

Marine Education

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

Is this your final Marine Education?

This could be your last issue of **Marine Education**. As was announced in the March 1988 issue of the newsletter, **Marine Education** will become a paid-subscription publication in September 1988. The mailing list revision will begin after this mailing, and only those who have returned their subscription forms will receive the newsletter during the next academic year.

A subscription form is included on page 7, and your current mailing label is on the reverse side. Please return it, with your mailing label attached to ensure that the correct information is transferred, along with a check for \$2.50.

We also are still asking for suggestions or comments about **Marine Education** to help us plan future issues in a way that will meet your needs more closely.

Plastic is nemesis for rare Minke whale

Pieces of plastic again proved to be the nemesis for a 20-foot, 2,000-pound Minke whale that stranded on an island west of Matagorda Beach, Texas, the end of March. The Minke, a member of the baleen suborder of Cetacea that has a series of horny plates called baleen (whalebone) that hang from the roof of the mouth and filter its food. It also has two blowholes, rather than the one commonly seen in dolphins. The Minke normally lives off small schooling fish, plankton and krill, but also is known to eat shrimp and squid.

Minkes are an eastern deep water mammal, more commonly reported stranded on Florida beaches, although some have come ashore in Louisiana. There has been at least one previous report of a Minke at the Texas-Louisiana border.

Although first sighted on a weekend, word of the stranding was not reported to the Texas Marine Mammal Stranding Network until four days later, and then there were conflicting reports on if the whale was still alive. Once stranded, whales and dolphins are vulnerable to dehydration, sun exposure and starvation. Because of the stranded whale's remote location, it was impossible to move it to a treatment facility. After working more than six hours, the Network treatment team determine that their efforts were futile, and an injection was used to end the whale's suffering.

Upon performing a necropsy, they discovered a two-inch piece of plastic sheeting in one of the whale's three stomachs and more in the passageway between the second and third stomachs. (See Minke, page 7)

Summer courses offered statewide

Summer is the time for teachers to become students – and in turn to become better teachers through their own learning experiences. Several Texas institutions offer a variety of courses and field trips related to marine science and education.

Texas A&M University

Texas A&M University in College Station has a number of courses available this summer during the first and second five-week sessions (June 6–July 8 and July 11–August 12, respectively).

Survey of Oceanography (OCN 660) is designed for graduate or upper-level students. Half the course is devoted to an overview of the basic principles of oceanography, and the remaining time to applying these principles to practical uses. The course will examine how ocean research can be applied to social and economic problems and will

discuss the interrelationships between the ocean disciplines and other fields of study. A minimal background in the sciences and math is required; the course is concept-oriented.

Special supplemental information, such as slides, reference materials and laboratory ideas, is available for those involved in teaching earth or marine science at the pre-college level.

Marine Biology (BIO 440), taught by Dr. Mary Wicksten during the first five-week term, is a general course that emphasizes marine environments and their inhabitants along the Texas coast. Plants and animals are presented in the context of their natural habitat. Emphasis is placed on general ecological concepts rather than on memorization of names. The laboratory work includes a field trip to marine habitats along the northern Texas coast.

The prerequisites for the course are

a class in introductory biology and an ability to perform upper-division course work. The course is open to non-majors in general science education, geology, wildlife and fisheries sciences and related disciplines. For further information, contact Dr. Wicksten, Department of Biology, Texas A&M University, College Station, Texas 77843 (409/845-3388).

Texas A&M's Department of Wildlife and Fisheries Sciences offers four courses for teachers this summer – *Integrating Natural Resources for Classroom Use* (WFS 409); *Ecology for Teachers* (WFS 420); *Museum Programming* (WFS 630); and a new course for teachers, *Natural History of Invertebrates* (WFS 489). The first course implements nationally developed programs, while the museum programming course will instruct teachers on integrating museum (See Study, page 2)

Flower Gardens closer to sanctuary status

(NOTE—This article is based on "A Safe Harbor," by Norman Martin, that first appeared in the Winter 1988 issue of *Texas Shores* magazine.)

After years of discussion about how to make the Flower Garden Banks off Texas a national marine sanctuary, officials are on the verge of making a series of key decisions that could shape the future of the rare coral reef well into the next century.

During the next few months, officials are scheduled to draft the final environmental impact statement and management plan and decide whether to proceed with sanctuary designation by early 1989. There are no battle lines being drawn over the scope of the proposal. No organized opponent or organization has stepped forward to dispute the need for sanctuary status. The only apparent foe is the time-

consuming federal bureaucracy itself.

"The Flower Gardens have been a lengthy, lengthy process, but that's the way Congress set up the designation process," says Ralph Lopez, project manager with the Marine and Estuarine Management Division of the National Oceanic and Atmospheric Administration (NOAA). "It's unfortunate, but that's the way it is."

The Flower Gardens support the most ecologically complex and biologically productive reef communities on the Texas/Louisiana outer continental shelf. Located 115 miles southeast of Galveston, on the outer edge of the continental shelf, the banks are situated approximately 12 miles apart.

The reefs have probably been forming since the Ice Age, perhaps for 10,000 to 15,000 years, and are now

about 60 feet beneath the surface of the Gulf.

The reefs are considered a top sanctuary candidate because they:

— Represent the northernmost extent of typical Atlantic coral reef communities in the western Gulf of Mexico.

— Serve as a regional "reservoir" of shallow-water Caribbean reef fishes and invertebrates.

— Offer opportunities for scientific research and represent an aesthetic, educational and recreational resource.

This is the second time the Flower Gardens have been up for sanctuary designation. In 1979 the site was placed on a list of active candidates, but in 1982 NOAA announced its decision to remove the site from the list of active candidates. One of the major

(See *Sanctuary*, page 4)

Study opportunities available for teachers

(Continued from page 1)
resources into the classroom.

Ecology for Teachers is offered during both summer terms. *Integrating Natural Resources and Natural History of Invertebrates* will be during the first term, and *Museum Programming* is offered in the second term. Further information on the courses is available through Dr. Clark Adams, Department of Wildlife and Fisheries Sciences (409/845-5777), or Tom Linton in the same department (409/845-5794).

The Department of Educational Technology offers a computer education course in both summer sessions. *Classroom Applications of Microcom-*

puters (EDTC 645) is an introduction to the use of microcomputers. Many class activities will be directed toward the students' areas of application and expertise. For more information, contact Dr. Lloyd Rieber at 409/845-5405.

The Department of Educational Curriculum and Instruction is offering *Advanced Methods of Secondary Science Education* (EDCI 664) during the second five-week term. The course will cover the design and evaluation of science instruction in the secondary school. Strategies for teaching secondary school science and recent developments in science education will be presented.

In the same department, Dr. Marla Stone will conduct a three-week course, *Texas Coast from the Rio Grande to the Sabine* (EDCI 689). It will be the study of biotic and abiotic factors in coastal habitats, including geomorphology, plant/animal adaptations and niches, and human influences. Classroom and laboratory techniques for on-site data gathering, including beach transects, sampling, specimen collecting, photography and chemical testing will be taught. Three days (June 16, 17 and July 1) will be on the Texas A&M campus and the rest of the course (June 20–June 30) will be at selected sites along the Texas coast. For more information, contact Dr. Stone at (409) 845-3467.

Texas A&M University at Galveston

Five sandy beach ecology work-

shops and a marine mammal workshop, all of which provide Advanced Academic Training for public school teachers, supplement the Galveston campus' regular offerings during the two summer sessions.

The sandy beach ecology sessions, conducted by Dr. Don Harper, are designed primarily for high school teachers. Each workshop includes 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.

The summer schedule includes workshops on June 11, June 25, July 9, Aug. 5 and Aug. 24. 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, Texas 77551.

A marine mammal workshop is tentatively scheduled for mid-August, and will be coordinated by Dr. André Landry of the Texas A&M Marine Laboratory. This will be a weekend

(Continued on page 7)

Marine Education (ISSN 0744-0162) is published four times a year (September, December, March, May) by the Sea Grant College Program, Texas A&M University, College Station, Texas 77843-4115. **POSTMASTER: Send address changes to Marine Education, Sea Grant College Program, Texas A&M University, College Station, Texas 77843-4115.** Second Class postage paid at College Station, Texas.

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

Editorial office— Sea Grant College Program, Texas A&M University at Galveston, P.O. Box 1675, Galveston, Texas 77553.

Marine Facts

A close look at marine bivalves

by Dr. William J. Wardle*

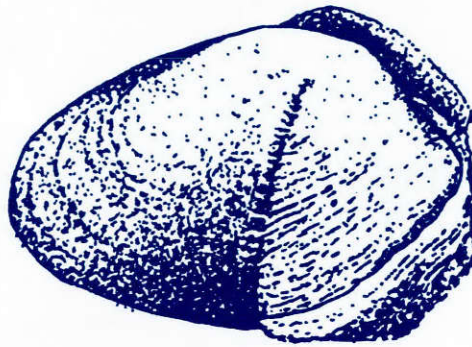
Bivalved molluscs are related to other molluscs such as snails, tooth shells, chitons, squids and octopi in that they all share a common ancestry and, consequently, have similar anatomical features such as a muscular "foot," ciliated gills located in a mantle cavity, and chalky shells.

Bivalves differ from other molluscs, however, in that their head has been reduced by evolution to nothing more than a mouth and a pair of ciliated feeding flaps called labial palps. The eyes, tentacles and characteristic scraping tongue (radula) found in other types of molluscs are lacking in bivalves, and the shell is divided into two valves (half-shells), which are attached by a dorsal hinge and are opened and closed by the combined action of the hinge and large "adductor" muscles that are inserted on the inner surface of each valve.

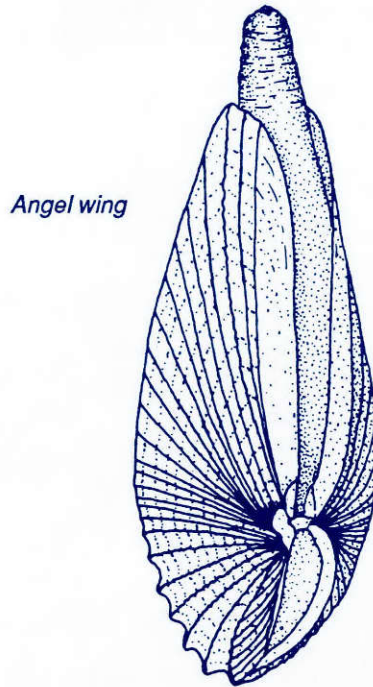
Most marine bivalves come under the general headings of clams, scallops, mussels and oysters, but also included are such strange creatures as angel wings, ship worms and piddocks, which bore into the sediments and into wood and into limestone, respectively.

Marine bivalves begin life as microscopic planktonic larvae (life history stages that have a different form and habitat than the adult stage). These larvae keep afloat by means of swimming "hairs" called cilia and are distributed far and wide by the ocean tides and currents. Bivalves that live close to shore, such as most species of mussels and oysters, may spend only a few days or weeks in the larval stage, then they undergo a sudden metamorphosis (change in form), develop a shell and drop to the bottom where they will spend their adult lives. Oceanic bivalves that live in deeper water may extend their larval lifespan to a month or more in order to allow for wider dissemination of the species over the vast oceanic habitat.

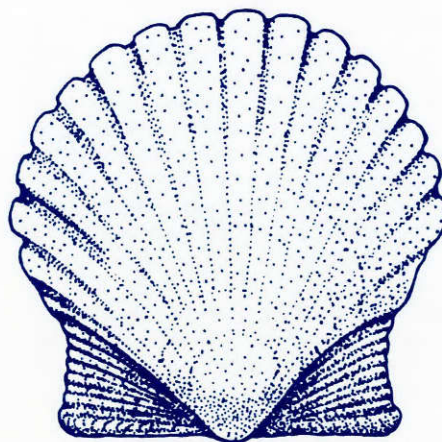
Once bivalves have undergone metamorphosis and have taken up their benthonic (bottom-dwelling) mode of adult life, most depend heavily on two pairs of large ciliated curtain-like ctenidia that hang down in the large



Oyster piddock



Angel wing



Bay scallop

mantle cavity. The ctenidia serve not only to take in oxygen, which is the function normally associated with a gill, but to pump, strain and sort water containing the microscopic food particles upon which they depend for their food.

Bivalves can be divided into two ecological groups according to how they acquire their food. The first group is referred to as the filter-feeding or suspension-feeding bivalves. These animals draw water containing suspended food particles directly from the water column, as opposed to the second type of bivalves (deposit feeders) that vacuum food that has become deposited on the sediment surface.

Suspension feeders include oysters, scallops, mussels and most of the large and varied groups called clams. Suspension feeding bivalves may be further subdivided ecologically by their physical relationship to the bottom substrate. Those that attach or rest above the sediment surface are called epifauna (above-animals) as opposed to those suspension feeders whose bodies lie buried in the sediment and are called infauna. Epifaunal suspension feeders include such bivalves as mussels, oysters and scallops. Mussels have apparently lost the ancestral ability to burrow in the sediments and, consequently, the burrowing foot and associated organs have been greatly reduced and function in the secretions of elastic byssal threads by which they are able to form a root-like byssus that attach them to solid objects. Oysters are even more highly specialized for epifaunal life. They cement themselves permanently to a solid substrate where they remain for life. The foot is completely lacking in oysters as is the small anterior adductor muscle, which is present in the mussels.

Scallops, the third main group of epifaunal bivalves, begin their bottom-dwelling life as attached epifauna, but later become detached and lie freely on the sediment surface. Most adult scallops are able to swim for varying distances by snapping their valves together. This results in a kind of jet propulsion that can be directed by the fleshy mantle margin in order to lift them off the bottom and propel them through the water. Many scallops have evolved secondary eyes (not evolutionarily homologous with the eyes on

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Marine Facts

the head of other molluscs), which are located on the mantle tissue in order to direct their swimming movements.

Infaunal bivalves differ structurally from epifaunal bivalves in that they usually possess two adductor muscles of roughly equal size that can be used against one another to rock the valves to facilitate burrowing. In addition, infaunal bivalves usually have a large and powerful hatchet-shaped or piston-like foot with which they can maintain the proper position in the sediment to facilitate feeding. The

mantle margins are fused in place to form two tubular siphons with which the clams communicate with the surface.

Clams that live near the surface, such as cockles and quahogs (hard clams) have short siphons, while species that burrow deeply, such as razor clams and softshell clams, have long siphons. The lower (central) incurrent siphon is situated so that it extends from the low-pressure upper half of the mantle cavity and sucks water and food in due to the action of the cilia on the gills. The water and food are then drawn through the gills where special sorting cilia help trap the food particles in a stream of mucus that flows to the mouth. The strained water then passes up into the upper half of the mantle cavity where it is directed out, with the clam's waste products, through the dorsal excurrent

siphon that returns the water to the surface.

Deposit-feeding bivalves are less numerous than suspension feeders and all are infaunal in habit. Some, such as the primitive nut clams of the genus *Nocula*, apply their labial palps directly to the substrate and use them to "mop up" organic debris that has fallen to the ocean floor. Other deposit feeders, such as *Macoma*, bend their incurrent siphon back to the substrate to feed by vacuuming organic debris from the sediment surface.

Marine bivalves are of commercial importance worldwide and are the objects of many fishery and aquaculture industries. In addition to their food value, various species provide commercially important sources of pearls, paving materials, and curios and decorations.

Sanctuary designation .

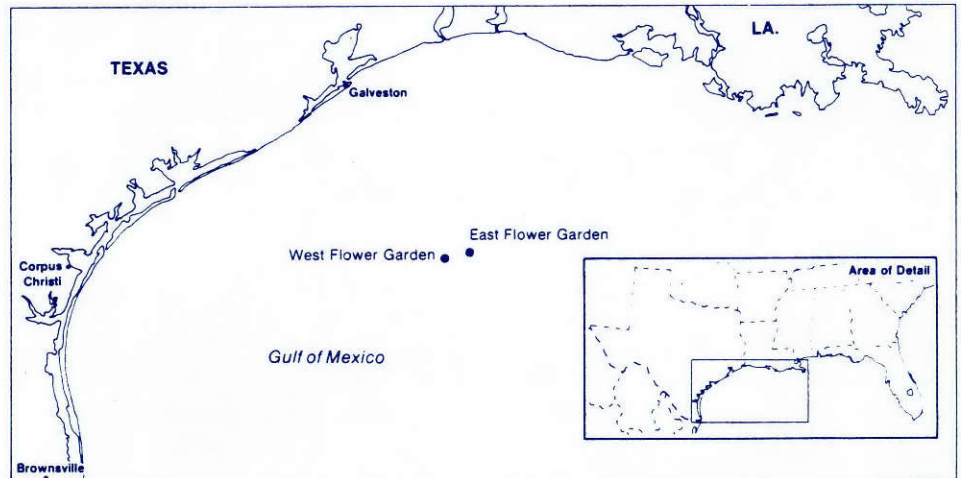
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reasons for this action was that a Coral Fishery Management Plan for the Gulf of Mexico was about to be implemented. It was expected that the plan would regulate vessel anchoring on the Flower Gardens. The final plan was approved, but it didn't include the "no anchoring" provision, and the need for the special protection of a sanctuary was once again recognized. The Banks were placed on the site evaluation list under NOAA's revised procedures in 1983, and, a year later, were named an active candidate for designation as a national marine sanctuary.

National marine sanctuaries may be designated in coastal and ocean waters, the Great Lakes and their connecting waters, and submerged lands over which the United States exercises jurisdiction, consistent with international law. Title III of the Marine Protection, Research and Sanctuaries Act of 1972 authorizes the Secretary of Commerce to designate discrete marine areas of special national significance as national marine sanctuaries in order to provide comprehensive, protective management of their conservation, recreational, ecological, historical, research, educational or aesthetic values.

NOAA is now actively pursuing the Flower Garden Banks' designation as a national marine sanctuary. At present, the Marine and Estuarine Management Division is preparing a draft

4 ... Marine Education



Environmental Impact Statement and Management Plan for the site.

Both are scheduled for public review in July, concurrent with the publication of proposed site-specific regulations and the submission of a prospectus on the proposed designation to the Congress. A public hearing on the draft EIS/MP will be held as part of this review. Comments will then be incorporated into the final EIS/MP and regulations by the beginning of 1989. Sanctuary designation is expected in late winter or early spring of 1989.

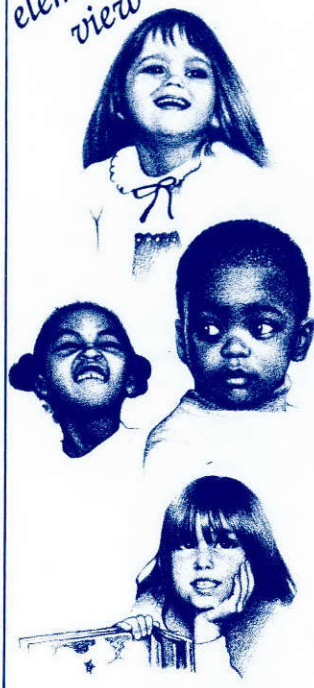
The Flower Gardens hold a bounty of benefits for a variety of users. Being relatively pristine and isolated in the northern Gulf, the Flower Gardens are increasingly an attraction to scuba divers from all over the country. In addition, commercial fishing is common along the edges of the banks. But among the greatest benefits the Flower Gardens provide are their

potential for scientific research. The majority of research performed so far has been conducted by Texas A&M University. The effort has produced a number of preserved collections and on-site transects.

The first phase of studying the area is nearing completion, according to Dr. Thomas Bright, an oceanographer and director of the Texas Sea Grant Program. Many, but not all, of the plants and animals of the reef have been identified as to species. Now major groups, such as sponges and seaweeds, remain to be identified. He believes there is great potential for further ecological, physiological and other types of marine-related research.

"The Flower Gardens represent a unique and valuable tropical coral reef community," Bright says. "Sanctuary status is the only mechanisms that we have that could provide for appropriate regulation and management."

An elementary view



Zooplankton

The clear blue waters of the oceans may seem lifeless, but floating in these waters are communities of tiny plants and animals. All of the larger life in the ocean depends on these tiny life forms for their existence.

The ocean's ecosystem depends on the microscopic plant life that traps the energy of the sun. These tiny plants are eaten by zooplankton (**zoo**—animal, **plankton**—float), which are then eaten by other animals for their energy. The zooplankton may be eaten by other zooplankton, by fish, or by some of the ocean's largest residents, whales and sharks.

There is no way to hide in the ocean except to become invisible, so many of the zooplankton are transparent (light will pass through). If they are plant eaters, they will have a green or yellow streak of gut filled with algae. Many of these tiny animals are weird shapes. They may have long spines, strange shaped legs and dragon-like tails.

Zooplankton represents most groups of marine life. Not all of these members are permanent. Some types of zooplankton are larval that some day may survive to be free-swimming fish or crabs walking the ocean floor. Some examples of these types of zooplankton are the larvae of sponges, worms, molluscs, barnacles, crabs and fish. Others are permanent members of the zooplankton community, living their entire life cycle as plankton. Some examples of these are jellyfish, worms, copepods and certain types of shrimp.

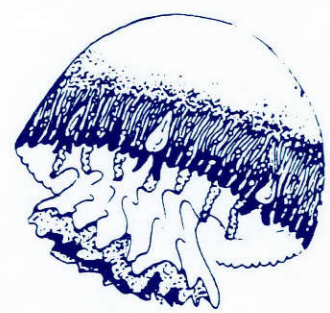
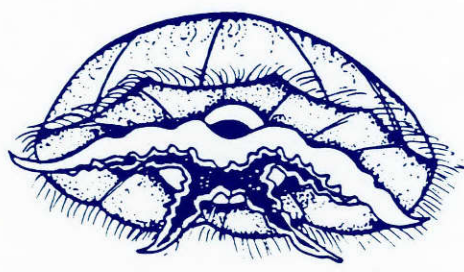
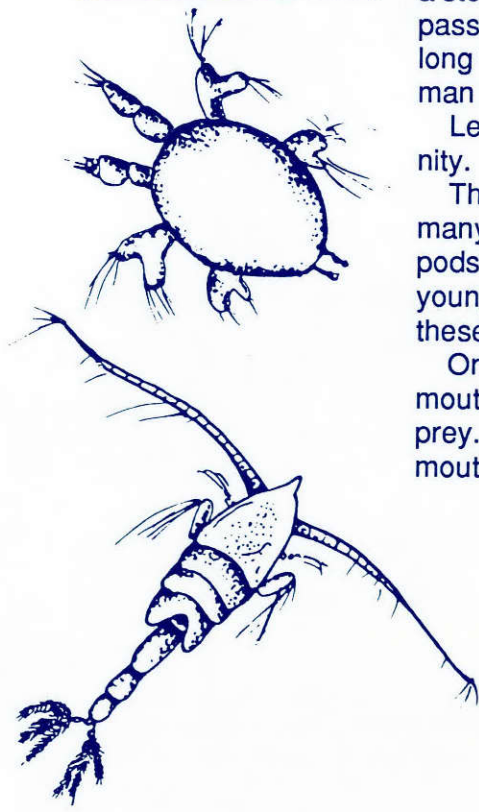
Locomotion (movement) in animals of the sea is varied. Most zooplankton, however, are carried by currents or blown by the wind. Portuguese man-of-war, comb jellies and jellyfish are examples of zooplankton blown by the wind.

Some countries have tried to collect plankton for food. This has not been very successful for several reasons. How much plankton is available depends on the season and the amount of nutrients in the water, so there is not a steady supply in certain areas. A tremendous amount of water must be passed through the nets to collect these tiny creatures, and it takes a very long time to collect enough for a meal. Too, some plankton are poisonous to man and it is hard to separate the harmful organisms from the good ones.

Let's look at some of the important members of the zooplankton community.

The copepods are one of the most common kinds of zooplankton and many fish and other marine animals depend on them for food. Adult copepods have long antennae, six pairs of legs and a tail with feathery bristles. A young copepod and an adult are shown. Determine which is which and label these.

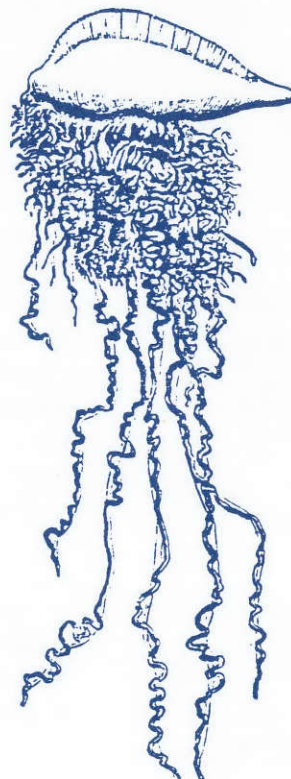
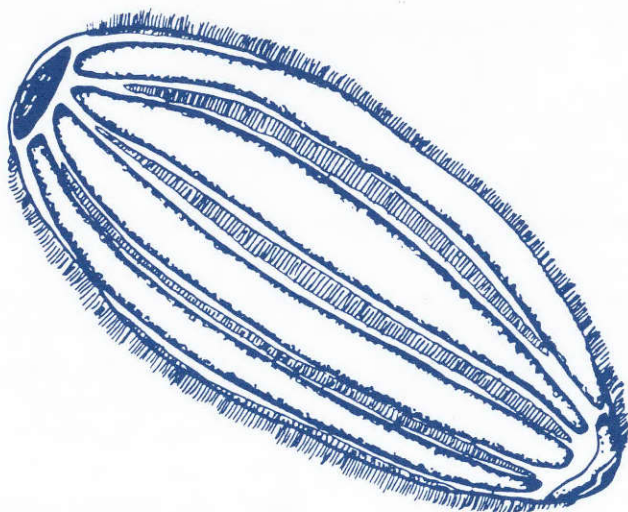
One of the best known zooplankton members is the jellyfish. A jellyfish's mouth is on its underside, surrounded by stinging tentacles used to capture prey. Two jellyfish that you might see are shown. Locate and label the mouth, tentacles and umbrella for each.



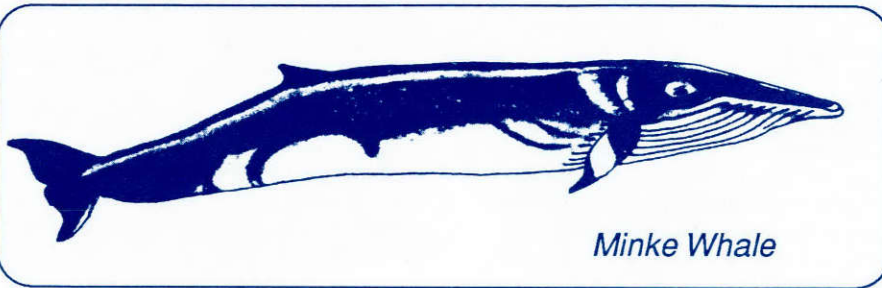
Two other commonly seen zooplankton are comb jellies and Portuguese man-of-war. The comb jellies are not actually jellyfish, but they are transparent. Their mouths are at one end of their bodies. They move by beating the rows of cilia, or combs, on their bodies.

The man-of-war resembles a light blue sandwich bag floating in the water. Don't get too close! The tentacles hang down into the water and are sometimes 30 feet long. These tentacles have stinging cells, and the venom (or poison) can be very painful, if not dangerous, to man.

On the drawing of the comb jelly, locate and label the mouth and the combs. Then, locate and label the float and tentacles on the drawing of the Portuguese man-of-war.



1. Describe the general feature of zooplankton.
2. Why are zooplankton important to the ocean ecosystem?
3. What are some examples of zooplankton that you might see without a microscope?
4. How do most zooplankton hide in the ocean?
5. How do zooplankton move from place to place?
6. Describe how zooplankton differ from free-swimming fish and bottom-dwelling crabs.
7. Listen to some music, such as Neil Diamond's "Jonathan Livingston Seagull." Close your eyes and imagine yourself as a zooplankton, drifting silently, weightlessly in the sea. Think about how you feel. When the music is over, write a poem or short story, pretending you are a zooplankton and telling about your travels or your life in the ocean.



Minke Whale

Summer . . .

(Continued from page 2)

workshop, similar to one conducted for the Texas Marine Educators Association in February, and will include Texas A&M-Galveston faculty as well as other marine mammal specialists. Those interested in the workshop should contact Landry at the Texas A&M Marine Laboratory.

During the University's regular summer sessions, graduate-level, marine-related courses will be offered, including *Problems in Biology, Research in Biology, Problems in Wildlife and Fisheries Sciences* and *Research in Wildlife in Fisheries Sciences*.

Other courses include *Biology of the Mollusca, Research in Oceanography, Biology of Invertebrates, Special Topics in Marine Biology of the Upper Texas Coast*, and *Statistical Methods in Ecology*.

Address inquiries to Student Records Office, Texas A&M University at Galveston, P.O. Box 1675, Galveston, Texas 77553 (409/740-4400).

Texas A&I University

Texas A&I University's Department of Biology offers two, three-week summer workshops (BIOL 341 and

BIOL 342). The first will be held June 6 through June 24 and the second from July 11 through July 29.

Participants can enroll in either for four hours' credit, or in both for eight. The latter option is advised since the second workshop is a continuation of the first. The workshops stress aquatic and near-aquatic organisms, both plant and animal, how to study them, their places in the natural scheme, how "people pressures" affect them, how they came to be, and what they are.

More than half of each workshop deals with the marine environment. The courses are open-ended—there are no prerequisites and persons with no biology background can work at their own level while those with biology majors can advance as far as they wish with any of the topics covered.

A number of day-long and overnight field trips are included, to Padre Island National Seashore, the Port Aransas jetties and the Welder Wildlife Foundation.

Further information is available from Dr. Allen H. Chaney, Department of

(See *Summer Offerings*, page 8)

Minke . . .

(Continued from page 1)

achs. Stranding Network personnel reported that even if the whale had been returned to deeper water, it probably would have starved to death as the plastic would have prevented normal digestion of food.

Tony Amos, an oceanographer at The University of Texas Marine Science Institute in Port Aransas and a Network volunteer, said the Minke appeared to be about 2 years old, and that it may have been a Caribbean mammal that just weaned itself from its mother and became lost. Minkes, according to Amos, typically live in the polar waters of the Pacific and Atlantic oceans and occasionally in the Caribbean, but migrate very rarely.

Tissue samples and the whale's skull were taken to Texas A&M University for further study. Once positive identification is made, the skull will become part of the permanent mammal collection that is maintained by the Department of Wildlife and Fisheries Sciences in College Station.

This is the second reported case of a whale beaching itself along Texas with plastic clogging its stomach chambers. A baby pygmy sperm whale, later named Jean LaFitte, was found with pounds of plastic bags inside its stomach during a necropsy following its death. Jean LaFitte later became a virtual rallying cry as state officials pushed for U.S. Senate ratification of Annex V to the MARPOL treaty, which bans all ocean dumping of plastics the end of this year.

Marine Education Subscription Form

Subscriptions will begin September 1988 and run through May 1989 (four issues). Renewal notices will be sent in March 1989. Please type or print all information.

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Texas A&M University
College Station, Texas 77843

Summer offerings

(Continued from page 2)

Biology, Texas A&I University,
Campus Box 158, Kingsville, Texas
78363 (512/595-3803).

Corpus Christi State University

Corpus Christi State University's Summer Science Institute includes *Advanced Topics: Marine Science Field Study* (BIO 503H) led by Dr. Wes Tunnell. The three-week course is offered July 11–July 28. One to one-and-a-half days each week will be spent in the classroom and the rest of the week will be devoted to field trips in the Coastal Bend area.

The course is designed to introduce middle-school teachers to the physical processes and the biology and ecology of the common organisms inhabiting shorelines, estuaries and the open sea. High school and elementary teachers will find the course valuable as well. The course will equip teachers with lecture and lab knowledge of the marine environment, marine science teaching materials, and ideas for instruction activities and field trips. Teachers will be encouraged to develop collections for classroom use.

Lectures will cover marine ecological principles; environmental factors that govern the distribution of marine organisms, such as tides, temperatures and salinity; types of marine organisms (plankton, plants, invertebrates, fish and reptiles, birds and mammals); types of marine environments; and marine fisheries.

One-half day will be spent aboard the *Katy*, a University of Texas research/education vessel, in the Aransas Pass Channel and Redfish Bay. Participants will tour The University of Texas Marine Science Institute at Port Aransas. Other field trips will be taken to the various kinds of marine environments, such as open ocean, rocky seashores, sandy beaches, saltmarsh, and seagrass beds. One overnight trip will be taken down the length of Padre Island, through the National Seashore to the Port Mansfield jetties.

Also offered at Corpus Christi State is a *Coral Reef Ecology* course during the first summer session, June 2 through July 18. Students will spend one week in class and laboratory sessions to prepare for a 17-day field trip to Veracruz, Mexico. Upon their return, students will work on independent research projects.

The course will focus on such aspects of coral reefs as ecology, geology and organisms. Registration for the course begins June 1. Students will earn six graduate credit hours.

For more information, contact Dr. Wes Tunnell, Biology Department, Corpus Christi State University, at (512) 991-6810, extension 470.

Gladys Porter Zoo

The education department of the Gladys Porter Zoo in Brownsville is offering a one-day course for teachers, *Introduction to Birdwatching*. The course will be offered twice: Friday, July 8 and Saturday, July 9. Teachers can earn credit of eight clock hours. The only prerequisite is one college-level course in biology. Participants will learn the basics of birdwatching, including how to use binoculars, how to attract birds to the classroom

window, and will get ideas for activities and lesson plans dealing with bird-watching. The course is limited to 20 participants.

For more information or to request registration materials, contact course instructor Sandra G. Skrei, Curator of Education and Information, Gladys Porter Zoo, 500 Ringgold St., Brownsville, Tex., 78520 (512/546-7187).

Welder Wildlife Foundation

The Welder Wildlife Foundation of Sinton, Texas, is offering two natural science conservation workshops for elementary and secondary teachers with little or no scientific background in natural science. Librarians and principals also are encouraged to apply.

The workshops will be offered July 11–18 and June 20–27. The program includes aspects of natural history, conservation, ecology, botany, ornithology, mammalogy, herpetology, limnology, and range and wildlife management. The program is sponsored in cooperation with Texas A&I University. There are no prerequisites, and the workshop can be applied for three semester hours of extension graduate credit.

Contact the Wildlife Foundation at (512) 364-2643.

Texas Marine Educators Association

The Annual Conference of the National Marine Educators Association is planned for July 18–22 on the campus of the University of California in Santa Cruz, CA. The theme this year is "New Waves in Marine Education."

For more information, contact Rick Tinnin at The University of Texas Marine Science Institute in Port Aransas, (512) 749-6729.

— Lona Dearthmont

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