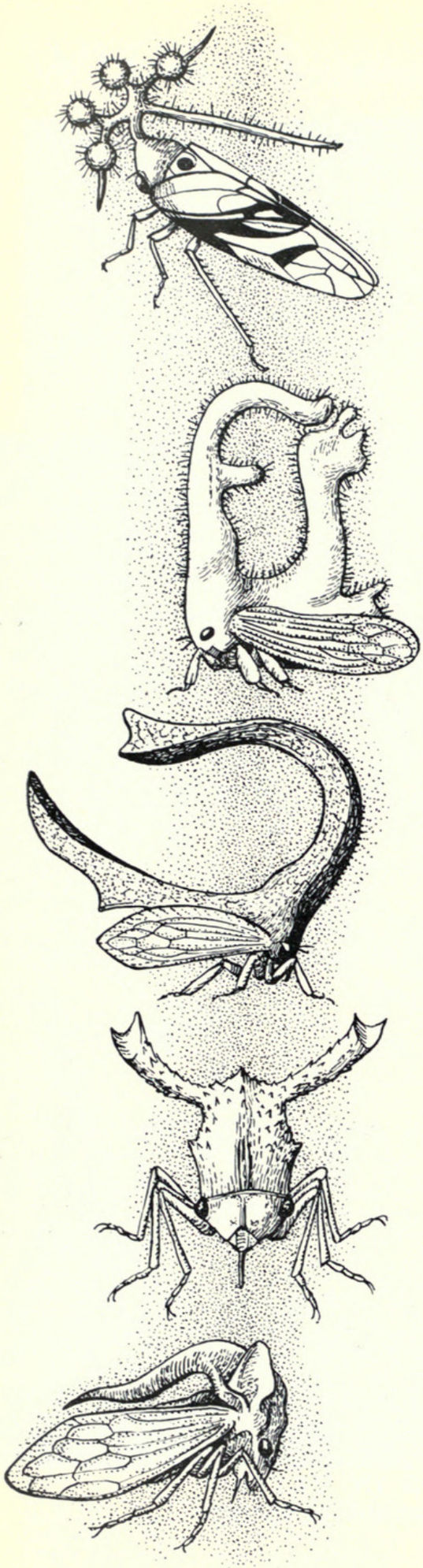

Tropical treehoppers. Drawing by Marion Pahl from "The Insect World."

This month's cover shows two European stag beetles battling over a female. The scene is part of a new exhibition, "The Insect World," which illustrates the diversity of form and habit of the major groups of insects. Among the many kinds shown are the familiar, the rare, the bizarre, the beautiful, and the exotic. How insects exploit nearly every possible environment is graphically illustrated. The exhibition is planned in three sections: the first two are now on display in Hall 18 as the Museum's featured exhibit for March. The third and last section is scheduled for completion later this spring.

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A COMMON question about insects is "How many kinds are there?" The question would appear to be perfectly straightforward but, unfortunately, it is not easy to answer even when we modify it to, "How many kinds have been named and described?"

Since the time of Linnaeus, two centuries ago, insects have been named and described in hundreds of technical journals published in many parts of the world in a number of languages. In some cases, the same insect may have been described several times under different names. Again, different species may be masquerading under the same name. It is easy to see how such a situation can cause confusion—different written accounts about an insect that transmits disease, say, may not really refer to the same insect at all. It is one of the continuing tasks of entomologists to evaluate and to synthesize the scattered, uneven work of the past and to monograph and catalogue the various groups of insects. Since entomologists, alas, are hopelessly outnumbered by the insects, the work proceeds slowly, except in certain groups like mosquitoes, for example, where public health problems furnish a special urgency (as well as the required financial support).

Present figures on the number of described species of insects, then, can be no more than rough estimates. In current publications these estimates range from 650,000 to about 1,000,000, with 850,000 species being a reasonable guess. This exceeds the number of all other described animals, as well as all species of the plant kingdom, combined. Moreover, new species are continually turning up, and it is evident that the job of cataloguing the insects that share the earth with us is very far from complete. Estimates of the total number of species—undescribed as well as described—range from a low of two million to a high of ten million! Insects, clearly, are an eminently successful group.

Every continent is inhabited by insects, even Antarctica where, as a matter of fact, insects are the largest land animals. They have successfully adapted to life in forests, grasslands, deserts, and fresh waters. They live underground, on the surface, in the upper strata of forests. Every imaginable way of life seems to be represented. Some kinds live only in ant nests, or feed only on the leaves of one special kind of plant. Others live in the fur of beavers, or in hot springs where the water is 120°F, in salt lakes, or even in petroleum seeps. The insect world is one of astonishing adaptations to precise and unusual modes of life. It is endlessly fascinating.

Why are insects so successful? Biologists have long speculated on this question. For one thing, the insect body plan appears to be one of Nature's most adaptable inventions. The external skeleton, made of chitin impregnated with other materials, is light and strong. It protects the internal organs against injury and desiccation (the great hazard of terrestrial life), and is mechanically efficient. The number and arrangement of appendages seems a happy compromise. Having three pairs of legs makes

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NRY S. DYBAS
TE CURATOR, INSECTS

it possible for one pair to be modified for special purposes like digging or grasping, without impairing the locomotory abilities of the animal. With relatively slight modifications, the insect body plan can serve for life under water, for instance, as well as in the harshest desert environment.

By any standards, mammals are also a successful group of animals. They are geographically co-extensive with the insects, and have invaded the same habitats. Like the insects, mammals burrow underground, run on the surface, climb trees, fly in the air, and swim in the waters. They even inhabit the seas, the one habitat in which insects are unaccountably unsuccessful. The mammals, however, "exploit" their environment with only about 3,200 species (or modes of life) as contrasted with the 850,000 already described species of insects. One of my colleagues at the museum accuses me of a kind of "gamesmanship" in contrasting these figures. I hasten to deny any intent at invidious comparison—some of my best friends are mammals—yet it is instructive, I believe, to compare the different ways in which mammals and insects exploit the same environments.

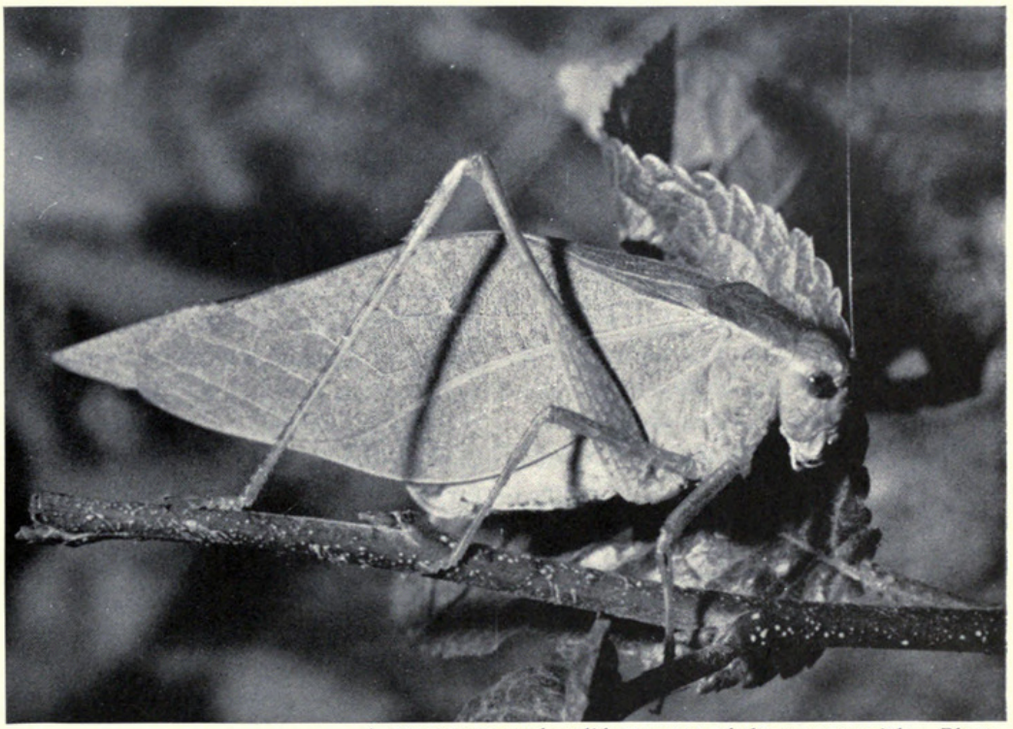
It is clear that insects have subdivided their environment, so to speak, into more kinds of living places and have evolved much more specialized ways of life than have the mammals. One kind of mosquito, *Wyeomyia smithi*, lives only in insectivorous pitcher plants in the United States. A tineid moth, related to our clothes moths, lives only in the fur of living sloths in the American tropics; and so on.

There are many reasons, some of them quite obvious, why insects can be more narrowly specialized in their modes of life than can mammals. There is size, for example. Although some insects, like the giant Goliath beetles of Africa, are larger than small mammals like mice and shrews, most insects are much smaller. Their mean size is probably considerably less than a quarter of an inch. In contrast to the giant beetles, the smallest beetles known are less than 1/75 of an inch long. It would take 23,000,000 of these microscopic featherwing beetles to weigh as much as a Goliath beetle, yet they have all the structures of their giant relatives—compound eyes, many-segmented antennae, flying wings, complex mouth parts—packed into a tiny space smaller than the size of many single-celled Protozoa.

Miniaturization on such a scale is presently beyond the wildest dreams of the space engineers. It opens to the insects a world of special living spaces and ways of life that are not available for larger animals like the mammals. For example, small insects can be supported by scant and specialized food supplies—the tiny featherwing beetles mentioned feed only on growing spores in the microscopic spore tubes of shelf or bracket fungi. In fact, some of these tiny beetles will live only on one particular kind of fungus and not on any other.

Another example of a specialized food supply is the nectar and pollen of flowers. These scattered, tiny parcels of food can be exploited by insects through the use of another adaptation—flying wings. Insects are the only invertebrates that can fly. Many thousands of kinds of wild bees, for instance, have been able to evolve in association with blossoms. Wings help insects to find their mates, escape enemies, locate food, and clearly are an important element in the success of insects as a group.

Many insects go through several stages of life, often in very different kinds of habitats. The dragonfly, for example, spends its early life as a fierce predator under water and then climbs a plant stem into the air and changes into a marvelously graceful and skillful flier. This transformation is analogous to a submarine shedding some of its riveted plates and emerging into the open air as a gleaming jet plane. Such drastic change of body form, called "complete metamorphosis," permits insects to exploit different environments at different times in their life with the most efficient



A common green katydid—songster of the summer night. Photograph by D. Dwight Davis on display in "The Insect World."

(*Continued on page 8*)

CHICAGO NATURAL HISTORY MUSEUM *News*

Photographic Exhibit Shows Southwest Indian Life

Indian life in the Navajo and Hopi country of the Southwest is the subject of a photographic exhibit which opened March 1 in Stanley Field Hall and will continue through the 31st. The 58 black-and-white photo enlargements were taken by Elizabeth Compton Hegemann in the 1920's and early thirties when she lived in the Southwest and traded at the Shonto Trading Post in the high mesas west of Tsegi Canyon.

"My thought was to catch a true reflection of the reservation life around me, among the Navajos and Hopis," comments Miss Hegemann. Her pictures capture the excitement of traditional ritualistic observances like the Entah (square dance) and the Rabbit-skin Robe and Niman Kachina ceremonies; the ordeal of moving herds of goats across the treacherous Colorado River; the eagerly anticipated arrival of a Harvey Car at a Hopi trading post; portrait studies of contemporary Hopi and Navajo tribal leaders; the Shonto Trading Post at sheep dip time; and many other scenes that shed light on the American Indian and his historic past.

Raymond Foundation Contributes To Children's Television

A reminder to Museum Members seeking worthwhile children's television programming: staff members of the Museum's Raymond Foundation have been participating on a regular basis on two television programs—Lee Phillip's "Friendship Show," broadcast each Saturday morning at 7:30 on Channel 2, and WTTW's "Totem Club" on Channel 11 Monday through Friday at 5:15 P.M.

The Foundation's contributions to "Totem Club" have been especially prepared for hard-of-hearing and deaf children.

New Museum Exhibits in Preparation for Chicago's "Space Month"

A series of new exhibits on "Space Geology" is being prepared by the Museum for display during Chicago's official celebration of Space Month (April–May, 1963).

A historical diorama will illustrate the steps in the progress of man's knowledge of outer space, beginning with the mathematical computations of the ancient Greeks; continuing with the invention and use of the telescope, astro-photography, and radio-astronomy; and culminating in personal exploration by man himself.

As use of these methods increases our knowledge of the geology of the moon, we can predict with greater accuracy what kind of landscape our astronauts will encounter when they accomplish the first lunar landing. The Museum's Space Month exhibits will focus on the physical features of this landscape—the most prominent being the enormous craters that pit the moon's surface. How these were formed will be graphically explained, and one of the larger craters on the moon will be reproduced in an exact, nine-foot scale model.

A group of meteorites—first messengers to reach the earth from outer space—will be displayed, the largest weighing 3,300 pounds. Also featured are tektites—objects of black glass formed by the tremendous heat of a meteoritic impact—and the various kinds of rocks to be found on the moon.

Completing the Space Month exhibits will be an eight-foot photographic blow-up of the visible half of the moon, and the most recent large-scale maps of lunar physiographic and geological zones.

The exhibits and a special Soundtrek commentary are now being prepared under the direction of the Museum's Department of Geology, headed by Dr. Rainer Zangerl. Formal opening has been scheduled for April 11 by the Chicago and Midwest Space Month Committee, of which Chicago Natural History Museum is a participating agency. Museum Members will have a special opportunity to see the new exhibits on Members' Night, scheduled for Friday, April 26.

Central American Field Study Continues

Dr. Louis O. Williams, Curator of Central American Botany, has resumed his field work in Guatemala in connection with the Museum's continuing research program on the flora of that country. Dr. Williams plans to work from four to

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New Museum

The new children's Journey for March, April, and May will take youngsters into the fascinating realm of archaeology, to meet "Prehistoric Americans."

Young Museum Journeyers will first test their own detective abilities, using the methods by which archaeologists "read" unwritten history. Then their Journey through time starts 20,000 years ago, with the discovery of America by Ice-Age hunters from Siberia. Following a charted path through Hall 4, "Indians Before Columbus," junior explorers will find elephant-hunters in Chicagoland and will meet the Woodland hunt-

five months collecting plants from a relatively little known region of northwestern Guatemala. Sr. Antonio Molina R., botanist of the Escuela Agricola Panamericana in Honduras, will join Dr. Williams in the field.

Additional Program in Free Concerts Series

The final concert in the Free Concerts Foundation's 1962–63 series will be held on Tuesday, April 16, at 8:15 P.M. in the James Simpson Theatre. The program is to be announced.

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ers and farm villagers who were the ancestors of historic tribes of the midwest—focusing on Illinois: the Shell Mound People, Hopewellians, and the builders of giant mound-cities in the Mississippi Valley.

Journey instructions and questionnaires are available at the Information Desk and at the north and south doors. Completed question sheets must be deposited in barrels located at both entrances in order to receive credit leading to Journey awards, which are based on the number of Journeys successfully completed.

Panel to Discuss "Silent Spring" on March 13

Museum Members are cordially invited by the Adult Education Council of Greater Chicago to hear Dr. Rupert L. Wenzel, Curator of Insects, in a panel discussion of the controversial new book, *Silent Spring*.

Several points of view toward the problems raised by the use of chemicals in controlling insects and other pests will be presented during the program. Deploring the "extreme position, sometimes unrealistic and uninformed," taken by both the supporters and opponents of Miss Carson's thesis, Dr. Wenzel has stated that "it is little wonder that the public—not competent to judge the technicalities, but entitled to explanations—is confused and rightfully alarmed."

Speaking in opposition to Miss Carson's thesis as to the dangers of chemical control will be Mr. Louis A. McLean, Secretary of the Velsicol Chemical Corporation. A third member of the panel, Dr. Lawrence Gilbert, Associate Professor of Biological Sciences at Northwestern University, will suggest a possible alternative to the use of chemicals "through biological control by bacteria and viruses which can kill specific insect pests but have no effect on higher organisms." He will present some of his own research in the use of juvenile hormones to prevent insects from reaching maturity and will review other pioneering experiments that may lead to biological control. Ample opportunity will be allowed for questions from the audience.

The program will be held on March 13 from 7 to 9 P.M. in the Adult Education Council headquarters at 332 S. Michigan Avenue (Room 462). There is a charge of $1.00 for those who are not members of the Council.

Museum Hours

In March and April, the Museum will be open to the public from 9 A.M. to 5 P.M. every day of the week.

Chicago Natural History Museum
Founded by Marshall Field, 1893
Roosevelt Road and Lake Shore Drive, Chicago 5
Telephone: WAbash 2-9410

Cetacean Research

Dr. Joseph Curtis Moore, Curator of Mammals, has been invited to participate in a symposium on International Cetacean Research to take place in Washington, D. C., in August, 1963. Dr. Moore will review those species of a polytypic genus of the beaked whale family, *Ziphiidae*, which live in North American waters. His paper will be presented in the systematics, distribution, and natural history session of the symposium.

Saturday Films For Adults

The Spring series of film-lectures for adults continues through April 27. The lectures are presented on Saturday afternoons at 2:30 P.M. in the James Simpson

(*Continued on page 8*)

Drawing by Gustav Dahlstrom

A Maple Sugar Camp

200 years ago

GEORGE I. QUIMBY

CURATOR, NORTH AMERICAN ARCHAEOLOGY AND ETHNOLOGY

MAPLE sugar was a very important food among the somewhat acculturated Chippewa Indians who lived in northern Michigan during the latter half of the eighteenth century. For about one month of each year the principal part of the Indian diet was maple sugar, and a well-known fur trader of the period, named Alexander Henry, wrote, "I have known Indians to live wholly upon the same, and become fat."[1]

Maple sugar and maple syrup were made in the early spring. Chippewa families returning from their winter hunting grounds in the interior parts of the lands they inhabited would spend a month or so at a sugaring camp usually located in a spot not far from the shores of Lake Michigan, Lake Huron, or Lake Superior. Then, with the furs and dried meats obtained on the winter hunt and any surplus of maple sugar produced in the spring, they would journey by canoe to their summer villages located near trading posts, where they could exchange their wealth for the manufactured goods of the white men.

The proper time for sugaring was well described by Henry, who with seven Indian friends comprised or formed a Chippewa sugaring camp near Sault Ste. Marie, Michigan, in late March of 1763. "The earlier part of the spring," wrote Henry, "is that best adapted to making maple-sugar. The sap runs only in the day; and it will not run unless there has been a frost the night before. When in the morning there is a clear sun, and the night has left ice of the thickness of a dollar, the greatest quantity is produced."[2]

Henry also described the sugaring process, in which he participated: "A certain part of the maple-woods having been chosen . . . a house, twenty feet long and fourteen broad, was begun in the morning, and before night made fit for the comfortable reception of eight persons and their baggage.

"The next day was employed in gathering the bark of white birch-trees, with which to make vessels to catch the wine or sap. The trees were now cut or tapped, and spouts or ducts introduced into the wound. The bark vessels were placed under the ducts; and, as they filled, the liquor was taken out in buckets and conveyed into reservoirs or vats of moose-skin, each vat containing a hundred gallons. From these we supplied the boilers, of which we had twelve of from twelve to twenty gallons each, with fires constantly under them, day and night. While the women collected the sap, boiled it, and completed the sugar, the men were not less busy in cutting wood, making fires, and in hunting and fishing.

"On the twenty-fifth of April our labour ended, and we returned to the [trading post], carrying with us . . . sixteen hundred [pounds] weight of sugar. We had, besides, thirty-six gallons of syrup; and during our stay in the woods we certainly consumed three hundred weight [of maple sugar]. Though, as I have said, we hunted and fished, yet sugar was our principal food during the whole month of April."[3]

In about one month during the spring of 1763 Alexander Henry and his Indian friends had produced almost one ton of maple sugar and 36 gallons of maple syrup. According to the estimates of Dr. Wilbert B. Hinsdale,[4] about two pounds of maple sugar per day is sufficient food for one adult. On this basis the group of which Henry was a part produced enough maple sugar to sustain them for 118 days.

They must have collected tremendous quantities of maple sap. Since it takes about 50 gallons of sap to make one gallon of syrup, the 36 gallons of syrup mentioned by Henry must represent 1,800 gallons of sap. Since it also takes about 50 gallons of sap to make eight pounds of sugar, the 1,900 pounds of sugar listed by Henry must represent some 11,875 gallons of sap.[5] Thus the Chippewa Indian women in Alexander Henry's group must have collected about 13,675 gallons of maple sap in the spring of 1763.

To obtain this amount of sap it probably would have been necessary for the Indians to tap some 700 or more maple trees. And since it takes one cord of wood to produce eight to ten gallons of syrup in a modern evaporator, the Indians and Alexander Henry must have had to collect the equivalent of at least thirty cords of wood for their twelve boilers that had fires constantly under them day and night.[6] As Henry has indicated, the men cut the wood for the fires and the women collected the maple sap and boiled it into syrup and sugar.

The transportation of the surplus sugar and syrup to the Indians' summer village or a trading post must have presented somewhat of a problem. A gallon of syrup should weigh about 11 pounds; thus the 36 gallons of syrup produced by Alexander Henry and his friends should have weighed 396 pounds. With the weight of the syrup added to the 1,600 pounds of sugar they produced, there was a total of 1,996 pounds of maple products that had to be transported by eight persons. This was a load of more than 200 pounds per person. If they also transported their sugaring kettles and other equipment they must have made several trips between their sugaring camp and the trading post at Sault Ste. Marie.

The sugar and syrup produced by the Chippewa in the second half of the eighteenth century constituted about one twelfth of the annual diet of many Chippewa families. In addition, the surplus of these products was bartered at trading posts or possibily exchanged for corn with the Ottawa. For these reasons, maple sugar and syrup were extremely important in the Chippewa economy during this period.

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[1] Henry, Alexander. *Travels and Adventures in Canada and the Indian Territories between the Years 1760 and 1776* (Bain edition, Toronto 1901), p. 71.

[2] Ibid., p. 70.

[3] Ibid., pp. 70–71.

[4] Hinsdale, Wilbert B. "Distribution of the Aboriginal Population of Michigan," *Occasional Contributions from the Museum of Anthropology of the University of Michigan*, No. 2 (Ann Arbor, 1932), p. 9.

[5] Panshin, A. J.; Harrar, E. S.; Baker, W. J.; and Proctor, P. B. *Forest Products: Their Sources, Production, and Utilization* (New York, 1950), pp. 466–468.

[1] Ibid., pp. 466–468.

EXPEDITIONS 1963

FISHES from the Indian Ocean; Central American plants threatened with extinction; 400-million-year-old fossils and prehistoric Indian pottery from the American West; an extremely rare emergence of destructive insects in southern Illinois—these are some of the objects and events of natural history that will be studied on expeditions and field trips by scientists from Chicago Natural History Museum during 1963.

During the past three decades, through the work of Dr. Paul S. Martin, Chief Curator of Anthropology, the history and ways of life of several groups of prehistoric peoples living in east-central Arizona from 5000 B.C. to A.D. 1400 has been gradually unfolded. Dr. Martin expects to leave for the field in May to continue his studies.

In Wisconsin, Michigan, and Ontario, Mr. George I. Quimby, Curator of North American Archaeology and Ethnology, will search for sites inhabited by Indian tribes of the 16th, 17th, and 18th centuries. Mr. Quimby is especially interested in collecting artifacts representative of a newly-discovered flint-knapping technique that was characteristic of Indians living in the Upper Great Lakes region from 1000 to 1700 A.D.

With a number of other scientists, Mr. Loren P. Woods, Curator of Fishes, will participate in the U. S. Biological Program of the International Indian Ocean Expedition now being planned by the Woods Hole Oceanographic Institute with the help of an advisory panel. One of the vessels to be used in the expedition is the former presidential yacht, now refitted with the latest equipment for collecting and studying marine fauna. Woods expects to collect fishes in the western Indian Ocean from September through April, 1964.

In Central America, the current population explosion has resulted in extensive forest lands being cleared for the cultivation of food—a process that is de-

(*Continued on next page*)