert and Juanita Bayer that would make an interesting addition to upper elementary or middle school classrooms.

The 27-page paperback book explores basic questions that are frequently asked about the American lobster, such as why lobsters shed their shells and claws, how they grow, what they eat and how they find their food. The authors, a lobster researcher at the University of Maine and an elementary school teacher, have based their text on questions asked by their own children.

The text is presented in large type, with an easy-to-read format, and is

enhanced by the clear illustrations by Marcia Spencer and MaJo Keleshian. Inquiries about the book should be addressed to Maine/New Hampshire Sea Grant College Program, 30 Coburn Hall, University of Maine, Orono, Me. 04469. There is a \$5.00 charge.

Some space remains in the spring workshops at The University of Texas Marine Science Institute in Port Aransas, particularly for the Birds of the Texas Coast session April 15-17. Workshop Coordinator Rick Tinnin says this workshops is for both elementary and secondary teachers, as is the Basic Marine Science session scheduled for March 11-13.

Workshop registration begins each Friday from 7 until 10 p.m. at the Institute's Visitor Center. Both workshops cost \$45.00, which includes five meals, two nights in the dormitories and a registration fee. All workshops have Texas Education Agency approval for AAT credit hours. The registration deadline is the Friday preceding the week a workshop is scheduled.

Tinnin also will conduct a Chautauqua Workshop for junior college professors from throughout the country May 18-22.

Further information or registration materials is available by contacting Tinnin at The University of Texas Marine Science Institute, Port Aransas, Tex. 78373-1267, or by calling (512) 749-6729.

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