

"THIS IS A MAMMAL"

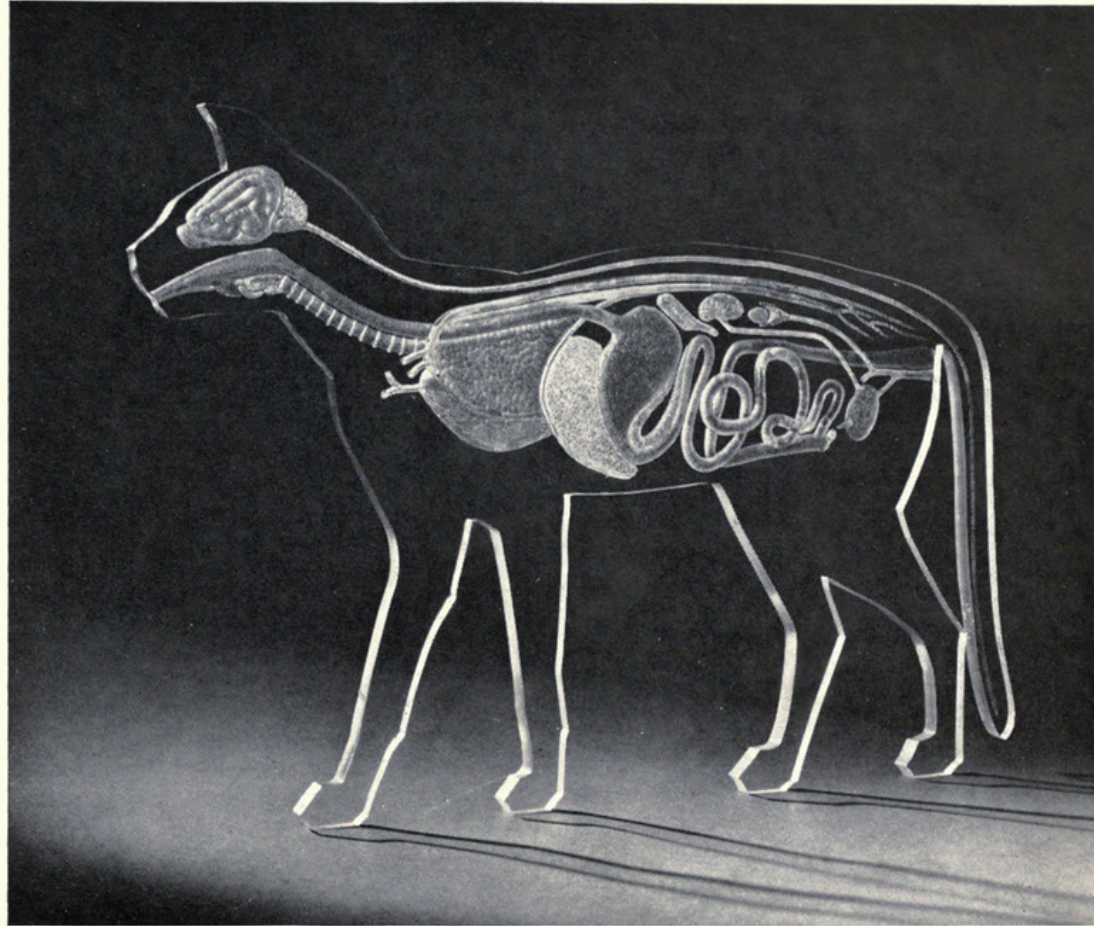
Featured Exhibit for June

Philip HersHKovitz
Curator, Mammals

"THIS IS A MAMMAL" is the title of June's Exhibit-of-the-Month in Stanley Field Hall. The display is the first completed in a series being prepared for a redesigned Hall of Mammals.

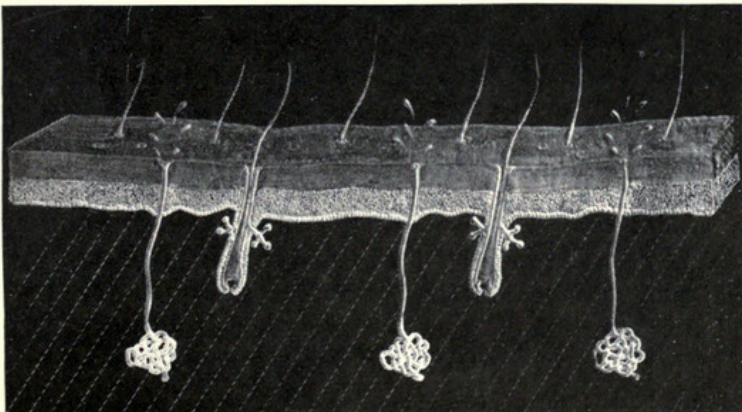
The exhibit uses actual specimens, models, drawings, and text to illustrate the distinctive anatomical characters of mammals and to show how mammals differ from all other animals. Some of the outstanding mammalian features are the nourishment of young with milk produced by the mother, the facial muscles developed primarily for suckling, the body covering of hair, the four-chambered heart with the main artery on the left side, and the muscular diaphragm which separates the lungs from the general body cavity.

Among the most important characters of mammals, certainly from the point of view of zoologists concerned with the earliest creatures of the kind, are those found in the hard parts, which may be preserved as fossils. The differences between living mammals and other living animals are many and clear. The distinction between mammals and the extinct mammal-like reptiles from which they evolved more than 160 million years ago rests primarily on the structure of the lower jaw and the way it hinges on the skull.



The lower jaw of a mammal consists of a single bone, the dentary. The reptilian lower jaw is made up of the dentary and a number of other bones including the articular, which hinges with the quadrate of the upper jaw. In mammals the dentary itself hinges directly on a bone of the brain case, the squamosal.

Somewhere along the evolutionary line from reptiles to mammals these two little hinge bones of the reptilian jaw found a new place and function. Still jointed, the reptilian articular and quadrate bones moved into the middle ear and, joining the stapes, became the mal-
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Above: The chief internal organs of a typical mammal. The model, sculptured in plexiglass that reveals the internal parts in color, shows the normal position of the brain, heart, lungs, and other organs which are displayed separately on the exhibition panel.

Left: Skin glands of mammals. A greatly magnified section of skin shows hairs, the oil glands around their base, and the sweat glands which help maintain an even body temperature.



Members' Night

Members' Night, 1961, saw 1,725 persons stream through the Museum's doors for an evening of intellectual stimulation and enjoyment. They talked with the Museum's scientists, learned something of their research, and glimpsed the varied behind-the-scenes operations that are such an important part of the Museum's functioning. Carrying articles purchased in the Mexican market place, our guests lingered before the demonstrations and exhibits prepared for them on the third and fourth floors of the Museum, and examined the treasures now on permanent display in the new Hall of Polynesian and Micronesian Cultures.

Many visitors wrote to express their pleasure in the evening. As one couple put it: "It is difficult to say what one subject was the most enjoyable, or gave the greatest pleasure. Having seen the film showing what goes on behind the scenes at the Museum and what efforts are made to produce a leaf which is authentic, it will be with great humility and deeper appreciation that we shall view the exhibits in the future." Another member wrote: "The staff of the Museum should be congratulated for the exciting program. It was the first Members' Night my children and I have attended. We want to come back every year as well as in between." One happy youngster addressed his note to Dr. Fritz Haas, Curator Emeritus of Lower Invertebrates and a member of the Museum's staff for 23 years:

ABOVE (Zoology): Members' Night visitors examine some "facts and fables about abominable snowmen."

"Dear Dr. Haas,

Thank you for giving me those very wonderful shells you gave me last night. All together my shells weigh two pounds. . . . I was 7 December 30th. I like to go to Members' Night. I hope to see you next year."

For these and the many other expressions of appreciation received, the Museum's staff is deeply grateful. In reply, Dr. Haas has summed up the feelings of all of us in his own apt comment: "All the work, the trouble, the preparations that are a staff member's lot before Members' Night were highly rewarded!"

Lapidary Exhibit

Approximately 100 outstanding examples of amateur gem and jewelry craftsmanship will be displayed at the Museum from June 10 through July 4 in the Eleventh Annual Amateur Handcrafted Gem and Jewelry Competitive Exhibition.

The exhibition, sponsored by the Chicago Lapidary Club, will include prize-winning cabochoned and faceted gems, gem collections, individual pieces of jewelry and jewelry sets, polished stone



and slab collections, and enameled stone work. The exhibitors are amateur "lapidarists" residing in the Chicago metropolitan area.

Television Program

WTTW's new "Festival" program series on Channel 11 will feature Dr. Roland Force, Curator of Oceanic Archaeology and Ethnology, on Friday, June 29 at 9:30 P.M. The program will highlight the Museum's newest exhibition hall, "Cultures of Polynesia and Micronesia," devoted to the art and customs of the peoples living in those areas of the South Pacific. Through the use of photographs, paintings, music, and the display of outstanding objects from the Museum's collections, Dr. Force will recreate the life and culture of Polynesia and Micronesia. Dr. Force has lived in the South Pacific, and has done anthropological research there. "Festival" is a weekly series on Chicago's educational television station, designed to call attention to the cultural life of the city by focussing on outstanding personalities and events promoting culture and the arts in Chicago.

Lectures and Meetings

Dr. Clifford C. Gregg, Director, and Mr. E. Leland Webber, Assistant Director of the Museum, attended the annual meeting of the Association of Science Museum Directors at Cranbrook Institute of Science, Bloomfield Hills, Michigan, on May 23. Dr. Gregg introduced the panel discussion on "Problem of Sportsman Collections for Museums."

Dr. Gregg also attended the annual meeting of the American Association of Museums held in Detroit May 24-26 at which he was one of three panel speakers on the subject of "Federal Support of Museums." Other staff members attending the meeting of the Association included Mr. E. Leland Webber, Assistant

Director, Mr. John R. Millar, Chief Curator, Department of Botany, Miss Miriam Wood, Chief of the Raymond Foundation, Dr. Roland W. Force, and Mr. Allen S. Liss, Custodian of Collections, Department of Anthropology.

Dr. Rainer Zangerl, Curator of Fossil Reptiles, was recently selected by the American Geological Institute to participate in its "Visiting Geological Scientist Program," through which eminent geologists from larger institutions are brought to the campuses of smaller colleges and universities to lecture and to confer with the faculty on curricula, departmental organization, and expansion. Dr. Zangerl visited the West Texas State University (Canyon, Texas) and Brigham Young University (Provo, Utah).

Dr. Louis A. Williams, Associate Curator of Central American Botany, attended the annual meeting of the Society for Economic Botany held in Boston. He

also visited the Gray Herbarium at Harvard University and the National Museum's herbarium in Washington, D.C., where he checked his manuscript for the next part of the publication, *Flora of Guatemala*, against specimens in the collections of both institutions.

Ohio State University was the site of a recent gathering of American anthropologists and archaeologists attending the annual meetings of several scientific organizations held on that midwestern campus. Among those participating were Dr. Paul S. Martin, Chief Curator of Anthropology; Dr. Roland Force, Curator of Oceanic Archaeology and Ethnology; and Mr. George I. Quimby, Curator of North American Archaeology and Ethnology. Two papers were presented by the Museum staff, one by Mr. Quimby on "Protohistoric Indians of the Upper Great Lakes Region," and the other by Dr. Force entitled "Palauan Paradox: Some Comments on Kinship Terminology." Another recent paper by Dr. Force, also based on his research on the Palauan language, appeared in the April 21, 1961 issue of *Science*. Entitled "Keys to Cultural Understanding," the paper discussed the relation of figures of speech to fundamental modes of perception. At the Ohio meetings, Dr. Force was elected first vice-president of the Central States Anthropological Society.

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LEFT MIDDLE (Anthropology): Dr. Hoshien Tchen, consultant on the Museum's East Asian Collection, demonstrates Chinese brush writing for a fascinated group.

RIGHT MIDDLE (Geology): Mr. David Techter, Museum Assistant in Fossil Vertebrates, explains some interesting facts about a fossil duck-billed dinosaur being prepared for exhibit.

(Except where other credit is given, photographs in this issue are by the Division of Photography.)

BELOW (Botany): A reconstruction of a fossil plant that lived more than 150 million years ago, the giant *Cycadoidea*, also attracted many Members.



New Fossil Fishes from Wyoming

Museum paleontologists have discovered the oldest ancestral relatives of a modern "living fossil"—the lungfish



ROBERT H. DENISON

Curator, Fossil Fishes

Nearly 400 million years ago the Devonian sea overflowed the margins of the western geosyncline and spread over the flatlands of what is today Wyoming, Utah, and Idaho. Near the margins of this advancing sea and in streams emptying into it lived a variety of fishes that would appear strange to our modern eyes. The commonest of these were armored fishes, including weird jawless ostracoderms, and jawed fishes, called arthrodires, that are distantly related to sharks. This fish fauna, one of the earliest that is known at all adequately, has been the object of Museum expeditions in 1950,

1953, and 1959 to western states. It has been found in sediments deposited in estuaries and bays of the advancing sea in a few localities in Wyoming, northern Utah, and southeastern Idaho.

In 1953 a geology student of the University of Wyoming discovered a new locality in the Bighorn Mountains of Wyoming, and while returning from our 1959 collecting trip we stopped off briefly to see it. It appeared to be very promising; in fact, it was the only locality that I had seen where the rock was easily workable, and the fossils were sufficiently abundant so that one could sit down and

quarry them out. Not only that, but certain levels contained well preserved plants and eurypterids, or "sea scorpions." So I planned a return visit for 1960, with our invertebrate paleontologist, Dr. Eugene S. Richardson, to watch for eurypterids, and some younger assistants, Dave Denison, Pete Richardson, and a graduate student from the University of Wyoming, John Cutler, to do most of the heavy digging.

Our quarry was opened high on the side of a canyon, in limestones that were deposited in an ancient channel, possibly representing an estuary of the De-

vonian sea. Plates of the ostracoderms, *Protaspis* and *Cardipeltis*, proved to be so common that soon we were collecting only the best specimens. Among the scattered plates we did discover a few complete, articulated *Protaspis*, and some of these were juveniles only about three inches long. Entire specimens are most unusual in this family, and babies have not been reported before. Arthrodire plates were also common and appeared to belong to several different genera.

Besides these known forms, we found an occasional large, rounded scale with a glossy surface punctured with many minute pores; these we attributed at first to the lobe-finned fishes or *Crossopterygii*. Also we found one or two fragments of jaws unlike anything that I had seen before in that, instead of having teeth, the margin was provided with a continuous, highly sculptured ridge of dentine. It wasn't until we found a complete set of lower jaws that we properly identified these scales and fragments. The jaws were short, massive, and fused at the symphysis. They could only belong to lung-fishes, even though they lacked the typical tooth plates. The surface was shiny and punctate like that of the scales we had referred to "crossops," and the biting surface showed the peculiar, sculptured, dentine ridges that had puzzled us earlier.

This was an exciting find because the only other lungfish as old was a single specimen from the Hunsrückschiefer of Germany. Here we were at the beginnings of the recorded history of a group that has persisted nearly 400 million years to the present day. Moreover, it is one of the few major groups that was known from fossils before living members were discovered. Lungfishes from the British Old Red Sandstone were first described in 1828, several years before living lungfishes, *Lepidosiren* and *Protopterus*, were discovered in South America and Africa. Fossil tooth plates of *Ceratodus* were described in 1838, while the closely related living genus of Australia, *Neoceratodus*, was not found until 1870. These three living lungfishes are a small remnant of a long evolutionary history. They are archaoid forms that might well be called "living fossils," much like the living coelacanths that have been caught in recent years in the Indian Ocean.

The group gets its name from the presence of lungs, which are known, of course, only in modern forms. Like other fishes, they possess gills, too, but the lungs permit them to get their oxygen from the air as well as from the water. This is often necessary in habitats of living lungfishes. Many live in tropical swamps where the water may contain so little oxygen that the fishes would die without an additional supply. Others live in bodies of water that dry up periodically, and the lungs permit them to survive until the next wet season, which they usually do buried in the mud. Burrows of fossil lungfishes are known as far back as the late Paleozoic, which means that habits similar to those of modern forms were developed at least 250 million years ago. In Upper Devonian rocks, lungfishes are associated with a peculiar armored fish that is known to have lungs because they have been preserved as fillings. Also associated is a crossopterygian fish that may have had lungs because it is close to the ancestry of land animals.

These points suggest that lungfishes may have developed this characteristic feature quite early in their history, but we do not expect to find any clue to this question in our new Lower Devonian discovery.

Last summer, after we realized that there were lungfishes in our quarry, we worked with added enthusiasm. When we finished the field season, we had skulls, plates of the cheek and gill cover, shoulder girdles, and many scales—enough to fill five Museum specimen drawers. Although they are not showy specimens such as we would be apt to select for an exhibit, they will add much to the knowledge of the structure of early lungfishes.

Right now the long process of preparation is progressing slowly. The hard limestone must be removed by careful grinding or chipping, and on irregular surfaces where the rock adheres strongly, dilute acetic acid must be used to dissolve it off. Already we can see that ridged tooth plates were never developed in our form, so we can assume that

Above left: A closer view of the excavation site.

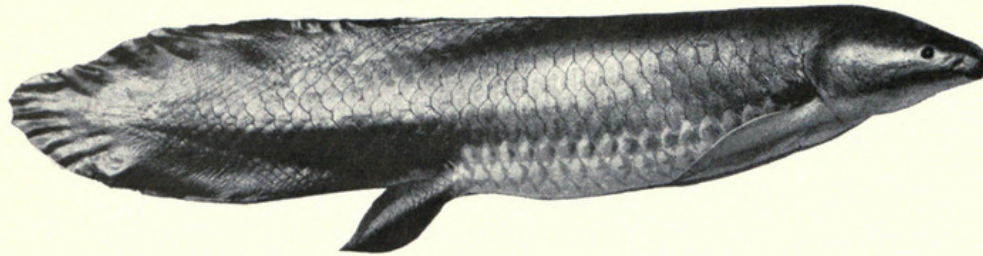
Below: A view of the Big Horn Mountains of Wyoming, looking across Cottonwood Canyon. Site of the Museum expedition's excavation is encircled.



Photographs by E. S. Richardson, Jr.

it was not ancestral to most later lungfishes. But what will it indicate about the ancestry of this group, and about its relationships to other fishes? Will the palate support the belief of most paleontologists that the lungfishes and lobe-finned fishes are closely related? Or will

it favor the theory of a Swedish paleontologist that lungfishes were a widely distinct group? We may hope that these and many other anatomical questions will soon be answered as the preparation of the specimens advances and the details of their structure are revealed.



Model of a modern Australian lungfish (NEOCERATODUS) on exhibit in the Hall of Fishes (Hall O).

MUSEUM NEWS

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Mr. Henry S. Dybas, Associate Curator of Insects, at the recent annual meeting of The Entomological Society of America held in Kansas City, Kansas, was elected secretary of its regional north central branch. Mr. Dybas also participated last month in meetings of the Mosquito Control Association of Illinois in Urbana.

On May 21, Mrs. Paula R. Nelson, Public Relations Counsel, spoke on Chicago's cultural activities as part of a panel on "Leisure-Time Opportunities for Senior Citizens." The panel was one of a series of programs and exhibits held at McCormick Place during Senior Citizens' Week (May 14-21) under the auspices of the Mayor's Commission on Senior Citizens.

Summer Hours

Beginning June 28 and continuing through September 3, on Wednesday, Friday, Saturday, and Sunday (days of the free Grant Park Concerts held in the bandshell just across the drive from the Museum), the Museum will be open to the public from 9 A.M. to 8 P.M. On those evenings the cafeteria will serve dinner from 5:30 to 7:30 P.M. Museum hours on Monday, Tuesday, and Thursday will be 9 A.M. to 6 P.M. Through June 27 the Museum will be open seven days a week from 9 to 6.

New Staff Member

Patricia M. Williams has succeeded Martha H. Mullen, recently resigned, as Assistant Editor of Scientific Publications. Miss Williams comes to the Museum from an editorial position with the National Retail Furniture Association. She is a graduate of the University of Illinois, where she majored in English. In her present position, Miss Williams will assist Lillian A. Ross, Editor of Museum Scientific Publications.



"THIS IS A MAMMAL"

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leus and incus, respectively, of mammals. These three ear bones, now transmitting sound from ear drum to brain, distinguish all living mammals from reptiles, in which there is but a single ear bone, the stapes.

Where, during the course of this remarkable transformation of jaw bones to ear bones, does a reptile become a mammal? If our new exhibit dealt only with this critical period, its title would have to be changed from "This is a Mammal" to "What is a Mammal?"

The models of the display are the handiwork of Joseph Krstolich, taxidermy is by Carl Cotton, and the design and background are by E. John Pfiffner.

Below: *Zoology Staff Artist Joseph Krstolich studies his handiwork, a house cat and her kittens modeled in clay. It will be cast in plaster before being added to the Museum's featured exhibit for June. The cat and her kittens are included in the exhibit to point out that only mammals suckle their young.*



Herskovitz, Philip. 1961. "This is a Mammal." *Bulletin* 32(6), 3–8.

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