



Using long-handled tongs, Harold Voris separates highly venomous sea snakes from catch of fish and prawns.

Sea Snakes: A Field Report

by Harold and Helen Voris

Well over fifty years ago, in 1917, Malcolm Smith made the world's first extensive collection of sea snakes, for the British Museum. This spring, in Kuala Kurau, Perak, Malaysia, we met an elderly Malay fisherman who had collected snakes for Smith. Smith's collections and monographs have stood for many years as the major work on sea snakes; but soon Field Museum will have an even larger sea snake collection as one result of a year-long study in the Straits of Malacca and the South China

Harold Voris is assistant curator of reptiles and amphibians.

Sea. The work is supported in part by the Allen-Heath Foundation and the Philip K. Wrigley Marine Biological Research Fund.

The sea snakes are a family of about fifty species of marine and estuarine snakes; they are related to the cobras and coral snakes but are even more venomous. All true sea snakes have flattened, oarlike tails, and most have nostrils positioned—like those of crocodiles—on the top of the head. By far the greatest number of species occurs in the tropical areas of South East Asia; as many as seventeen species may be found in our main study area, the Straits of Malacca, which lie between the Malay Peninsula

and Sumatra.

Although a large general collection of sea snakes is of value to the Museum, it is only one product of the research we have under way here. The main focus of our work is on the ecology of these highly specialized marine creatures. So far, our observations indicate that the seventeen or so species of sea snakes occurring in the straits are not all distributed throughout the straits, but form unique assemblages of only six or seven species at each of our collecting sites. In view of this, we are trying to find out who lives with whom, and where and why. How do these species which live in the same area divvy up the resources such as food and



space? To help answer these questions we are looking at what each species eats by examining their stomach contents. We have found some species to be generalists, eating a large variety of fish and cuttlefish. Others are specialists, concentrating exclusively on fish eggs or eels, for example. We are also looking at reproduction patterns—Do all the different species at a locality give birth to their young at one time? Is there synchrony within a single species at two separate localities? If so, what environmental cues are used in these habitats that lie directly on the equator?

We obtain our collections of sea snakes by working with the local fishermen who regularly catch and release them in the course of their normal fishing activities. At two localities, Sungai Buloh and Parit Botak, trawling is the predominant fishing method. We go out with the trawlers collecting data—as well as snakes—on salinity, turbidity, bottom type, and water depth, in order to try to characterize the habitat in which each species of snake lives. At Muar, our third major collecting site on the straits, we are working with fishermen who use the river stake net, or *pukit togok*.

The *togok* net is suspended from a bamboo stake frame permanently planted in the mud at the mouth of the river. As

(Continued on p. 21)

Top: Local fisherman lowers togok net as tide begins to run out. Bottom: Downstream from a raised togok net at Muar.



FIELD MUSEUM'S AGUSAN GOLD IMAGE

"The most spectacular find yet
made in Philippine archeology"

by Bennet Bronson

Displayed in a wall case in the Museum's Hall of Gems is a small statue of solid gold, roughly but boldly cast, in the form of a seated and haloed woman. While easy to overlook, it is a famous piece. In the words of H. Otley Beyer, for decades the dean of archeologists in the Philippines, this statue is "the most spectacular single find yet made in Philippine archeology."

It is said to have been found in 1917 by an anonymous woman, probably of the Manobo tribe, while walking through a little-frequented ravine in Agusan Province in the southern Philippines. After a series of narrow escapes from the gold dealer's melting pot, the statue chanced to come to Beyer's attention. Immediately recognizing its importance, he tried unsuccessfully to persuade the (American) colonial government to purchase it for the National Museum in Manila and then turned for help to three private individuals: Faye-Cooper Cole, then Southeast Asian curator at this museum; Shaler Matthews, professor of religion at the University of Chicago; and Mrs. Leonard Wood, wife of the governor-general of the Philippines. Through the efforts of these three the money was raised. The statue arrived, still in good condition, at Field Museum in 1922.

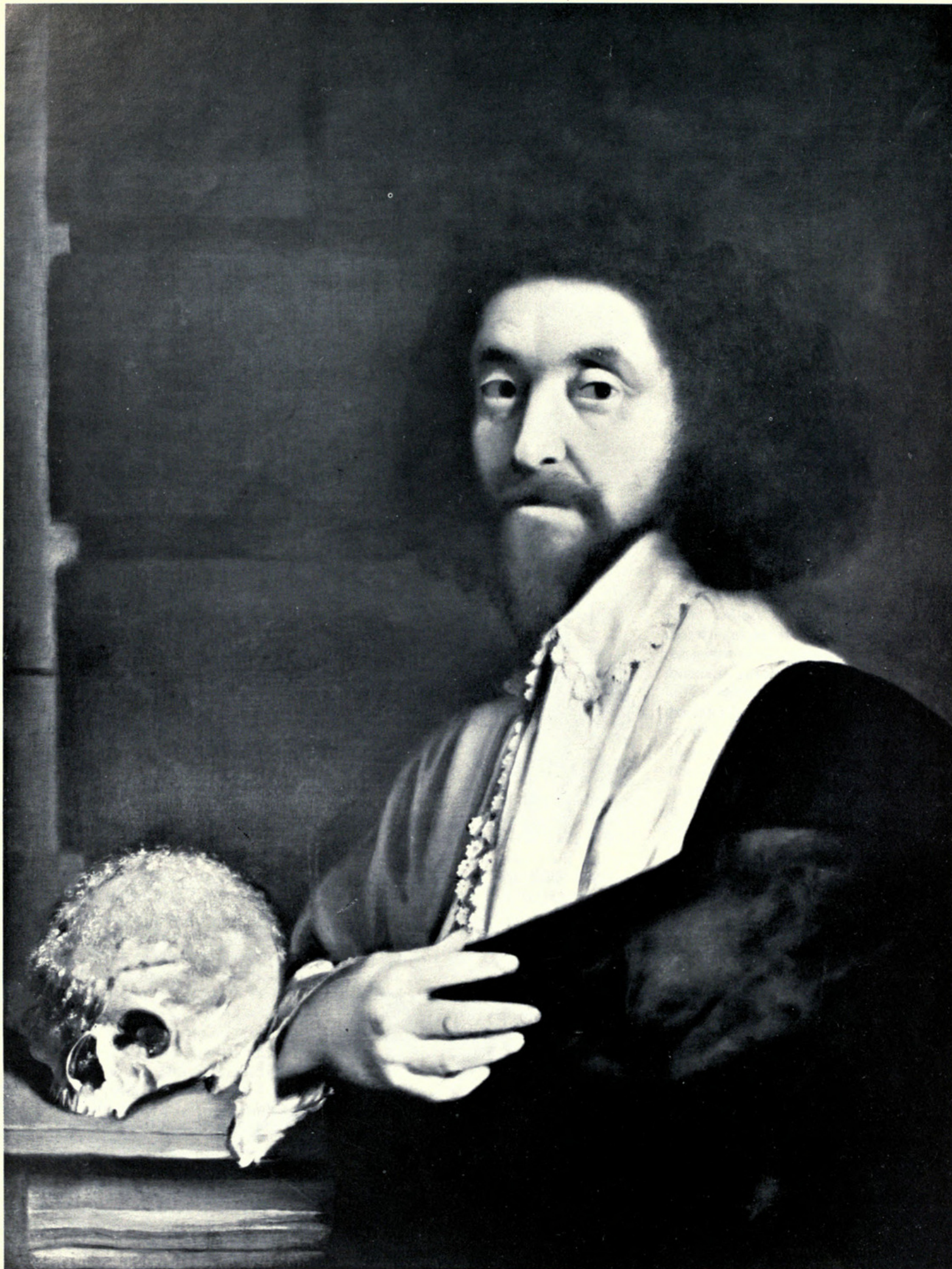
The statue is five and a half inches high and weighs almost four pounds—a substantial quantity of gold. However, its historical importance greatly exceeds its value as bullion, for it symbolizes the start of a major era in Philippines history. Before the statue was made, about A.D. 1000-1300, the Philippines were isolated from the mainstream of world events. Other parts of Southeast Asia had been closer to the developed parts of Eurasia

Bennet Bronson is assistant curator, Asiatic archaeology and ethnology.



and Africa and had begun to show the effects of this contact—the use of writing, of imported art styles, and of outside political and religious ideas—as early as A.D. 100. In the Philippines, on the other hand, this process of "Asianization" began so late that some have doubted that it occurred at all, maintaining that the islands remained effectively isolated until the arrival of Muslim traders and Spanish conquerors in the early 1500s. Yet, evidence is now accumulating to the contrary. Vast quantities of Chinese and Thai ceramics are being found, showing that the Philippines were commercially linked to the rest of the world by A.D. 1000 at the latest. Specialists are beginning to take new interest in the fact that many Philippines people possessed the art of writing long before the arrival of the Conquistadors, apparently borrowed from India at an early date. And occasional objects are discovered which show that the ancient Filipinos were not passive spectators of the contact process. The Agusan Gold Image is prime evidence of this.

What else the image is remains a puzzle. It is clearly a Hindu or Buddhist female deity: according to the Filipino expert Juan Francisco, perhaps a *sakti* or a *tara*. But it is quite atypical by the standards of most Hindu-Buddhist artistic traditions including that of ancient Java, to which it seems distantly to belong. Perhaps, as Otley Beyer himself suggested, the statue was made in the Philippines by Javanese miners, not necessarily expert in their own artistic traditions, while engaged in working the placer gold deposits in the Agusan area. Or perhaps, as the great Dutch historian F. D. K. Bosch once hinted, the statue is atypical in style because it was made by native Filipinos. Like other Filipinos, the Manobos of Agusan have a long tradition of excellent metal-working, as is shown by several of the exhibits in Hall G at Field Museum. A Manobo artist in, say, A.D. 1100 might have been quite capable of producing the statue. However, no such speculation can be proved at present. We will not know definitely who made it until many more Philippines excavations have been performed. □



John Tradescant the Younger. Painting attributed to Emanuel de Critz; 31 x 23 inches. National Portrait Gallery, London.

"Musaeum Tradescantianum"

a rare gift to field museum

by W. Peyton Fawcett

Christopher Legge, custodian of collections in the Department of Anthropology (retired), recently returned from a visit to England. He immediately came to me with the news that he had a gift from Mrs. Fuller that he had been reluctant to trust to the mails and had hand-carried across the Atlantic. As Field Museum librarian, one of my duties is to receive and record the many books and other materials that are donated to the library. It is always a pleasure to receive these gifts and a special one if the works are historically interesting or rarely encountered. When Mr. Legge mentioned the name of Mrs. Estelle W. Fuller I knew that I was about to receive a most interesting work; for she has given numerous rare volumes to the library over the years. I was not disappointed!

Mr. Legge handed me a small, leather-bound volume published in London in 1656, bearing the title: *Musaeum Tradescantianum: or, A Collection of Rarities. Preserved at South-Lambeth near London* by John Tradescant. It is a list of the contents of the museum known popularly as "Tradescant's Ark" and of the plant species growing in the attached garden. The museum was founded by John Tradescant the elder and continued by his son John, who is the author of the catalog. Both men were noted travelers, collectors, and gardeners and their museum contained the natural history specimens, anthropological and archeological objects, specimens of industrial art, coins, and curios that they had amassed as a result of their travels and

W. Peyton Fawcett is Field Museum librarian.

passion for collecting, and as gifts from their friends. The collection included such diverse items as the "Dodar (dodo), from the Island Mauritius; it is not able to flie being so big." "A Cherry-stone, upon one side S. Geo: (St. George) and

the Dragon, perfectly cut: and on the other side 88 Emperours faces," "Anne of Bullens (Anne Boleyn's) silke knit-gloves," and "Shooes to walk on Snow without sinking."

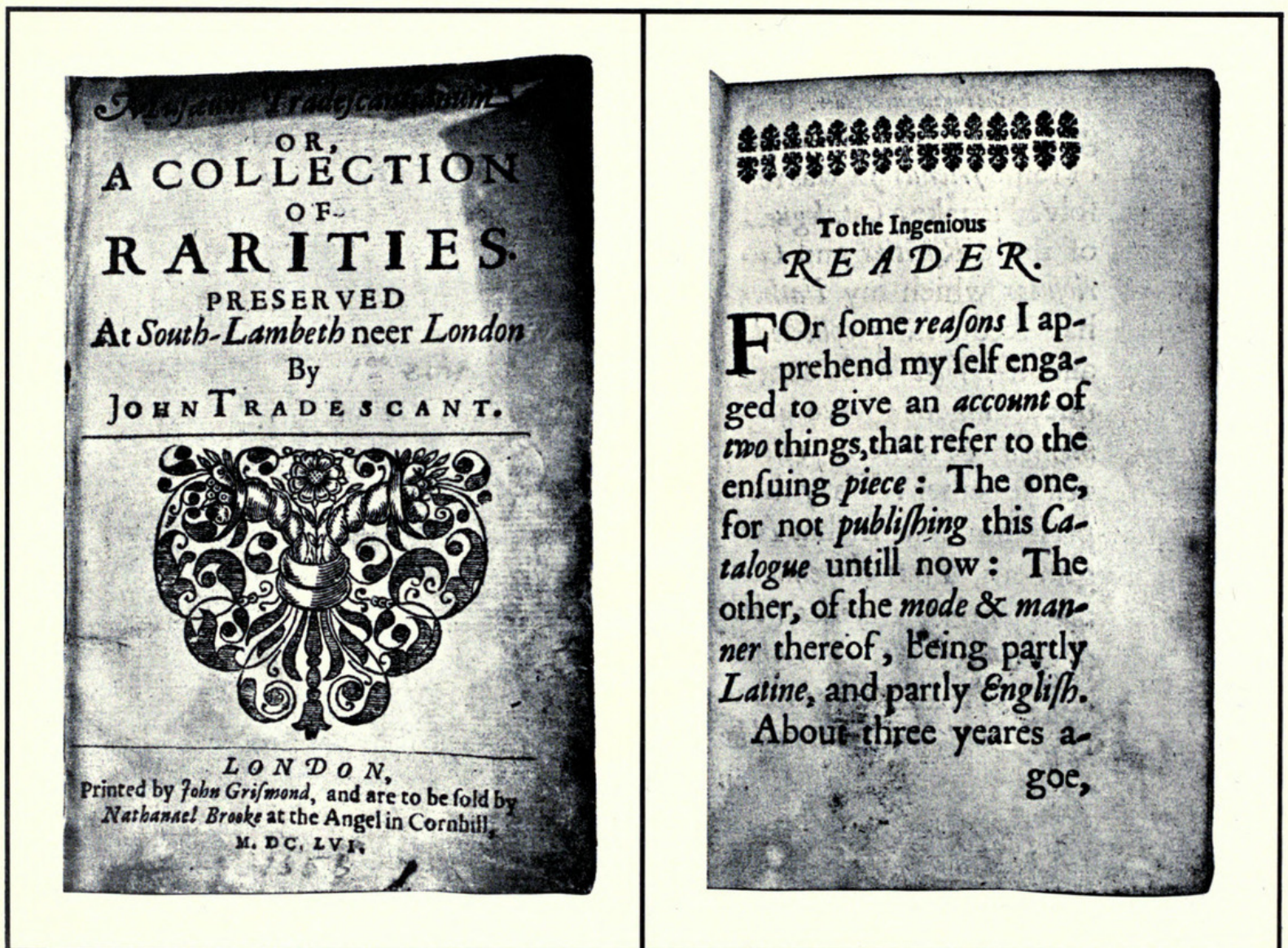
The attached garden contained exotic



Engraving of John Tradescant the Younger. Artist unknown.

plants from all over the world. The Tradescants collected plants with the same avidity as they did curios and are credited with introducing many into England, including the lilac and acacia. The Ark was a great attraction in its day and no visit to London was considered complete without a view of "John Tradeskin's rarities." After the death of the younger Tradescant in 1662 the contents were acquired by Elias Ashmole and incorporated into his own collection. The whole passed by gift to Oxford University in 1682 and was the foundation of the great Ashmolean Museum. Some of the rarities can still be seen there, including the cloak of Pocahantas' father, described as: "Pohatan, King of Virginia's habit all embroidered with shells, or Roanoke."

Below: Title page of *Musaeum Tradescantianum* and opening page of introductory essay. Complete text of introduction is given on p. 9 (opposite).



To the Ingenious Reader.

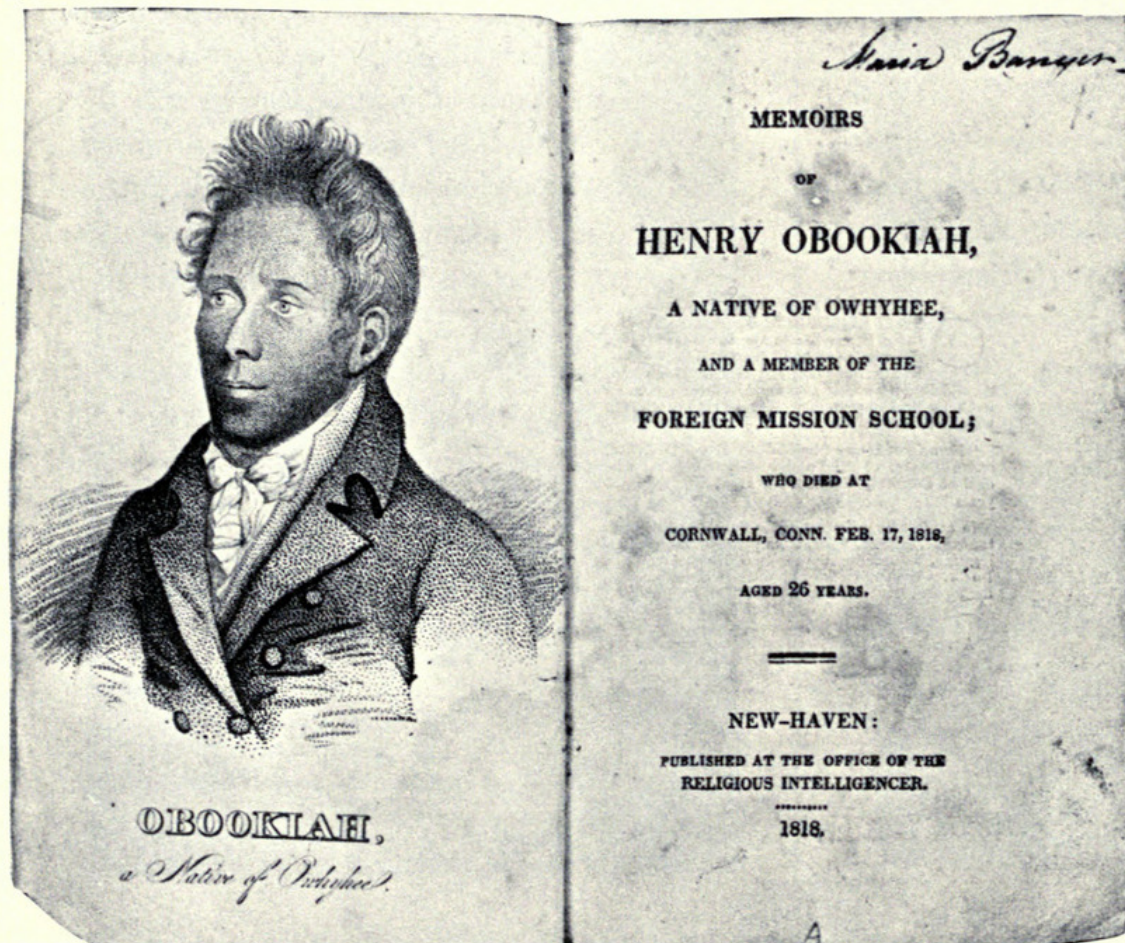
For some reasons I apprehend my self engaged to give an *account* of two things, that refer to the ensuing *piece*: The one, for not *publishing* this *Catalogue* until now: The other, of the *mode* & manner thereof, being partly *Latine*, and partly *English*.

About three yeares agoe, (by the perswasion of some *friends*) I was resolved to take a *Catalogue* of those *Rarities* and *Curiosities* which my Father had scedulously *collected*, and my *selfe* with continued diligence have *augmented*, & hitherto *preserved* together: They then pressed me with that Argument, *That the enumeration of these Rarities, (being more for variety than any one place known in Europe could afford) would be an honour to our Nation, and a benefit to such ingenious persons as would become further enquirers into the various modes of Natures admirable workes, and the curious Imitators thereof*: I readily yielded to the *thing* so urged, and with the assistance of two worthy *friends* (well acquainted with my design,) we then began it, and many *examinations* of the *materialls* themselves, & their *agreements* with severall Authors *compared*, a *Draught* was made, whith they gave into my hands to examine over. Presently thereupon my *onely Sonne dyed*, one of my *Friends* fell very *sick* for about a *yeare*, and my *other Friend* by unhappy *Law-suits* much disturbed. Upon these accidents that *first Draught*

lay neglected in *my* hands another year. Afterwards my said *Friends* call again upon me, and the designe of *Printing*, a-new *contrived*, onely the prefixed *Pictures* were not ready, and I found my kinde friend Mr *Hollar* then engaged for about tenne Moneths, for whose hand to finish the *Plates*, I was necessarily constrained to stay untill this time.

Now for the *materialls* themselves I reduce them unto two sorts; one *Naturall*, of which some are more familiarly known & named amongst us, as divers sorts of Birds, foure-footed Beasts and Fishes, to whom I have given usual *English* names. Others are lesse familiar, and as yet unfitted with apt *English* termes, as the shell-Creatures, Insects, Mineralls, Outlandish-Fruits, and the like, which are part of the *Materia Medica*; (Encroachers upon that faculty, may try how they can crack such shels.) The other sort is *Artificialls*, as Utensills, Householdstuffe, Habits, Instruments of Warre used by severall Nations, rare curiosities of Art, &c. These are also expressed in *English*, (saving the *Coynes*, which would vary but little if Translated) for the ready satisfying whomsoever may desire a view thereof. The *Catalogue* of my *Garden* I have also added in the Conclusion (and given the names of the *Plants* both in *Latine* and *English*) that nothing may be wanting which at present comes within view, and might be expected from

Your ready friend
John Tradescant



Above: The Tradescant house, in South Lambeth. The garden is enclosed by wall to right. As a storehouse of exotic plants, animals, and anthropological curiosities, the Tradescant home was one of the first natural history museums. Left: Title page of the Memoirs of Henry Obookiah (slightly reduced), with facing portrait. Published 1818. Book is among several recently given to Field Museum by Mrs. A.W.F. Fuller.

(Continued on p. 15)

The Ray A. Kroc Environmental Education Program



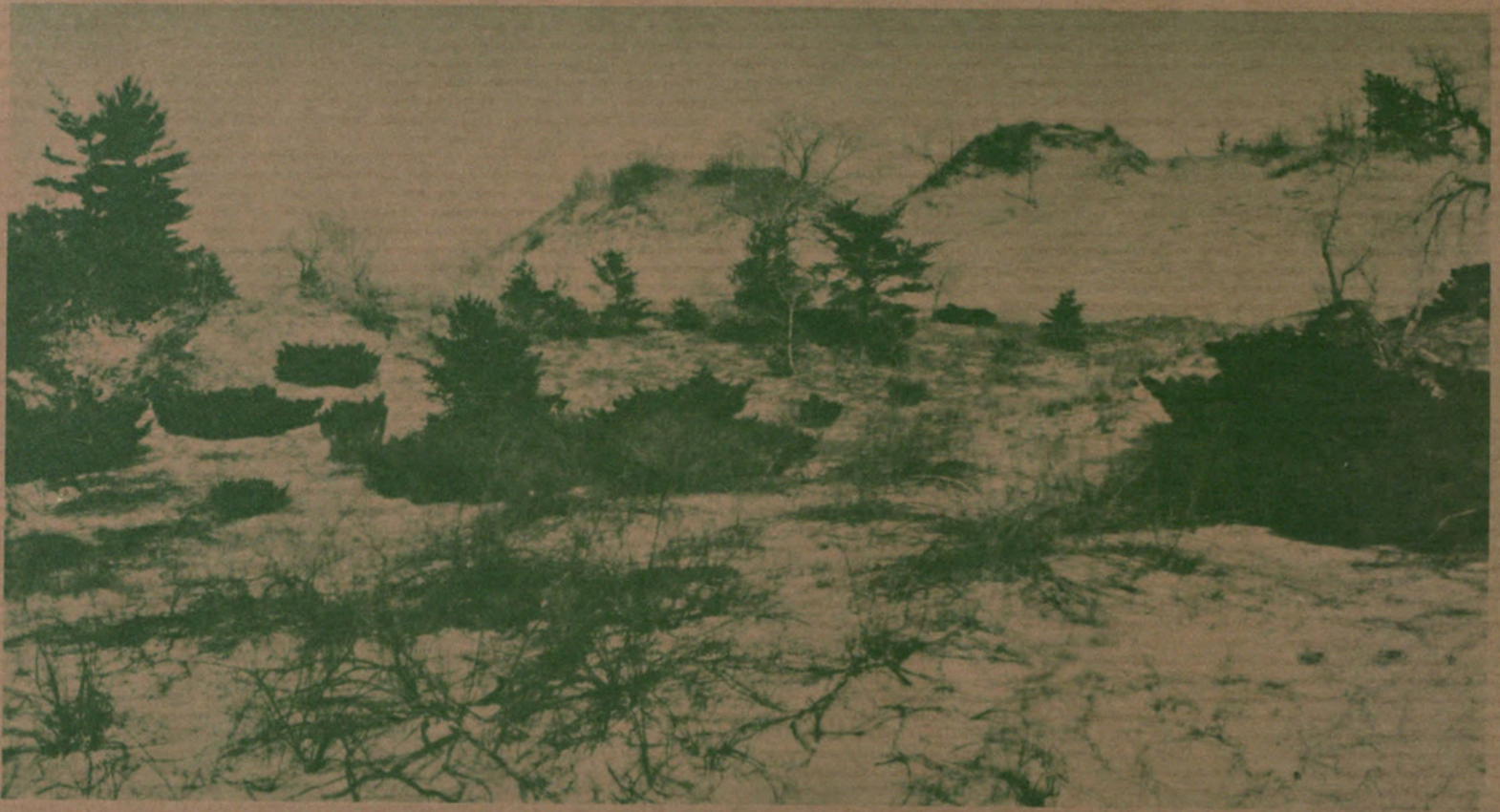
for August, September, and October

An overview of the role of natural ecosystems in the economy of life



The Ray A. Kroc Environmental Education Program at Field Museum for August, September, and October, 1975, explores the importance of natural communities from a pragmatic, as well as an aesthetic viewpoint. Man is dependent on a viable biosphere to provide such services as pure air, drinking water, natural resources, and food. Our local native communities have much to show us about these, and other often unrecognized functions performed by natural ecosystems. ►

Left: Field Museum diorama of Illinois woodland, Hall 29 (Plant Families)



Indiana dunes—the unique ecosystem of this region will be the subject of field trips on September 13 and 17.

FAMILY NATURE HIKE

Illinois Beach State Park

Join your children in an exploration of this unique community. Observation will be the theme, and we will hope to see August flowers as well as ants, ant-lions, toad-bugs, damsel flies, and other local wildlife on our way to the Dead River and along its winding banks.

Meet at the site and bring your own lunch and beverage. Detailed instructions will be sent with confirmation. A nonrefundable fee of \$2 for adults and \$1 for children will hold advance reservation. Priority will be given to parents and their children. Minimum age: 8 years. Limited to 25.

10:00 a.m.
Saturday, August 9

Leader: Betty Deis, Field Museum

ADULT FIELD TRIPS

All adult field trips leave from Field Museum North Parking lot regardless of weather. A non-refundable fee, covers lunch and transportation and holds your reservation. Saturday adult trips are limited to 40 people per trip.

Morton Arboretum Prairie and Wetlands

View a native prairie restoration as a small replica of the once extensive grassland ecosystem, and as a disappearing part of

our Illinois heritage. Examine the ecological role of arboretum river and ponds. \$5.00 for members. \$6.00 for nonmembers.

9:00 a.m.
Saturday, August 30

Leader: Ray Schulenberg, Morton Arboretum

Starved Rock State Park

Enjoy fall color in this beautiful native forest, and discover that trees are more than potential newspapers. \$5.00 for members, \$6.00 for nonmembers.

8:00 a.m.
Sunday, September 28
Saturday, October 4 (repeat)

Leader: John A. Wagner, Kendall College

Illinois Beach State Park

Learn about the value of marsh and lakeshore and meet some interesting inhabitants of these wetland communities. \$5.00 for members, \$6.00 for nonmembers.

9:00 a.m.
Wednesday, September 10
Sunday, September 14 (repeat)

Leader: Harry Nelson, Roosevelt University

THE RAY A. KROC ENVIRONMENTAL EDUCATION PROGRAM...

Indiana Dunes

Hike the dunes and discover how this unique ecosystem is much more than a recreational facility. \$5.00 for members, \$6.00 for nonmembers.

9:00 a.m.

Saturday, September 13 Wednesday, September 17 (repeat)

Leader: Floyd Swink, Morton Arboretum

COURSE FOR TEACHERS

Introduction to Community Ecology

This course, consisting of four field trips and a museum workshop, will explore communities reflecting both urban and natural ecology. Resource materials, field techniques, and ideas for organizing and conducting school field trips will be presented. A nonrefundable fee, \$22.00 for members and \$27.00 for nonmembers, holds advance reservation and covers lunch and transportation for field trips. Areas studied include the dunes, a vacant lot, a stream, a prairie, and Lake Michigan.

Two semester hours of graduate credit are offered for this course (listed as #34-581 workshop in Outdoor Education) by the National College of Education. Tuition for credit is \$74.00 in addition to the Museum fee, and is payable at the first session. All sessions meet at the North Door of the Museum. Limited to 30. An official degree transcript will be required to receive credit. For further information call Jim Bland, 922-9410, ext. 203.

9:00 a.m.

Saturdays September 13, 20, 27; October 4 and 11.

Leader: Jim Bland, Field Museum

FIELD TRIPS FOR GEOLOGY BUFFS—ADULT

Pit 11

Hunt for fossils and see how an ecosystem of 300 million years ago affects our life in the twentieth century. Bring sack and hammer. \$5.00 for members, \$6.00 for nonmembers. Meet at Museum North Parking Lot. Limited to 40.

8:30 a.m.

Saturday, September 27

Wednesday, October 1 (repeat)

Sunday, October 5 (repeat)

Leader: Eugene Richardson, Field Museum

FIELD TRIPS FOR GEOLOGY BUFFS

12, 13, 14 years old

Pit 11

Take a trip to a strip mine to find fossil evidence of an ancient coal forest. Bring sack and hammer. \$5.00 for members, \$6.00 for nonmembers. Meet at Museum Information Desk for introductory program. Limited to 30.

9:00 a.m.

Sunday, September 21

Leader: Martha Lussenhop

Reservations for all programs must be made in advance by mail. Confirmations will be sent in order of receipt of coupon on following page (or facsimile) and check. We reserve the right to cancel programs, in which case we will notify you and refund your fee. Otherwise, all fees are nonrefundable.

This program is made possible by the Ray A. Kroc Environmental Fund, which was established at Field Museum by his friends to honor Mr. Kroc, chairman of McDonald's Corporation, on his 70th birthday. Other events of this program will be presented in coming months and years. For further information call Lorain Stephens, Field Museum 922-9410; ext. 360 or 361.



Life-size diorama (Hall 38) of swamp forest as it appeared millions of years ago, when today's coal was still in the form of living plants. Participants in a September 21 field trip will search for fossil evidence of such an ancient forest.

THE RAY A. KROC ENVIRONMENTAL EDUCATION PROGRAM...

Field Museum—Environmental Program
Roosevelt Road at Lake Shore Drive
Chicago, Illinois 60605

Please enroll me in the following programs at Field Museum:

Program	date	time
Program	date	time
Program	date	time
Program	date	time

Enclosed is my check for \$_____, payable to Field Museum.

Name _____

Address _____

City _____ State _____ Zip code _____

Phone: Daytime _____ Evening _____

Museum Member: Yes _____ No _____

Field Museum—Environmental Program
Roosevelt Road at Lake Shore Drive
Chicago, Illinois 60605

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Enclosed is my check for \$_____, payable to Field Museum.

Name _____

Address _____

City _____ State _____ Zip code _____

Phone: Daytime _____ Evening _____

Museum Member: Yes _____ No _____

Akoquoua



Palikour



Left and below: *Illustrations from Nouvelle Relation de la France Equinoxiale (1743), by Pierre Barrère, a French naturalist and physician.*



TRADESCANTIANUM (Con't from p. 10)

Mr. Legge informed me that an additional work—too heavy and cumbersome to be conveniently hand-carried from England—was in the mail to the Museum; and shortly it arrived: *An Album of the Weapons, Tools, Ornaments, Articles of Dress, & of the Natives of the Pacific Islands*, by James Edge-Partington. This valuable work was issued in three series between 1890 and 1898 in a limited edition of 150 copies of the first two series and 175 of the third. It consists of reproductions of pen drawings of the objects together with concise description of each. The plates were lithographed from the author's manuscript. The purpose of the work is to illustrate a great number of types and to assist collectors in identifying their specimens.





Above: Mrs. A.W.F. Fuller; right: the late Capt. A.W.F. Fuller; facing page: Clifford C. Gregg, former director of Field Museum, and the late Stanley Field, former president of the Museum, examine artifacts purchased by the Museum from Capt. Fuller in 1958. One of the world's most comprehensive collections of ethnological materials from the South Pacific, it includes more than 6,500 specimens. A great number of these are currently on exhibit in Hall F (Peoples of Polynesia and Micronesia).

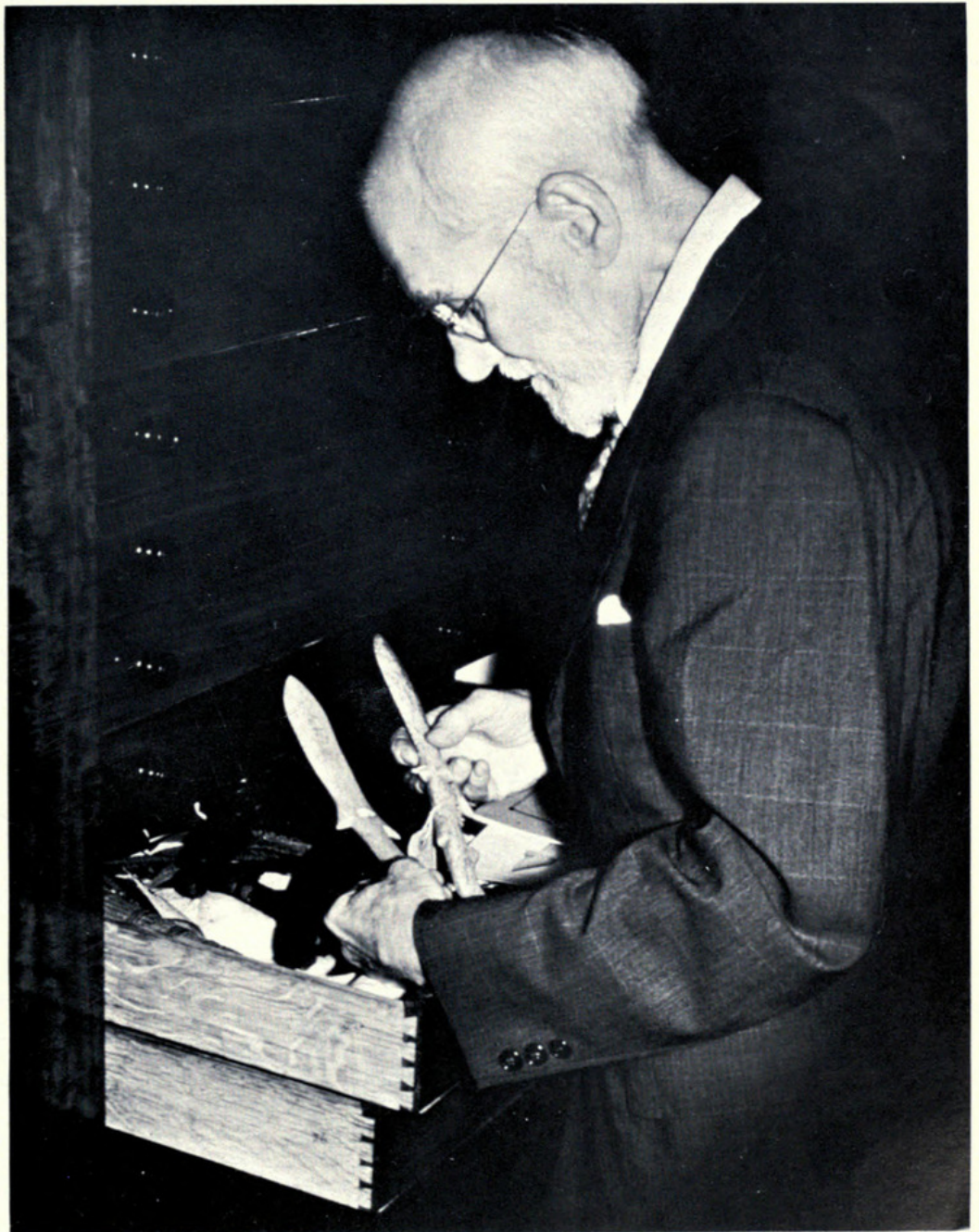
Arriving about the same time as the Edge-Partington was an additional parcel containing three more works: *Nouvelle Relation de la France Equinoxiale*, by Pierre Barrère (Paris, 1743); *Memoirs of Henry Obookiah*, a Native of Owhyhee (Hawaii), and a Member of the Foreign Mission School; *Who Died at Cornwall, Conn. Feb. 17, 1818, Aged 26 Years* (New Haven, 1818); and *Museum Leverianum, Containing Select Specimens from the Museum of the Late Sir Ashton Lever*, by George Shaw, London, 1792.)

The volume by Pierre Barrère, a French naturalist and physician, is a description of French Guiana and contains a great

deal of anthropological data. It supplements his *Essai sur l'Histoire Naturelle de la France Equinoxiale* (Paris, 1741) and fills a notable gap in our collection. The "Memoirs" of Henry Obookiah is a curious book that recounts the life and conversion to Christianity of a native of what were then called the Sandwich Islands. It appears to be quite rare. The last of the volumes is part one of a six-part work consisting of colored plates of birds and mammals contained in the Leverian Museum, with descriptive text in Latin and English. The interesting history of the Leverian Museum has been described by Christopher Legge in his

article "Tale of a Tiki" (*Field Museum of Natural History Bulletin*, Vol. 38, No. 8; Aug., 1967).

The five works received from Mrs. Fuller are from the library of her late husband, Capt. A. W. F. Fuller, and contain numerous notes in his hand on the provenance, history, and other features of the volumes. The Edge-Partington work, in particular, is a useful supplement to the Fuller Collection of Pacific Artifacts now in the Field Museum. All of the volumes are useful additions to our library and it is a pleasure to thank Mrs. Fuller again for her continuing benefactions. □



our environment

Are These Species Endangered, Threatened, or Safe? Vertebrates, Invertebrates, and Plants Under Consideration

Ten animals—two fish, one reptile, four mammals, and three birds—are being proposed for inclusion on the List of Endangered and Threatened species by the U.S. Fish and Wildlife Service. Acceptance of the proposal would bring the total number of threatened and endangered species in the United States to 119.

The ten animals under consideration for the list include the Mexican wolf, the Cedros Island mule deer, the peninsular pronghorn antelope, the United States population of the American crocodile, the gray bat, the bayou darter, the Scioto madtom, the po'o uli, the Hawaii creeper and Newell's Manx shearwater.

The animals proposed for addition to the endangered list meet at least one of five criteria mandated by the Endangered Species Act of 1973. These criteria are:

- The present or threatened destruction, modification, or curtailment of its habitat or range.
- Overutilization for commercial, sporting, scientific, or educational purposes.
- Disease or predation.
- The inadequacy of existing regulatory mechanisms.

The illustrations on pages 18-21 are from woodcuts executed by Konrad Gesner (1516-1565), a Swiss naturalist and physician. In his time the creatures shown here were believed to actually exist. While some, such as the sea monsters, were based on fragmentary information or imaginative tales, others, such as the butterfly and the white stork (p. 20), are reasonable representations.

- Other natural or manmade factors affecting its continued existence.

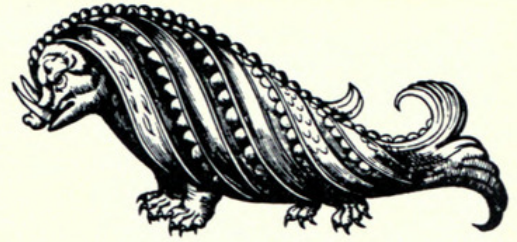
VERTEBRATES...

- The Mexican wolf was formerly common in Arizona, New Mexico, southwestern Texas, and much of Mexico. In the 20th century the animal declined substantially in numbers and distribution because of habitat loss and sport hunting. A recent survey of this dark wolf—the smallest in North America—indicated that there are fewer than 200 in Mexico, where they are protected by national law. Enforcement, however, is difficult and many wolves are thought to be killed illegally. These animals exist in widely scattered packs which are subject to intensive human pressure. In the United States, the Mexican wolf now occurs only as a rare wanderer, and there have been few reports of its presence since 1960.

- The Cedros Island mule deer is known to exist only on Cedros Island off the western coast of Baja California. Only a few, perhaps less than a dozen, are thought to survive in restricted sections of the island. Although it is illegal to hunt this deer, poaching continues and has been an important factor in the deer's reduced population. Predation by feral dogs is also thought to have been a major factor in the deer's decline.

- Peninsular pronghorn antelopes once inhabited most of Baja California, but their range has been greatly reduced, and only two or three small remnant groups survive. Competition with domestic livestock for forage reduced the antelope's numbers. Excessive illegal hunting, some of it by visitors from the United States, also seems to have contributed to this animal's decline.

- The scioto madtom, a catfish, lives only in one locality in the lower portion of Big Darby Creek, tributary to the Scioto River,



Pickaway County, Ohio. Its habitat is a riffle area with moderate to fast current, where the bottom consists of gravel, sand, silt, and boulders. The scioto madtom has declined because of the pollution and siltation of its habitat. Two proposed impoundments on Big Darby Creek also threaten its limited population.

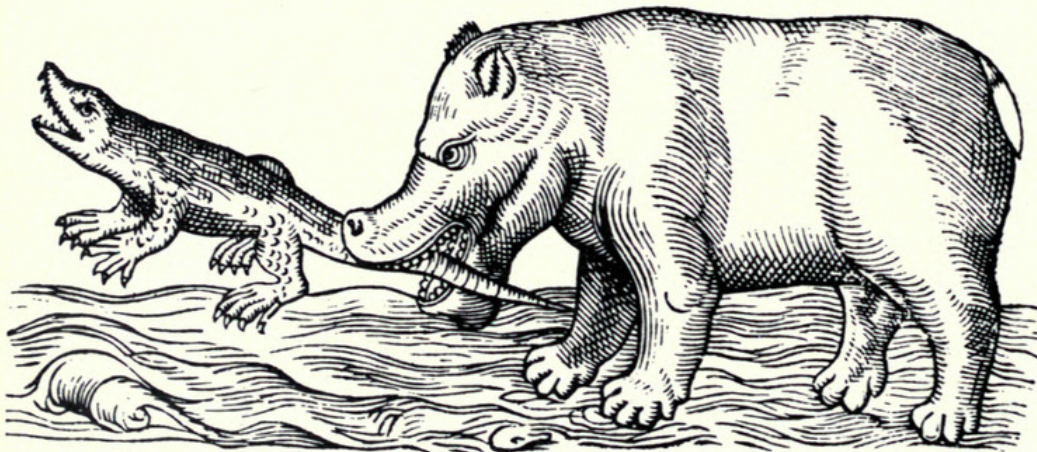
- The po'o uli, a sparrow-sized Hawaiian bird with a black mask, was discovered only in 1973. It is restricted to a small area of forest on the northeastern slope of Haleakala Volcano on the island of Maui. The po'o uli, which is Hawaiian for "black-faced," has an unknown history, but its decline was presumably caused in part by habitat alteration and by competition with non-native birds.

- The sparrow-sized Hawaii creeper was endemic to the island of Hawaii and was common through the 19th century. Subsequent changes to its native grounds and competition with non-native birds restricted it primarily to a small area of forest between 5,000 and 6,000 feet elevation. The Hawaii creeper's population was also reduced by rat predation and by transmission of avian diseases by an introduced mosquito. The bird is now rare and vulnerable to further environmental disruption.

- Newell's Manx shearwater is a medium-sized, black and white seabird that once bred on all of the main Hawaiian Islands. Now its breeding activity is restricted to an isolated part of Kauai. This fish- and squid-eating bird is thought to have been exterminated from most of its range by the introduction of predatory mongooses, dogs, pigs, and rats. The bird's attraction to lights also increases its mortality as it is killed from collisions with cars and lighted towers. Nonetheless, it is thought to number in the low thousands, and does not appear to be in immediate danger of extinction.

- The gray bat is quite vulnerable and in danger of extinction, although several large colonies still exist. Large numbers of the bats are needed to maintain a minimum breeding population.

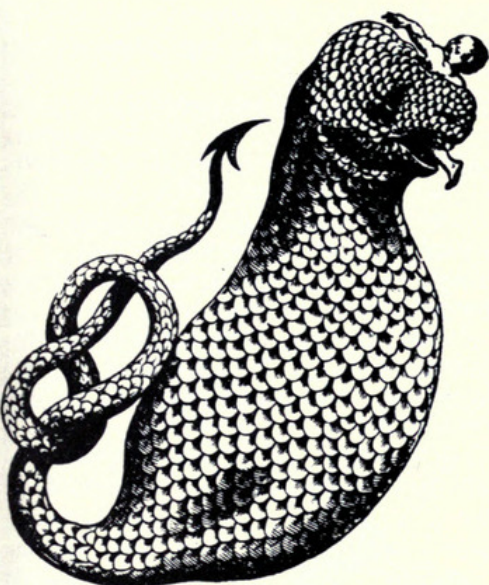
The gray bat uses certain kinds of caves in southeastern and south-central United States for roosting, breeding, and hibernating



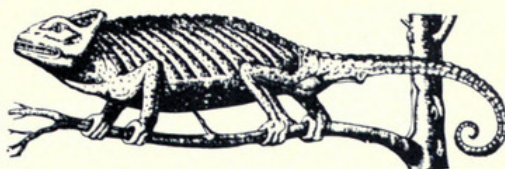
activities. Perhaps no other bat is more dependent upon caves for its existence, and it is the only bat in the eastern United States that normally requires caves in summer as well as in winter. Moreover, this species apparently can only use caves with specific temperature levels. Wintering caves are in short supply; approximately 65 percent of the entire known population hibernates in a single cave, and about 90 to 95 percent of the entire population is restricted to only five caves.

Over the past 20 years at least five other major wintering caves have been destroyed. Several major groups of bats were dislocated when their caves were commercialized, vandalized, or flooded. In some cases the bats were deliberately destroyed by explorers, scientists, or vandals. Most of the remaining major bat colonies live in caves readily accessible to humans. Several of these caves face future commercialization and probable abandonment by resident bats—a normal reaction to human disturbance.

Although gray bat populations have not been greatly reduced by natural predation and disease, these problems could become more significant as mortality factors.



● The bayou darter is a small, silvery fish known to exist only in the Bayou Pierre drainage, a small river tributary to the Mississippi River in west Mississippi. The bayou darter inhabits clean, silt-free, gravel riffle areas, but in recent years gravel pit operations and poor agricultural practices have damaged its habitat and reduced its numbers. The Soil Conservation Service has proposed a watershed project which would further degrade the bayou darter's habitat by adversely altering the water chemistry and contributing additional silt to the stream. This would pose a serious threat to the continued existence of the bayou darter.



● The American crocodile was once a common species in southern Florida, and old records suggest that it was occasionally present farther north on both the Atlantic and Gulf coasts. By the early 20th century the crocodile was still common throughout Biscayne Bay as well as along the shores of Florida Bay and in the Florida Keys.

Development of southern Florida eliminated much of the crocodile's habitat and also led to excessive killing by man. In the 1950's there was still significant nesting on Key Largo and on islands to the south of Florida Bay, but human pressure has eliminated most of this activity. The last suitable areas on Key Largo are rapidly being destroyed by commercial development. At present there are thought to be only about 10 to 20 breeding females in Florida, with most of these concentrated along the northeast shore of Florida Bay in Everglades National Park.

Raccoons prey heavily on the eggs and young of crocodiles, and probably destroy the great majority of the annual increment. Raccoon numbers are thought to have increased considerably after man largely eliminated natural predators, including the adult crocodiles themselves.

Poaching for skins and eggs still sometimes occurs, and crocodiles are occasionally shot for "sport" from passing boats. Although crocodiles are protected by state law, and by federal law in Everglades National Park where most of the population occurs, enforcement is difficult. The most nest sites and adult crocodiles are found in exposed areas that cannot be constantly guarded in the face of increasing human presence. Furthermore, present regulations do not restrict the destruction of habitat outside the park.

Other natural and human activities pose additional threats to the crocodile. The possibility of a hurricane or other major natural disaster is a real threat to such a small, isolated population. Increasing human development in southern Florida has restricted the flow of fresh water to the Everglades. This may greatly affect the crocodile population because young crocodiles swim upstream and depend for a period on water with low salt content.

The leopard and the clouded leopard are to be the subjects of two separate surveys by the U.S. Department of the Interior to determine if the animals should be listed as endangered or threatened species. The department is seeking the views of governments of all countries in which the leopard and clouded leopard occur.

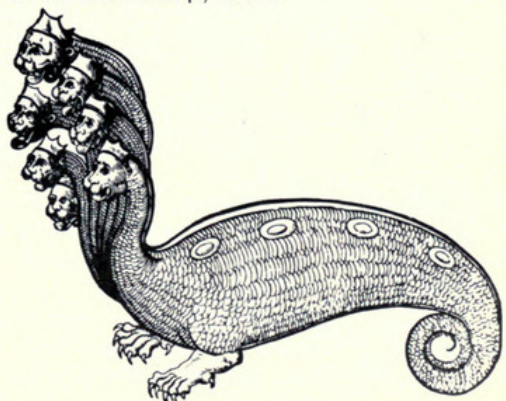
In 1972 the department declared the leopard (*Panthera pardus*) to be an endangered species throughout its natural range, primarily because of commercial exploitation which brought about a serious decline in the numbers and distribution of the animal. This designation as endangered ended the legal importation of leopards and their skins into the United States.

Scientific evidence accumulated since 1972 suggests that the leopard may not be endangered throughout its entire range. The department now has sufficient evidence to warrant a review of the leopard to determine whether it should be reclassified as a threatened species in any part of its range. This would allow some legal exploitation of the animal.

This species of leopard has the greatest range of any big cat. Found throughout most of Africa and Asia, it inhabits a variety of regions from tropical forests and rocky areas with heavy or scattered vegetation to the high, cold regions of the Himalayas. Coloration is cinnamon-buff with a rosette pattern. The "black panther" is a color phase of this species. In rocky areas the leopard lives in caves. In forested regions it lives in dense vegetation. The leopard is active and agile in trees, often springing on its prey from overhanging limbs. It usually travels in pairs, but sometimes family groups of four to six are noted.

The clouded leopard (*Neofelis nebulosa*), a smaller relative of the leopard, is not currently listed as either threatened or endangered. Recent evidence, however, indicates it may have declined to a point where its survival is in jeopardy.

The species is found only in Asia; it occurs in Nepal and Sikkim eastward to southern China, Hainan, and Formosa, Indochina, and Borneo. It frequents jungles and shrub and swampy areas.



INVERTEBRATES...

Fifty-seven species of freshwater crustaceans, including shrimp, scud, and crayfish, will be studied by the federal government, 24 states, and the District of Columbia to determine if any of them should be added to the endangered or threatened species list. The National Speleological Society of Washington, D.C., affiliated with the American Association for the Advancement of Science, has petitioned the Department of the Interior to review the status of these crustaceans, most of which are found in caves or springs. The crustaceans are an integral part of their ecosystems and in several instances they are the primary food of threatened or endangered fish, such as pupfish, which share the same habitat. Two of the 57 species are threatened by the construction of dams, but for most of the species being studied ground-water pollution is the greatest problem. Other habitat losses can be attributed to lowered water tables, development, flooding, and strip mining.

The spiny cave scud is common only to the Greenbriar Valley, a tributary of the New River in West Virginia. Strip mining is the greatest threat to this shrimplike animal. It is estimated that 90 percent of the state's freshwater mussels have been lost because of strip mining and other environmental disturbances.

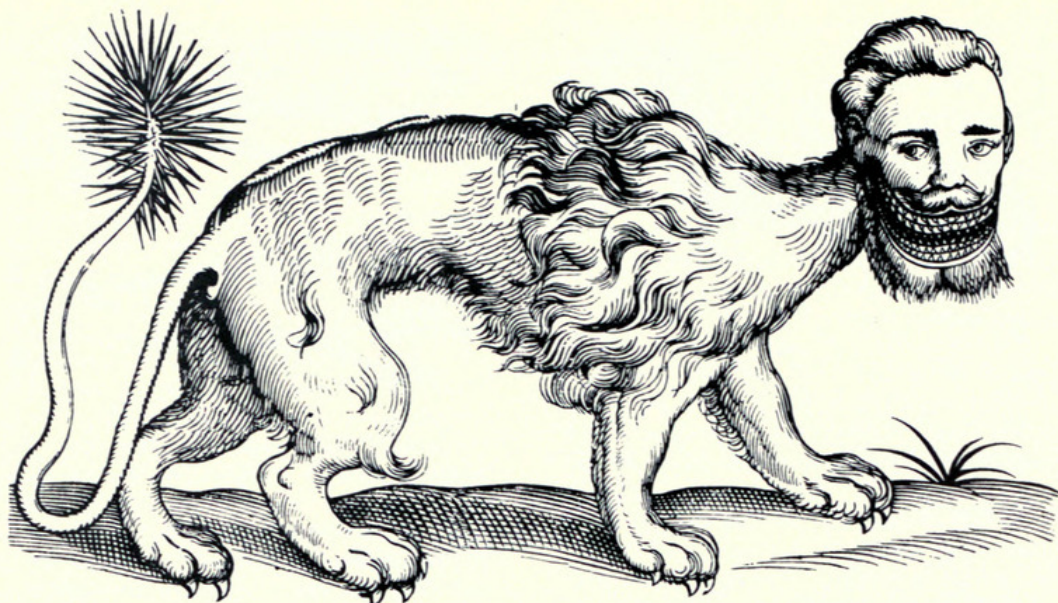
In Texas, the Pecos scud is also in trouble. This scud, which can have either reddish or greenish bands, is found only in Willbanks Spring northwest of Fort Stockton. It formerly lived in many other areas along the Pecos River system, but the pumping of subsurface water, particularly in New Mexico, wiped out those populations. Currently the isolated habitat of this scud is threatened by oil drilling, a lowered water table and by pollution.



PLANTS...

The first review of plants for possible inclusion on the Endangered Species List has been begun by the U.S. Fish and Wildlife Service for four species of wildflowers.

The plants are Monkshood (*Aconitum novaeboracense*) found in Iowa, Ohio, New York, and Wisconsin; *Sullivantia* (*Sullivantia*



renifolia) found in Illinois, Iowa, Minnesota, Missouri, and Wisconsin; Bird's-eye Primrose (*Primula mistassinica*) found in Illinois, Iowa, Maine, Michigan, New York, Wisconsin, and Canada (Laborador, New Brunswick, Quebec, Ontario); and Forbe's Saxifrage (*Saxifraga forbesii*) found in Illinois, Iowa, Minnesota, Missouri, and Wisconsin. All of the species occur in very small numbers in highly isolated areas.

The wildflowers primarily inhabit the "driftless area" of Illinois, Iowa, Minnesota, and Wisconsin. The region was so named by geologists and biologists because its native plants and animals are quite unlike those of the surrounding area. The region is actually an unglaciated island of terrain in the midst of a glaciated zone. The favorite habitat of these species appears to be the moist sandstone cliffs and rock ledges of the Kickapoo River gorge in Wisconsin.

White Stork on Decline

Once a familiar sight throughout much of Europe, the white stork appears to be on the decline. Now rarely seen in Belgium, France, and the Netherlands, the bird has vanished completely from Sweden. The cause, says James Baird, a Massachusetts Audubon Society ornithologist, is the use of DDT and other chlorinated pesticides. Only forty pairs of the species bred in Denmark last year, compared with 200 breeding pairs counted fifteen years ago.

New Mosquito Killer

A new pesticide recently registered by the Environmental Protection Agency (EPA) for mosquito control is Altosid SR-10, a growth regulator that prevents mosquito juveniles from maturing into adults. The insects are trapped by chemical action in their larval or

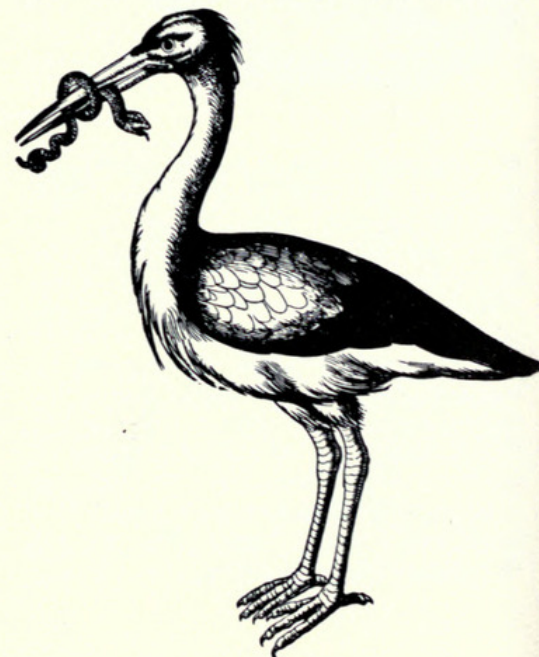
pupal stages until they die. The pesticide is specific for mosquitoes, is effective in small amounts, and degrades rapidly, reports the EPA.

\$50,000 Conservation Prize

Nominations are now being accepted for the second \$50,000 J. Paul Getty Wildlife Conservation Prize to be awarded in February, 1976, to an individual or organization chosen by an international jury for outstanding achievement or service of benefit to mankind in the conservation of wildlife, plants, or animals. The first Getty prize was awarded last January to Felipe Benavides, of Peru. The \$50,000 prize is the largest amount ever awarded for wildlife conservation.

Chairman of the international award jury of thirteen will be Prince Bernhard, of the Netherlands, who is also president of the World Wildlife Fund International.

Continuation of the prize, Bernhard said, will focus attention on conservation as a



world priority, and will provide inspiration and encouragement not only to those already at work in the field but also to those who may be thinking of becoming involved in this critically important work.

Candidates are considered for a diversity of accomplishments. These include work toward the conservation of rare or endangered species and habitats, toward increasing public awareness of the importance of wildlife and nature through scientific, educational, or aesthetic contributions, and toward the establishment of legislation or an organization or society of unusual importance to wildlife conservation. The candidate's achievement must be pioneering and substantial, so that recognition accorded by the award will increase public appreciation of the significance of wildlife and its conservation. Felipe Benavides, a Peruvian conservationist, was awarded the first Getty Prize for his successful promotion of international cooperation to save the endangered vicuña and other Latin American species and natural habitats. Benavides is using the award funds to establish a research institute at Paracas, on the coast of Peru, and proposes that a marine park be established at that location.

New Aids for Endangered Warbler

Kirtland's warbler (*Dendroica kirtlandii*), also known as the jack pine warbler, is being aided in a new program this summer in its fight against extinction. In a joint effort by the U.S. Fish and Wildlife Service, The U.S. Forest Service, and the Michigan Department of Natural Resources, forest lands in Huron National Forest, located in the northeastern part of Michigan's lower peninsula, will be burned over in order to stimulate the growth of new jack pines, the trees in which the warbler nests.

Kirtland's warbler requires jack pines from 5 to 18 feet in height for nesting. Fire pops open the cones of the jack pine which grow to a size attractive to warblers within a few years.

Since 1971, the U.S. Fish and Wildlife Service has been trapping and removing brown-headed cowbirds from warbler nesting areas to help ensure nesting success. The female cowbird does not build a nest of her own, but lays her eggs in the nests of other birds, relying on the host species to hatch and raise the young cowbirds. Before the trapping program began, cowbird parasitism was found in 59 percent of the Kirtland's warbler nests examined, and nesting success was greatly reduced by the presence of young cowbirds. The trapping program has been successful in reducing cowbird parasitism to about 9 percent, and increasing the number of warblers fledged from 0.81 to 2.84 young per nest.

This summer will be the first that Kirtland's warbler nesting areas will be closed to the public; this is being done to preclude interference with nesting success. Nesting areas will be closed from May 1 to August 15 to protect the warbler from human disturbance.

Federal Eagle-Trapping Program

Golden eagles are being trapped by the U.S. Fish and Wildlife Service in order to protect the eagle itself—an endangered species—as well as newborn lambs. The eagles trapped in southwestern Montana's Beaverhead County are being relocated to other areas of Montana and to Colorado.

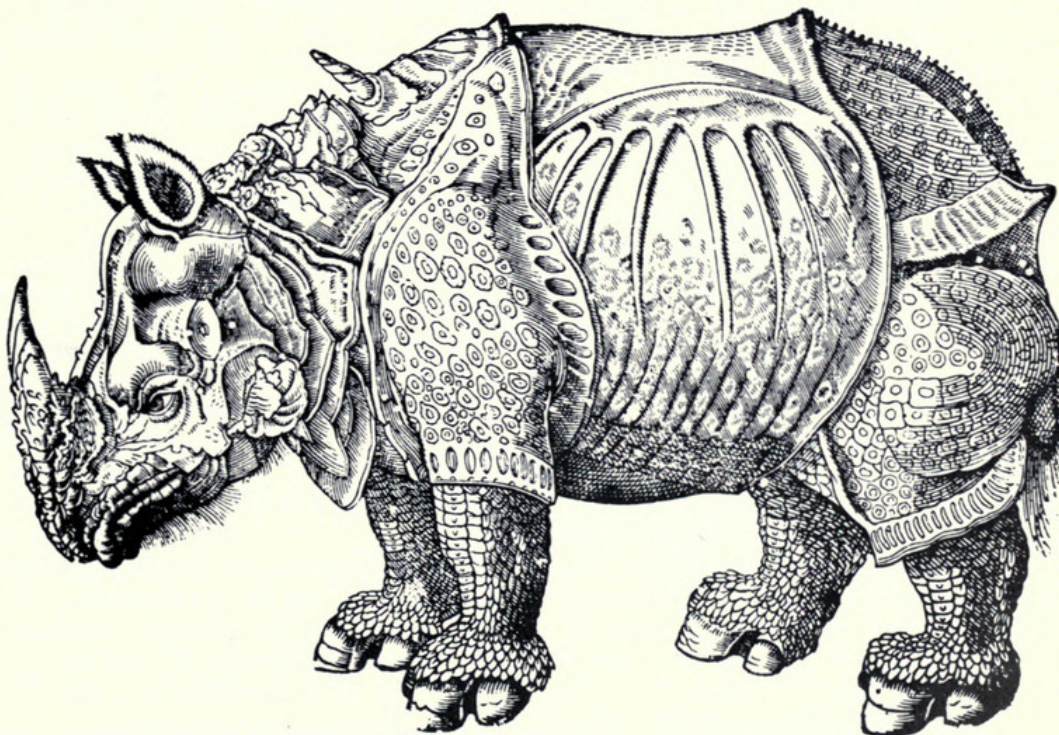
Heavy predation of spring lambs by eagles led ranchers to request authority last year to shoot the birds. Two ranchers reported losses of almost one quarter to one third of their spring crop of lambs to the eagles. The Montana Cooperative Wildlife Research Unit was assigned the task of examining lamb carcasses to determine the cause of the kills. Of 58 carcasses examined last year, 44 kills were determined to have been caused by eagles.

Under an agreement between the ranchers and the wildlife agency, the ranchers withdrew their request and the agency agreed to trap and relocate the birds. It also agreed to reimburse ranchers for documented cases of eagle-caused lamb kills. Sixty-four golden eagles were trapped and relocated prior to this year's mid-May lambing season. However, a spokesman for the federal agency was non-committal about the projected success of the experiment.

SEA SNAKES (Con't from p. 4)

the tide comes in, large volumes of sea water go up the river. Just as the tide starts to run back out of the river, the nets are lowered into the flow and a variety of marine and brackish water creatures are caught in the nets. Although this method of fishing is not as efficient as trawling, it is excellent for catching sea snakes. Just after Chinese New Year, in February of this year, we were delighted to obtain large numbers of newly born "beaked sea snakes" (*Enhydra schistosa*), which are rarely found in collections. For the first time, we are learning where the young live and what they eat, and we are attempting to monitor their growth and survival rate over the first months of their lives. We have even been able to maintain some baby snakes in an aquarium in our laboratory and observe their feeding behavior.

Our work in Malaysia is being done in collaboration with Lim Boo Liat, head of the Medical Ecology Division of the Institute for Medical Research (I.M.R.) in Kuala Lumpur. What we can learn about the habitats, feeding, and living conditions of sea snakes will be of use to I.M.R. in its newest project, the establishment of a snake farm in Perak, Malaysia. If we can solve the problems of maintaining sea snakes adequately for long periods in captivity, some further avenues of research will be opened. □





Voris, Harold K. 1975. "Sea Snakes: A Field Report." *Field Museum of Natural History bulletin* 46(7), 3–21.

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