In the Field

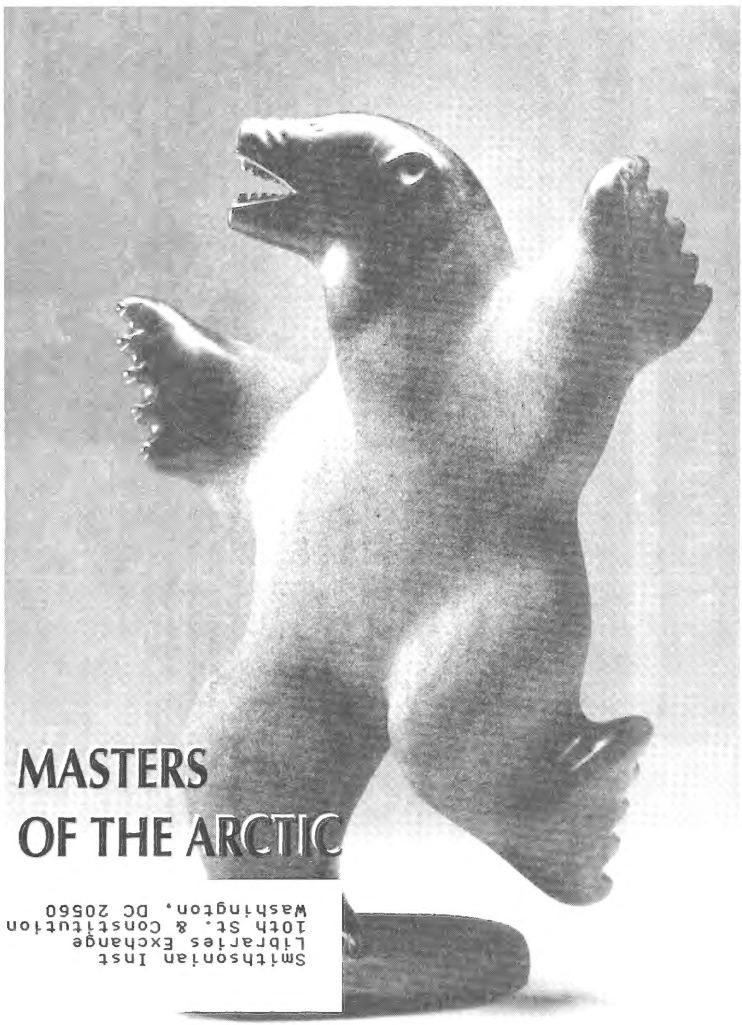
The Bulletin of the Field Museum of Natural History May/June 1993

THE BIGGEST DINOSAUR IS COMING TO TOWN

NATURE AS ENGINEER

BABBITT'S PLAN FOR A SPECIES SURVEY

MEMBERS' NIGHT — MAY 7



MASTERS OF THE ARCTIC

In the Field

The Bulletin of the Field Museum of Natural History — May/June 1993

CAT-SCANS REVEAL SECRETS OF LADY UDJA

A medical-imaging team at the University of Iowa has discovered some surprising new information about Lady Udja, a 26th Dynasty mummy in the Field Musum collection. And it wasn't her impacted molars.

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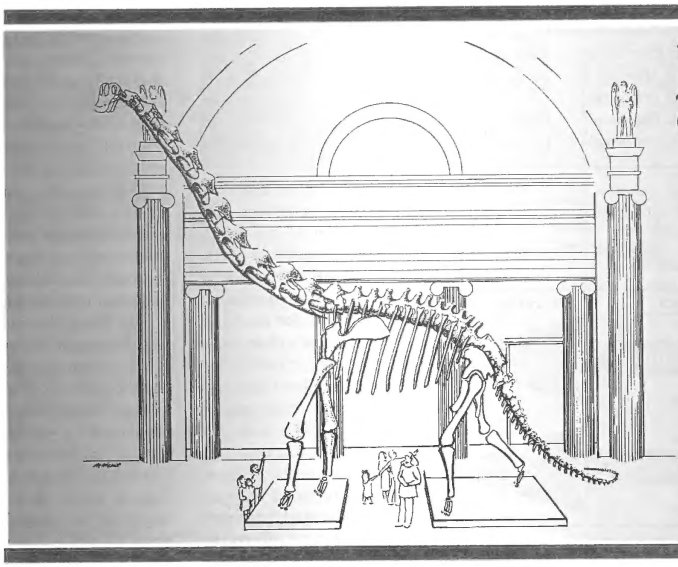


BIGGEST DINO COMING IN JULY

On July 3 the Museum's newest permanent exhibit debuts with the formal unveiling of a full-scale *Brachiosaurus* in Stanley Field Hall. Bones of the enormous beast were discovered by Field Museum scientists in 1900, and remain the "holotype" used for identifying it.

(Continued on page 11)

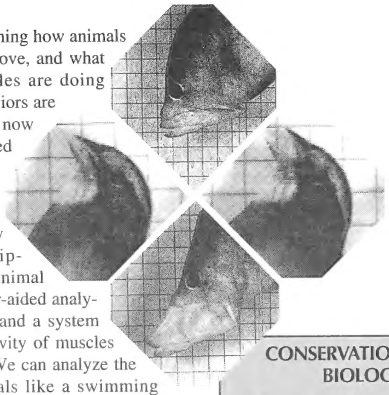
NATURE'S ENGINEERING

By Mark Westneat
Assistant Curator, Zoology

Living creatures have an astonishing diversity of body plans that work in different ways. How can a fish swim so fast just by wiggling its body? How do birds fly and produce beautiful songs? And why don't the legs of elephants and the branches of trees break more often under the tremendous weight they carry? These are general questions about function in living things that might come to mind as you walk through the woods or visit the zoo. Yet simple questions like these are the heart of an approach to biology called biomechanics — the study of the ways that living things are designed to function in response to the physical forces of their environments.

Animals and plants have no choice but to deal with the laws of physics. Those laws specify that an unsupported object falls down, blood is thicker than water which is thicker than air, bones resist bending, and muscles contract. Although the principles of gravity, viscosity, elasticity, and contractility are not things that we think about on a daily basis, our bodies and those of every other living thing are wonderfully designed to handle a myriad of physical forces encountered in diverse environments. Evolution is a brilliant mechanical engineer in the sense that each species is uniquely engineered to deal with its physical and ecological requirements. Biomechanics research can reveal the many inventions that nature has produced for dealing with physical phenomena, and these findings are being used in biology, engineering, and medicine.

At the Field Museum, my research is revealing some of the engineering designs that are used by animals to capture their food, move their limbs, produce sounds for communication, and swim against a current. To do this, my coworkers and I are learning how animals are built, how they move, and what the bones and muscles are doing when important behaviors are being performed. We now have a facility equipped with the latest in technology for the study of biomechanics. This laboratory includes video equipment for recording animal movements, computer-aided analysis of video images, and a system for recording the activity of muscles when they contract. We can analyze the movements of animals like a swimming tuna or a singing bird, or record the behavior of tiny shrimps or tadpoles swimming in a dish under the microscope. Although the equipment might be described as "high-tech," it is used to answer some very basic questions about the mechanics of animal movement.



Two recent studies involved the biomechanics of fish feeding and bird singing. We studied a very unusual fish called the "slingjaw," which was first observed slinging its jaw on the Great Barrier Reef in Australia (see photo). To understand how it performs this extraordinary feeding behavior, we studied the connections of bones and muscles in the head, used a high-speed camera to film the fish feeding, and measured the movements of individual bones and the electrical activity in the muscles that were driving the behavior. By combining these methods, we discovered that although this fish has drastically reorganized the bones and tendons in its head, it uses the same muscles and sequence of muscle contractions that most other fish use for feeding. Essentially, evolution has changed the hardware in the head of

(Continued on page 9)

CONSERVATION BIOLOGY

A day-long public symposium on how conservationists and museum scientists can work together more effectively will be held May 8. See story, page 10.

BABBITT PLAN

By Bruce D. Patterson
Curator of Mammals

Interior Secretary Bruce Babbitt recently announced a plan to create a national survey to map the nation's ecosystems and biological diversity. If implemented, this survey will give us the ability to take proactive, rather than reactive, measures to conserve our natural inheritance. The plan embodies a new environmental strategy that is strongly supported by the scientific community.

Many feel that existing laws, particularly the Endangered Species Act, already afford all the protection needed to sustain rare and endangered populations of plants and animals. Yet that legislation's focus on endangered species, rather than the ecosystems they inhabit and the interrelationships that sustain them, limits its usefulness. Furthermore, protracted, costly, and bitter battles between environmentalists and developers often result from enforcement of the law, as is currently the case with northern spotted owls.

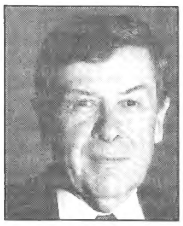
Another case, less familiar because its economic ramifications pale beside those of the struggle over the Pacific Northwest, clearly illustrates the limitations of species-based conservation efforts.

(Continued on page 10)

U.S. Fish & Wildlife Service

The Mt. Graham red squirrel

AN INTERDISCIPLINARY APPROACH



By Willard L. Boyd
President, Field Museum of Natural History

As I have reported here previously, our staff and trustees have been engaged for many months in strategic planning to launch the Museum into its second century. The plan's major focus has been on our institutional subject matter and how we approach it through collections, research, and public learning. Just as the biological and cultural communities we study change over time, so must our approach to them change.

Like the great universities that grew up in the same period, the hallmark of the Museum's first hundred years was a division of our activities among specialized disciplines. But as we enter our second century we are seeking broader explanations of the extent and character of biological and cultural diversity, similarities, and interdependency. We are looking at nature as a whole because all living things interact with all others both directly, and indirectly through the effects of their biological activity on the physical environment. Similarly, we are seeking to understand the principles of cultural change and the relationships among cultures in the past and present. This is a major intellectual watershed in the life of the Field Museum.

Working from our vast collections of objects and specimens, we hope to understand better the past, present, and future of biological and cultural change. No longer can we be satisfied with just knowing about a particular biota or culture in isolation. The world is smaller than we believed in 1893 and human actions have a more profound effect on that world than ever before. So it is that in our new century we must cast a wider net in order to find specific answers. There are also new means to knowledge, and so, for example, we now utilize computers extensively, and collect frozen tissue for biochemical analysis such as DNA sequencing. These and other new techniques help us understand the evolution and interrelationships of life on Earth.

Just as systematic biology has changed, so also have anthropology and archaeology. Cultural anthropologists are trying to understand why people of earlier cultures thought and acted the way they did, and are also concerned with the contemporary descendants of those cultures. Archaeologists seek to determine cultural principles that have relevance for contemporary and future societies, such as the relationship between people and their environment, the nature of ingtergroup hostility, and the persistence of cultural patterns through the millenia.

In order to continue its leadership role in the next century, the Museum will look more holistically at the problems of nature and culture. Because of interconnectedness within nature and across cultures, we will operate horizontally across traditional departmental boundaries while maintaining strengths in our areas of specialty. Instead of limiting our cultural understanding to particular cultures we will look across cultures. In pursuing evolutionary biology we will adopt a comparative approach, recognizing that each species exists in a larger evolutionary and ecological context.

To foster this interdisciplinary approach, we have organized two centers — the Center for Evolutionary and Environmental Biology, and the Center for Cultural Understanding and Change. These centers will be the vehicle for a Museum-wide approach to basic environmental and cultural issues that confront both our local and worldwide communities now and in the years to come. The Field Museum can play a major role in enhancing public understanding about the living Earth and how we can live in balance with the Earth and with each other.

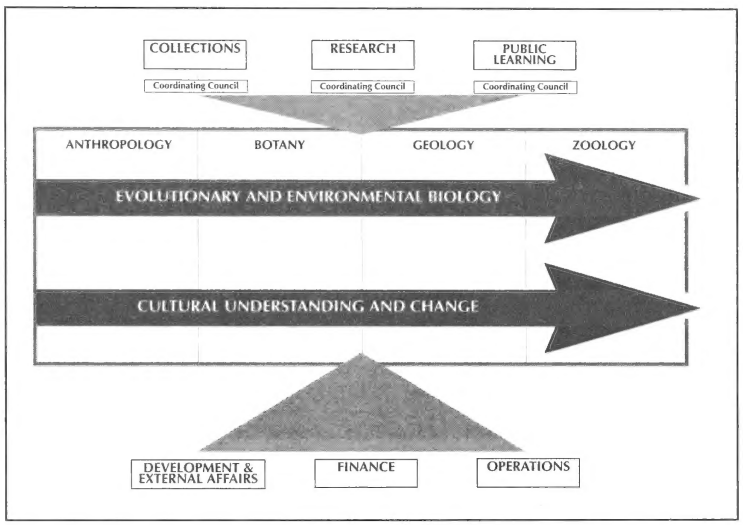


Chart illustrates how the themes of environmental and evolutionary biology and of cultural understanding and change will inform all Museum work.

18TH-CENTURY BOTANIST IS LIBRARY FRIENDS' SUBJECT

GN66720.19

The Friends of Field Museum Library hosted a reception and program April 6 with Charles Jarvis of the Natural History Museum (London). Jarvis provided the Friends with a scholarly look at early botanical explorations of America by John Clayton (1683-1773). The group also heard from Thomas G. Lammers, assistant curator of vascular plants. Above, with volumes from the Mary W. Runnells Rare Book Room, are Museum Vice President Peter Crane; Dr. Jarvis; Worthington Smith, chair of the Friends of Field Museum Library; and Special Collections Librarian Ben Williams.

GN66708.11

COLLECTIONS COMMITTEE HOSTS ASIAN ART DONORS

A Collections Committee luncheon on February 18 honored Dr. and Mrs. Hyman I. Kaplan for their gift of Chinese and Vietnamese lacquerware to the Anthropology Collection. The collection, which includes several finely carved cinnabar lacquerware pieces from the 17th through the 19th centuries, is on display in the North Lounge.

In the Field

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PINE WINS WESTINGHOUSE AWARD

ELIZABETH PINE, a Field Museum intern, won the first-place $40,000 college scholarship in the annual Westinghouse Science Talent Search. A student at the Illinois Mathematics and Science Academy in Aurora, Pine worked last summer with Field Museum's GREG MUELLER, associate curator in botany, and plans to accompany Mueller to Costa Rica this summer on a collecting trip.

For her winning project, Pine assisted Mueller by testing DNA sequences to resolve a current controversy about two major groups of fungi — mushrooms and false truffles. Because these two fungi are quite different in appearance, scientists have typically classified them in different orders. However, Pine's research revealed that some groups of the false truffles share microscopic similarities with mushrooms, and are therefore quite closely related.

"What's really impressed me about Elizabeth is that she'll be asking questions about C and D while I'm still explaining A and B — she's so quick. In comparison to other students I've worked with, she has, by far, the best potential for making a major impact in biology as a research scientist," said Mueller.

Pine was chosen from among 1,662 seniors who entered Westinghouse's 52nd annual Talent Search, co-sponsored by Science Service, a Washington-based non-profit corporation that furthers the public understanding of science. The Talent Search is the nation's oldest high-school science competition and offers the largest unrestricted scholarships.

Pine has accumulated a series of awards and honors in science and research as well as in mathematics, literature, and French. Last year, she was awarded the Chicagoland Outstanding Young Scientist Award, sponsored by the Nobel Foundation and the Museum of Science and Industry. She and her school each received $600 and a plaque, and in December she traveled to Stockholm to attend the Nobel Prize ceremonies. She has already received early acceptance to Harvard, and plans to go on to get a Ph.D. in biology and to work as a research scientist in a museum or university.

❧

HAROLD VORIS, curator of amphibians and reptiles, received a supplement of $21,058 to his National Science Foundation collections support grant to fund an educational project for high school students. This supplement will support a high school teacher, JOHN MURPHY, and three students for the summer months. Murphy and the students will work on collection projects in herpetology. Voris received a similar supplement last year and the program was a great success.

❧

AL NEWTON and MARGARET THAYER of the Department of Zoology returned recently from a two-month field trip to Australia. They brought back thousands of specimens of rove beetles (*Staphylinidae)* and related groups, as well as numerous other insects and arthropods. This collecting is part of their continuing work on the Australian beetles, focused on putting the Australian *Staphylinidae* into a modern phylogenetic context; currently, the beetles are known primarily through outdated texts that are scattered throughout the literature. The two also discovered adults and larvae of a previously unknown genus of "minute moss beetles" *(Hydraenidae*) while collecting at two Tasmanian coastal sites.

❧

CÉSAR PAREDES Canto, President (Rector) of the Universidad Nacional de Cajamarca in Peru visited the Field Museum March 13 to meet

Dr. César Paredes Canto

with MICHAEL DILLON of the Department of Botany. Dr. Paredes is currently president of the National Assemby of Rectors for northern Peru and southern Ecuador, an organization representing some 52 universities and nearly 450,000 alumni. His visit was part of a month-long trip to the United States supported by the International Visitors Program of the U.S. Information Agency and includes stops in the following US cities: Miami, Washington D.C., New York, Boston, Chicago, Madison, Los Angeles, Austin, and New Orleans. Dillon and Paredes discussed the potential for new cooperative educational efforts between Field Museum and institutions of higher learning in northern Peru and southern Ecuador.

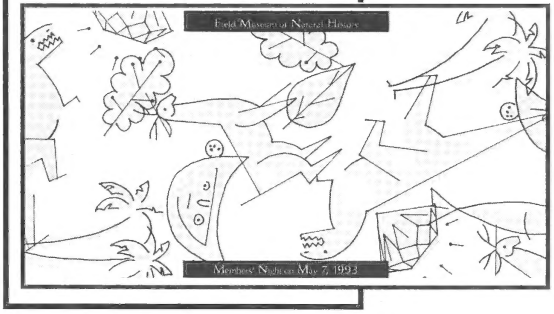
42nd Annual Members' Night

May 7, 1993 • 5 p.m. – 10 p.m.

Visit with the Museum's curators, exhibit developers and preparators, researchers, and educators and learn how their work becomes a Museum exhibit or scientific discovery. Find out what goes on behind the scenes in laboratories, collections areas, and design shops that the public rarely sees.

Present your Members' Night invitation or membership card at any entrance. Members may bring their families and two guests. McDonald's and Picnic in the Field will be open until 9:30 p.m. and cocktails and soft drinks will be available for purchase at a cash bar.

Parking is free in the Museum lots and in the Soldier Field lot. Free Willet bus service will be available at 20-minute intervals from the Canal Street entrances of Union and Northwestern stations, and at State and Washington, Michigan and Washington, Michigan and Adams, and Balbo and Michigan.



NEW TECHNOLOGIES REVEAL 'LADY' UDJA'S SECRETS

By Jessica Clark

Lady Udja, a 26th Dynasty mummy (663-525 B.C.), is on loan from the Field Museum to the University of Iowa Hospitals and Clinics Medical Museum for display in a new exhibit, "The Trail of the Invisible Light: A Century of Medical Imaging." Derek Notman, M.D., an expert on the use of radiological techniques in mummy research, performed X-rays and CT scans and constructed three-dimensional images of the mummy, providing previously undiscovered information about the ancient Egyptian.

Most strikingly, Dr. Notman discovered that Lady Udja was, in fact, a Lord. The papers that accompanied the mummy when Edward Ayer, the first director of the Field Museum, purchased it in 1894, identified it as female. However, during the medical imaging processes, a penis was detected, confirming Udja's gender.

The radiological examinations also revealed that Udja had impacted molars and some arthritis in the big toes, as well as worn-down dental enamel caused by gravel left in flour or meal during the grain-milling process — a trait shared by many ancient Egyptian corpses. Udja's nasal septum was fractured, perhaps when his brain was removed through his nose during the embalming process.

Dr. Notman speculates that the mummy was of royal descent because of the great quantity of linen used and the care with which he was wrapped. Embedded in the layers of linen are a few unidentified tiny circular objects; the scans also reveal a linen bundle between the legs which may be a scroll.

Courtesy University Relations, University of Iowa

The processes used to examine Udja included conventional X-rays to examine his bone structure, and CT (or CAT—Computed Axial Tomography) scans to create more complex images of the mummy's bandaging, soft tissues, and internal condition. CT involves inserting the body into an X-ray tube, allowing for multiple exposures from different angles. The images collected by the scanner are sent to a computer, which processes and assembles the information and constructs a cross-sectional image of the scanned area. Plain film X-ray depends on a single exposure to produce a two-dimensional image that might exhibit between 20 and 30 shades of gray; Computed Tomography provides a much more detailed three-dimensional image, which can recognize and register up to 200 shades of gray.

The mummy, and the images that reveal its inner secrets, have fascinated visitors to the Medical Museum. "The Trail of the Invisible Light: A Century of Medical Imaging" will be on display in the Iowa museum, in Iowa City, through January 1994.

RUATEPUPUKE

'A SENSE OF SACRED SPACE'

By Ron Dorfman
Editor, *In the Field*

Top right, Maori hosts and Field Museum tour group prepare to sleep in the successor meeting house to Ruatepupuke at Tokomaru Bay, 1986. Below right, the Maori delegation makes its grand entrance to Stanley Field Hall at the Dawn Ceremony rededicating Ruatepupuke II, March 9, 1993. Below, Gabriel Stowe Terrell communes with the ancestors after the opening ceremonies.

With the reopening and rededication of Ruatepupuke II, the 19th-century Maori meeting house in the Field Museum, the Friends of Ruatepupuke have achieved the goal they set for themselves seven years ago. Starting out as an ordinary Museum tour group planning a visit to New Zealand, they have become the elders of Ruatepupuke's American family and have laid a foundation for new forms of cooperation between museums and the peoples whose cultural treasures they hold in safekeeping.

When the members of the tour group were first introduced to the unreconstructed Ruatepupuke by curator John Terrell in November 1985, about five months before their trip, they experienced "a sense of sacred space," according to Friends member Barbara Ballard. Terrell, who would lead the tour, had made the group's approach to and viewing of the house especially dramatic because he had an agenda, which was to transform the tour into a diplomatic mission. The group met once a month after that and, by the time the twenty tourists left for New Zealand in March, Ballard says, "we felt we were ready."

John Weinstein / GN857011.14C

Donald Cameron, the group's chair, recalls that at their first meeting with the Maori community at Tokomaru Bay where the house once stood, there were two Maori factions, one that wanted to demand the return of Ruatepupuke to its native soil, and another that wanted to consider ways of maintaining the house as an outpost of Maori culture in America. The latter group included elders who had been invited to visit the house during the Field Museum's installation of the touring "Te Maori" art exhibit early in 1986. "We were there," Cameron says, "to represent to the Maori that Ruatepupuke II had a good home and would have a good home back in Chicago."

Barbara Ballard

John Weinstein / GN86608.26C

In the end, the Maori decided to help restore the house in Chicago. But upon their return the members of the tour group found the Museum gearing up for a major overhaul of its exhibits — a complex, multi-million-dollar program that did not include restoration of Ruatepupuke — and simultaneously undergoing a serious intellectual dispute among curators and exhibit developers about the direction of the Museum's public programs. So they constituted themselves the Friends of Ruatepupuke "to keep the issue alive without bugging people," Ballard says. "It was difficult making our way through the bureaucracy, but Dorothy Roder [the Museum tours director] was a brick through all this, the center," she adds.

"It was an almost magical fusion of people," Cameron says. "You have to realize that we were a totally typical traveling group. Normally when a group gets together on a planned tour they become friends but go their separate ways afterwards. With us the situation became radically different." They became a kind of family, having been welcomed as a group into the extended family of Ruatepupuke (the legendary ancestor of the Ngati Porou tribe) at Tokomaru Bay. And they had learned from the Maori, Cameron says, to hear each other out, respect differences of opinion, come to consensus, and persevere.

And persevere they did. By 1991, they had the Museum back on board, and funding secured by the Museum from the Ameritech Foundation for an unprecedented collaboration between American and Maori scholars and artisans to make a living Maori marae in the heart of Chicago.

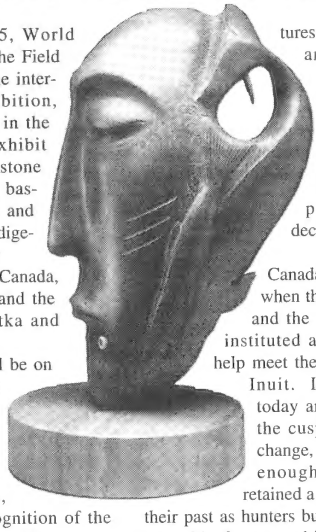
Its major work done, the group hopes to stay together and will meet soon to discuss its relationship to the functioning house of Ruatepupuke. "It's gratifying," says Ballard, "to see so many people being trained as interpreters — like going back to an old house and seeing new people beginning to love it."

Don't forget to enter Field Museum's Centennial Raffle!

Your participation in the Centennial Raffle will help to underwrite the cost of the Museum's Centennial celebration, a thank-you to its members and the public for 100 years of support. The Raffle — members should have received brochures and entry forms by mail — is a wonderful way to travel, study, and learn about the world and its peoples. You can win one of 18 exciting prizes by entering the Raffle for as little as $10 or multiple entries for a larger donation (15 entries for $100). Don't forget, all entrries must be received by June 25, 1993. For a Raffle brochure and entry form, contact the Women's Board at (312) 322-9970.

MASTERS OF THE ARCTIC

On Saturday, June 5, World Environment Day, the Field Museum presents the international art exhibition, "Masters of the Arctic — Art in the Service of the Earth." The exhibit brings together contemporary stone sculptures, tapestries, clothing, basketry, bone carvings, drawings, and silkscreen prints to honor the indigenous peoples who make their homes in the Arctic regions of Canada, Greenland, Northwest Alaska, and the Russian Republics of Chukotka and Sakha.



"Masters of the Arctic" will be on display in the Special Exhibit Gallery from June 5 through August 15, 1993. It features 150 contemporary masterworks contributed by 112 artists working in 83 Arctic communities, and is being displayed in recognition of the United Nations-designated "Year of Indigenous Peoples."

The works are arranged by location and represent a rich artistic tradition, primarily of carved sculptures. Contemporary Inuit sculptures and prints grow out of an artmaking tradition that is both ancient and modern. In one sense, the works reflect thousands of years of shared beliefs and customs, yet they are the product of only four decades of development.

Modern Inuit art in Canada can be traced to 1948, when the Canadian government and the Hudson Bay Company instituted artmaking activities to help meet the economic needs of the Inuit. Inuit works today are created on the cusp of cultural change, by artists old enough to have retained a strong link to their past as hunters but who live in a world of snowmobiles, satellite dishes, and video games. Artworks like those on display in the museum may mark the final authentic expression of traditional Inuit themes.

Certain themes, such as the portrayal of animals, are common to all settlements. Many carved stone sculptures describe a hunt, the animal hunted, and the spiritual identification of an Inuit with other living creatures. The movements of bear, seal, walrus, musk ox, owl, or caribou are presented as in a family portrait. Other carvings depict Inuit myths, transformations of humans to animals and vice versa. Affectionate and protective bonds between mother and child, man and wife are portrayed.

"Masters of the Arctic" was first shown on World Environment Day, June 5, 1989, at the United Nations headquarters, where it received full support from the Canadian, U.S., and Soviet missions. While on display in the National Historical Museum of Brazil in Rio de Janeiro, the exhibit served as a cultural centerpiece for the 1992 U.N. Conference on Environment and Development.

The exhibit is accompanied by a detailed catalogue, a video demonstrating a day in the life of an artist and her family in the Northwest Territories, a panel of photographs of artists, a computerized program of artists' biographies and their art, general photographs depicting Arctic scenes, and educational text panels including a map introducing the circumpolar area. A variety of educational programs will be offered in conjunction with the exhibition; see the "Get Smart" page for more details.

"Masters of the Arctic" is sponsored by Amway Environmental Foundation under the auspices of the Government of the Northwest Territories; the United Nations Environment Programme; the Greenland Home Rule Government; the Inuit Circumpolar Conference; Northwest Alaskan Native Association (NANA) Regional Corporation; NANA Museum of Arctic; and the Russian Chukotka Republic.

At a special Members' Preview Sweepstakes on June 2, Air Canada and Tourism Canada are offering a round-trip vacation for two to Yellowknife, Northwest Territories.

LAST DAYS TO SEE 'TE WAKA TOI'

Te Waka Toi: Contemporary Maori Art From New Zealand," on display in the Museum's Special Exhibition Gallery, closes May 9.

"Te Waka Toi" (The Carrier of Excellence) has been presented as a complement to the opening of "Ruatepupke: A Maori Meeting House," and features the works of 22 contemporary Maori artists recognized as leaders in their various artistic fields. Many of these works revolve around a relationship to the arts associated with the building of *marae*, or gathering places; they speak to the need to pass on traditional forms, or to discover new ways to express the values central to the Maori people.

CHINA BETWEEN REVOLUTIONS

China Between Revolutions: Photographs by Sidney D. Gamble 1917–1927" will be on display in the South Exhibit Gallery through June 20.

The exhibit comprises 81 black and white prints from an archive of photographs by Sidney D. Gamble (1890-1968), the first Western sociologist to fully document Chinese urban and rural life between the fall of the Manchu Dynasty in 1911 and the Communist revolution of 1949. The exhibition materials were drawn from almost 4,000 negatives, 600 hand-colored slides, and 30 reels of film discovered in the early 1980s by Gamble's daughter in his Riverdale, N.Y. home.

A video of historical footage, shot by Gamble on 16mm film in the 1920s, accompanies the exhibit and is itself an important visual record of one of the most turbulent periods in Chinese history, an exploration of a culture few Westerners ever personally experienced.

The exhibit was organized by the China Institue of America, the Sidney D. Gamble Foundation for China Studies, under the direction of Gamble's daughter, Catherine G. Curran, with the collaboration of the Smithsonian Institution Traveling Exhibition Services (SITES). Major funding was provided by the Henry Luce Foundation.

MAY/JUNE EVENTS

5/2 Sunday
Chicago Day

The Field Museum joins fifteen other museums and cultural institutions to kick off the city's salute to the World's Columbian Exposition of 1893, from which so much bounty still flows a century later. Free admission, free shuttle bus service to the participating institutions, and special programs highlight the day. WBBM Newsradio 78, a sponsor along with AT&T and Kraft General Foods, will broadcast live from the Chicago Cultural Center. For a free brochure, call (312) 230-4884.

5/3 Monday
Mycology Meeting

This month's meeting of the Illinois Mycological Association will feature "Illinois Mushrooms and Other Fungi" by Dr. Andre Methven, Eastern Illinois University, Charleston. Anyone interested in mushrooms at any level is welcome. Lecture Hall 2 at 7:30 p.m.; park in the West Lot.

5/4 Tuesday
Collections Committee

Join Chris Del Re, Associate Conservator, for a presentation on home conservation of ethnographic organic materials. Members are encouraged to bring objects from their personal collections for the Q&A period. Reception at 5:30 p.m.; program begins at 6:00 p.m. This program is for Collections Committee members only. For information on how to join the Collections Committee call Julie Sass at 322-8874.

5/7 Friday
Members' Night

Members Only: Bring the whole family and up to two guests. Peek behind the scenes of everything at the Museum — curators' labs, new exhibits being developed, library treasures, and more, including entertainment, fun & games. 5 p.m.–10 p.m.

5/10 Monday
Camera Club

"Close-ups in Nature" by Tom Holms. Learn more about this important technique in nature photography. Everyone is welcome. 7:30 p.m. in Lecture Hall 2; park in the West Lot.

5/14 & 15
Friday & Saturday
Margaret Mead Fest

For the first time, selections from the renowned Margaret Mead Film and Video Festival sponsored by the American Museum of Natural History in New York are touring nationally. The festival celebrates cultural differences by presenting works from around the world with similar themes: art and society, children and the future, community portraits, sports and culture, and women's stories. 5:30–10:30 p.m Friday. 9 a.m.– 4 p.m Saturday. $9 per participant ($8 members) for Friday or Saturday; $15 ($13 members) for both days. Call (312) 322-8854 for more information.

5/22 Saturday
Neighbors Night

The Community Outreach Program hosts its 5th annual Neighbors Night celebrating the ethnic diversity of the people of Chicago. Tour the world with our special Passport Program. And hear "Pop" Staples perform his Grammy-nominated LP *Peace to the Neighborhoods*. Pam Morris of V-103 FM emcees. 5 p.m.–9 p.m.

5/23 Sunday
Members' Lecture 'At the Field'

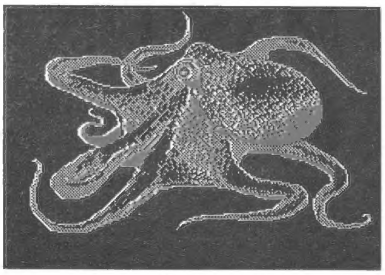
Dr. William Burger will present "Why do the Tropics Have So Many Kinds of Plants?" 1:30 p.m., Simpson Theatre; $3 for members, $5 guests.

6/5 Saturday
Exhibit Opening

"Masters of the Arctic — Art in the Service of the Earth" brings together contemporary stone sculptures, tapestries, clothing, basketry, bone carvings, drawings, and silkscreen prints to honor the indigenous peoples who make their homes in the Arctic regions of Canada, Greenland, Northwest Alaska, and the Russian Republics of Chukotka and Sakha. Through August 15 in the Special Exhibit Gallery, ground floor.

6/14 Monday
Camera Club

Wildflowers are the subject of the bimonthly slide competition. The mini-program is "Helicopter-hiking in the Canadian Rockies" by Beverly Rodgers. Everyone is welcome. 7:30 p.m. in Lecture Hall 2; park in the West Lot.



6/18 Sunday
Members' Lecture 'At the Field'

Dr. Janet Voight presents "Octopuses and Squids: Beastly Predators of the Seas." 1:30 p.m., Simpson Theatre; $3 for members, $5 guests.

6/26 Saturday
Canoeing & Collecting

Join the Education Department's geology specialist as you canoe 15 miles on the upper stretch of Sugar Creek in Crawfordsville, Indiana. Pass through narrow channels, around large rocks, and past historic landmarks as you learn more about this area's geological history and search for fossils. Participants must have previous canoeing experience.
6 a.m.–7 p.m. $60 per participant ($50 members). Call (312) 322-8854.

6/14,16,18
World Clubhouse

Adult / Toddler Camp
Be a part of our world clubhouse by getting to know animal friends from our own backyards and faraway places. Learn what children from other countries do for fun and what we can do to make our world a better place. Each day concludes with a snack and storytelling time! 9:30–10:30 a.m. or 11 a.m.–noon. $30 ($25 members) for 1 adult and 1 child.
Call (312) 322-8854.

June–August Field Guide

New field trips, featured programs with the exhibit "Masters of the Arctic," a summer camp for adults and toddlers, and a family overnight are just a few of the programs featured in the June-August 1993 *Field Guide — Programs for Adults & Children*. If you do not receive a copy by mid-May, call the Museum's Education Department at (312) 322-8854. Non-members may also sign up for these programs.

GET SMART

'MASTERS OF THE ARCTIC' EDUCATION PROGRAMS

Musical Performance
Thursday, June 3 at 1 p.m.

Rosemary Immingaik of the Canadian Northwest Terriories, an Inuit singer, will share this unique traditional art form. Gabriel Nirlungayuk will also display his mastery of the Inuit drum dance. Free with museum admission.

Alaskan Family Program
Saturday & Sunday, June 5 & 6
Wednesday & Thursday, June 9 & 10

Theodore and Phyllis Booth, elders of the Alaskan Inupiaq people and their grandchildren, Eli and Phyllis, will share their rich traditions and culture through craft demonstrations, story telling, and song and dance. Craft demonstrations are from 10 a.m.–12:30 p.m.; dance and song performances, 2–3 p.m. Free with Museum admission

Contemporary North: People & Events
Tuesday & Wednesday, June 8 & 9
7–9 p.m.

Join "Masters of the Arctic" exhibit curator Christopher Stephens, associate curator Martha Whiting and the Booth family, Inupiaq from Kotzebue, Alaska for a special evening program on Arctic lifestyles, focusing on Alaska and the Canadian Northwest Territories. Learn about contemporary lives and issues of northern peoples. A guided tour of the exhibit follows. $12 ($10 Museum members).

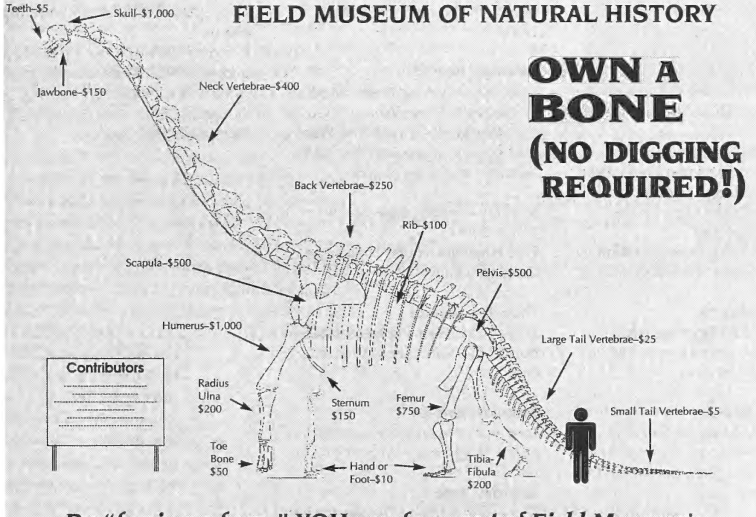
Circumpolar Craft: Inuit Artmaking
Saturday & Sunday, July 10 & 11

Join well-known Canadian Baffin Inuit artist Germaine Arnaktauyok and "Masters of the Arctic" associate curator Helen Webster for demonstrations that explore Inuit print and graphic making tradition, and a guided tour of the exhibition. Free with Museum admission.

Symposium: The Living Arctic
Saturday, July 17 from 9 a.m.–4 p.m.

The significant contributions made by the Inuit of the Arctic to environmental conservation and sustainable development have been recognized internationally. Mary Simon, Ph.D., Special Envoy with the Inuit Circumpolar Conference (ICC), will present a one-day symposium with four indigenous circumpolar leaders and authorities on the future of the Arctic and its environment. Exhibit curator Christopher Stephens will welcome and introduce our speakers from Alaska, Russia, Canada, Greenland and Finland. Topics discussed include the environment, human rights, development issues and the wise use of nature. The symposium is hosted with the cooperation of the Inuit Circumpolar Conference and United Nations Environment Programme, and funded by the Amway Environmental Foundation, the Government of Northwest Territories, the Government of Canada, and American Airlines / Canadian Airlines International. $20 ($10 for students/seniors). For registration information, call (312) 322-8854.

FIELD MUSEUM OF NATURAL HISTORY



OWN A BONE (NO DIGGING REQUIRED!)

By *"buying a bone,"* YOU *can be a part of* Field Museum's *mounting of the awesome* Brachiosaurus.

Amaze your friends and family as you point out the bone that your contribution helped put into place. Choose from a scapula, a femur, a tail vertebrae, or even the skull, which housed a brain smaller than a human fist. Donate a bone in someone else's name — a great gift for dinosaur enthusiasts that will last for generations to come! And come to the festive "Hard Hat Party" the night of July 2 to watch the beast being built — an exclusive treat for "Own a Bone" participants.

For more information, call the Field Museum Development Office at (312) 922-9410, ext. 639.

CLIP AND SEND

Yes, I'd like to "Buy a Bone" to build the *Brachiosaurus*:

Name of Bone _____ Amount Enclosed _____

Name _____
(As you would like it to appear on the donor plaque)

Address _____
City State Zip

All contributions are tax deductible. Mail to: Development Office, The Field Museum of Natural History
Roosevelt Road at Lake Shore Drive, Chicago, IL 60605

BECOME A MEMBER
of the Field Museum of Natural History and receive these benefits:

- Free admission
- Free coat checking and strollers
- Invitation to Members' Night
- Priority invitations to special exhibits
- Free subscription to *In the Field*
- 13-month wall calendar featuring exhibit photographs
- Reduced subscription prices on selected magazines
- Opportunity to receive the Museum's annual report
- 10% discount at all Museum stores
- Use of our 250,000-volume natural history library
- Discount on classes, field trips, and seminars for adults and children
- Members-only tour program
- Opportunity to attend the annual children's Holiday Tea
- Privileges at Chicago's largest furniture wholesaler
- Children's "dinosaur" birthday card

MEMBERSHIP APPLICATION
New Members only. This is not a renewal form.

◯ Please enroll me as a Member of the Field Museum of Natural History

Name _____
Address _____
City _____
State ___ Zip _____
Home phone _____
Business phone _____

GIFT APPLICATION FOR

Name _____
Address _____
City _____
State ___ Zip _____
Home phone _____
Business phone _____

GIFT FROM

Name _____
Address _____
City _____
State ___ Zip _____
Home phone _____
Business phone _____

MEMBERSHIP CATEGORIES

◯ Individual – one year $35 / two years $65

◯ Family – one year $45 / two years $85
(Includes two adults, children and grandchildren 18 and under.)

◯ Student/Senior – one year $25
(Individual only. Copy of I.D. required.)

◯ Field Contributor – $100 - $249

◯ Field Adventurer – $250 - $499

◯ Field Naturalist – $500 - $999

◯ Field Explorer – $1,000 - $1,499

All benefits of a family membership — and more

◯ Founders' Council – $1,500

Send form to:
Field Museum of Natural History, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605

Saturday, May 1
11am–4pm **Specimen Preparation** Watch as museum scientists prepare animal specimens for the research collection.
12 noon - 2:00pm **Egyptian Hieroglyphs** Have your name written in this ancient alphabet.
1pm **World Music presents Poet Paul Mabon.** Treat yourself to poetry from this spark of light in the inner city.
2pm **World Music with Musa Mosely** Join Musa as he demonstrates the use and history of drumming originating from various African regions.

Chicago Historical Society

Sunday, May 2 Chicago Day
Sixteen museums and other cultural institutions kick off the city's salute to the WSorld's Columbian Exposition of 1893 with free admission, bus service, and special programs. Sponsored by AT&T, Kraft General Foods, and WBBM Newsradio 78.
10am - 4:30pm **Scavenger Hunt!** Like solving mysteries? Take an adventure through the halls and finding answers to clues. Prizes for those who can!
10am - 4:30pm **Ruatepupuke: A Maori Meeting House** Visit a traditional meeting house of the Maori of New Zealand through on-going half hour programs.
10pm - 3pm **Dino Wagon** Join in on a wagon full of dinosaur and prehistoric life activities.
10pm - 3pm **Horns and Antlers** What's the difference between horns and antlers? Examine a variety of horns and antlers and discover their form and function.
11am, 12 noon, and 1pm **Messages from the Wilderness Tour** Travel through game parks and wildlife areas of distant lands through this highlight tour.
11am–4pm **Specimen Preparation** See how giraffe and zebra skins gathered in the 1920's are prepared for the research collection.
12:30pm **Museum Safari** Trek through the four corners of the museum on a highlight tour of exhibits that will take you across the world.
1pm **World Music with Musa Mosely** Join Musa as he demonstrate the use and history of drumming originating from various African regions.
3pm **World Music with Balkanske Igre** Experience the rich and diverse folk traditions of the Balkans and Eastern Europe through dance, songs and music.

Thursday, May 6
10am -1pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, May 8
1:30pm **Tibet Today and a Faith in Exile** A slide presentation which takes you to Lhasa and other places now open to tourists in Tibet.
2pm - 4pm **Egyptian Hieroglyphs** Have your name written in this ancient alphabet.

Sunday, May 9
11am - 3pm **Specimen Preparation** Watch as museum scientists prepare animal specimens for the reseach collection.

Thursday, May 13
10am -1pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, May 15 Asian Heritage Festival
10am -4pm Celebrate Asian Heritage Month with Field Museum during **Asian Heritage Festival**, a free one day event celebrating Asian American communities. Traditional ceremonies include a Thai wedding and Chinese tea ceremony, martial arts, dance, and music performances, a bonsai display and demonstration, and highlights of Field Museum's collections from Asia.
2pm - 4pm **Egyptian Hieroglyphs** Have your name written in this ancient alphabet.

Thursday, May 20
10am -1pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, May 22
1am–4pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Sunday, May 23
11am - 3pm **Specimen Preparation** Watch as museum scientists prepare animal specimens for the reseach collection.
1–4pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, May 29
12 noon - 2pm **Egyptian Hieroglyphs** Have your name written in this ancient alphabet.

Thursday, June 3
1pm **Drum Dancer & Singer** Discover the distinctive Inuit traditions of singing and drum dancing in this performance.

Saturday, June 5
10am-12:30pm **Alaskan Family Craft Demonstration** Three generations of this Inuit family demonstrate traditional crafts such as making fish nets, grass baskets, sewing skin, and creating hair pins and necklaces.
2pm **Alaskan Family Performance** masked dance and singing.

Sunday, June 6
10am-12:30pm
Alaskan Family Craft Demonstration Three generations of this Inuit family demonstrate traditional crafts such as making fish nets, grass baskets, sewing skin, and creating hair pins and necklaces.
2pm **Alaskan Family Performance** masked dance and singing.

Wednesday, June 9
10am-12:30pm
Alaskan Family Craft Demonstration. Three generations of this Inuit family demonstrate traditional crafts such as making fish nets, grass baskets, sewing skin, and creating hair pins and necklaces.
2pm **Alaskan Family Performance** masked dance and singing.

Thursday, June 10
10am -1pm **Weaving Demonstration** by the North Shore Weaver's Guild.
10am-12:30pm **Alaskan Family Craft Demonstration.** Three generations of this Inuit family demonstrate traditional crafts such as making fish nets, grass baskets, sewing skin, and creating hair pins and necklaces.

2pm **Alaskan Family Performance** masked dance and singing.

Saturday, June 12
1pm **World Music presents Tanglaw Dance Troupe** in an exciting display of dance, music and traditional clothing representing the

richness and diversity of Philippine culture.

Thursday, June 17
10am -1pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, June 19
1am–4pm **Weaving Demonstration** by the North Shore Weaver's Guild.
1pm **World Music with Rita Warford** presents a program that highlights the traditions of jazz.

Monday – Friday, June 21–25
11am–2pm
Free Highlight Tours. Topics and times vary daily.

Thursday, June 24
10am -1pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, June 26
1am–4pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Saturday, June 27
1am–4pm **Weaving Demonstration** by the North Shore Weaver's Guild.

Monday–Friday, June 28–July 2
11am–2pm
Free Highlight Tours. Topics and times vary daily.

Daniel F. & Ada L. Rice Wildlife Research Station
Resources for further study of zoology, ecology and conservation through videotapes, computer programs, educator resources, books and activity boxes are available.
Daily 9am-5pm

Webber Resource Center Native Cultures of the Americas
Books, videotapes, educator resources, tribal newspapers and activity boxes about native peoples of the Americas are available.
Daily 10am–4:30pm

Harris Educational Loan Center
Chicago area educators may borrow activity boxes and small dioramas from Harris Center. For more information call: (312) 322-8853.
Open House Hours:
Tuesdays 2:30-7pm
Thursdays 2:30–5pm
Saturdays 9am–5pm

Place For Wonder
A special room of touchable objects where you can discover daily life in Mexico, in addition to an array of fossils, shells, rocks, plants and live insects.
Weekdays: 12:30–4:30pm
Weekends: 10am–4:30pm

Pawnee Earth Lodge
Walk into a traditional home of the Pawnee Indians of the Great Plains and learn about their daily life during the mid-19th century. Free program tickets are available from the Information Desk in Stanley Field Hall.
Weekdays: 1pm program
Saturdays: 10am–4:30pm; Free ticketed programs at 11, 12, 2 & 3.
Sundays: 10am–4:30pm

Ruatepupuke: A Maori Meeting House
Discover the world of current Maori people of New Zealand at the treasured and sacred Maori Meeting House.
Open daily 9am-5pm

Balkanske Igre Dance Ensemble appears on Chicago Day, Sunday, May 2, at 3 p.m.

ENGINEERING...

(Continued from page 1)

this fish to produce a previously unknown design of the jaws — but the system is controlled using the old version of the software. The control of movement by muscles and nerves (the software) is a central subject in biomechanics, behavioral studies, and in areas of medical research as well.

In a second project, observations of singing birds led us to wonder if head and beak movements helped to produce sounds during song. We know that birds use a unique organ in the windpipe called the syrinx to produce vibrations, similar to the way our vocal cords produce vibrations during speech. But we wondered: Are the vocal tracts of birds like a musical instrument, such as a trombone, that produces changes in pitch by altering its length and volume? To test this idea, we recorded the head movements of white-throated sparrows and swamp sparrows (see photo below). At the same time, we recorded the acoustic content of their songs. The video and audio were synchronized by computer and the results were clear — the birds flared the beak to produce high-pitched notes, and closed the beak during low notes. This supports the idea that the windpipe and mouth cavity of birds act as a resonance chamber for sound. We can now begin to dig deeper into the question of how the lungs, syrinx, wind-pipe, and beak are controlled by muscles to produce songs. Through study of the biomechanics of song production in birds, we may learn principles of sound production in all animals.

Biomechanics is not so much a sub-discipline of biology as it is an attitude, an approach to biology that cuts across all biological fields. Principles of physics and engineering affect the way molecules of DNA are shaped, the way cells divide in a freshly fertilized egg, and the ability of a fish to swim against a racing mountain stream. Thus, biomechanical studies have important applications in many areas of biology as well as some surprising applied uses in the area of human engineering.

For example, let's look at a fish swimming up a stream to see how much useful information there might be in knowing how it works. What a gold mine! We can study the structure and function of that individual fish to determine how the design of fishes in general allow them to generate forward propulsion. How much force do muscles exert to bend the backbone? How do tendons transmit motion to the skeleton? Fishes, amphibians, reptiles, birds and mammals often have the same kind of muscle and bone connections. Therefore, answers to these kinds of questions can help us to better understand the engineering design features of all vertebrate animals, including humans.

Biomechanics is far-reaching, and it impacts the ecology of every habitat. The ability of fishes to swim against current is an integral part of their ecology. Swimming mechanics will dictate many facets of their life, from catching food to finding mates. Biomechanics also operates on a broader evolutionary time scale. A large part of evolution for a particular way of life is driven by the fact that animals adapt to the physical forces of the environment. At the Field Museum we are combining our knowlege of the evolutionary tree of fishes with the study of the biomechanics of swimming to draw conclusions about the different ways that evolution has shaped the bodies of fishes for moving through the water.

How else can we use biomechanics? There are lots of practical uses for biomechanical information, many of which appear in our lives every day. It is no accident that the hulls of ships have a streamlined shape much like that of a swimming fish, or that the wings of airplanes are shaped like those of a soaring bird. The tires on your car are made of synthetic rubber, a substance originally engineered by nature in rubber trees and now copied by humans. Fiberglass, plastic, and graphite composites that are in construction materials, golf clubs, and fishing poles are often modeled after materials such as bone and wood that have shown engineers how to design stronger materials. Research on human biomechanics has produced artificial organs and prosthetic limbs. A new field of engineering, called bio-mimetics, is revolutionizing the design of synthetic materials by mimicking the properties of biological tissues like bone, wood, muscle, skin, and mucus.

Every living thing is an example of the engineering genius of the process of evolution, and there are many interesting biomechanical questions to ask in the years ahead. How does a fish fin work? Why can water striders walk on water? How has evolution shaped fish heads for feeding on different things?

Although the questions are relatively simple, obtaining complete answers requires the study of many aspects of biomechanics. They are nonetheless questions well worth posing.

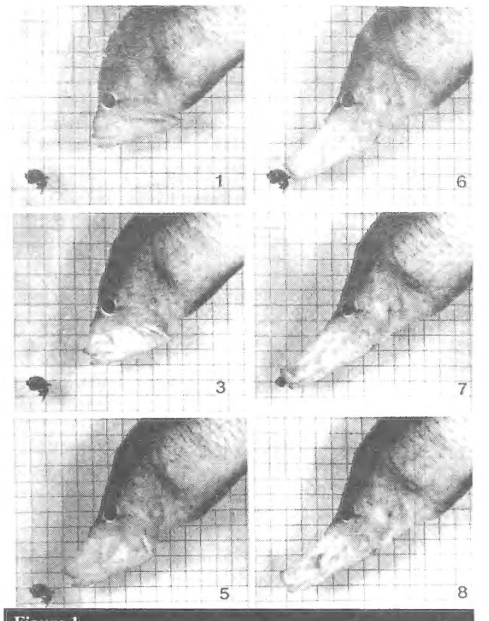


Figure 1

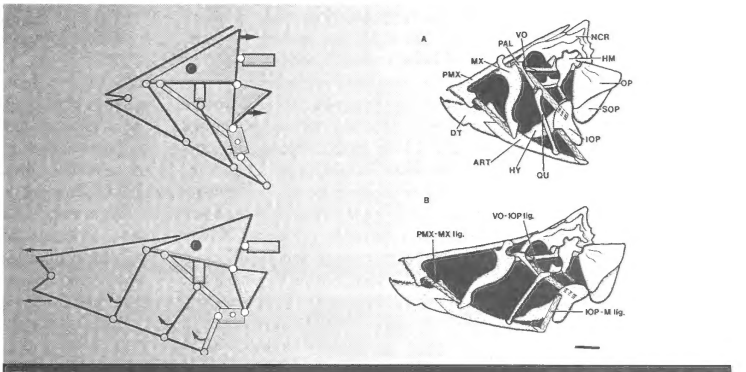


Figure 2

Figure 1. Frames 1, 3, 5, 6, 7, and 8 from a high speed film (200 frames/sec.) of the feeding strike of the sling-jaw, Epibulus insidiator. *The feeding event is fast, occuring in 0.04 seconds. Successive frames are 0.005 sec apart. See Figures 2 and 3 for the anatomy and mechanical design of the jaws.*

Figure 2. Mechanical design of the head of the sling-jaw fish,* Epibulus insidiator. *Bones and ligaments of the head are shown when the jaws are (A) slightly protruded, and (B) almost fully protruded. Many of these bones are very different from those of all other fishes. The mechanical diagrams to the left show the motions of thc bones duling feeding. Heavy arrows in (A) indicate the pull of muscles on the neurocranium (NCR) of the skull and on the opercle (OP) of the gill cover. Lighter arrows indicate the forward motion and rotation of the jaws and the bones supporting the jaws. Abbreviations for bones and ligaments of the head: ART, articular; DT, dentary; HM, hyomandibula; HY, hyoid; IOP, interopercle; IOP-M lig., interoperculo-mandibular ligament; MX, maxilla; NCR, neurocranium; OP, opercle; PAL, palatine; PMX, premaxilla; PMX-MX lig., premaxillary-maxilla ligament; QU, quadrate; SOP, subopercle; VO, vomer; VO-IOP lig., vomero-interopercular ligament. Scale bar = 1 cm.

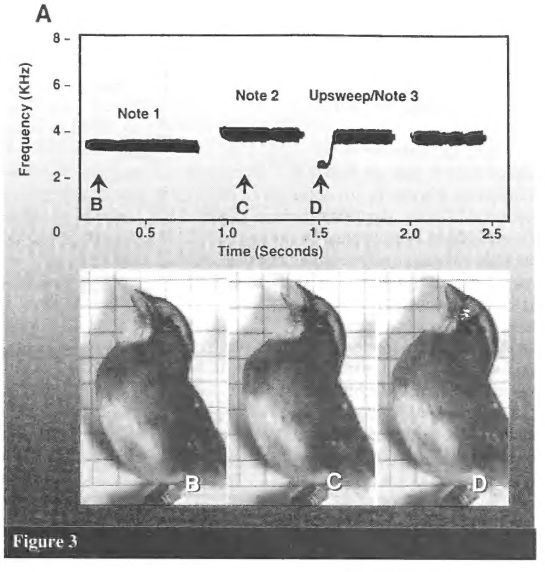


Figure 3

Figure 3. Sonagram and associated video images of a white-throated sparrow song. The sonagram (A) shows the changes in frequency over time of the pure-tonal notes of the song. The first image (B) shows the partially closed beak associated with note 1, sung at a low frequency. The second image (C) illustrates the more flared beak position associated with note 2 which is sung at a higher frequency. The third image (D) corresponds to the lowest frequency at the beginning of the upsweep portion of note 3. The arrows in A mark the points in time from which the video fields in B, C, and D were taken.

BABBITT PLAN . . .

(Continued from page 1)

In October 1989, the University of Arizona and the Smithsonian Institution convened a symposium on the biology of Mt. Graham. This "sky island" of coniferous forest in a "sea" of desert had become an environmental battleground because plans to install an astronomical observatory on the summit imperiled populations of an endemic red squirrel, Tamiasciurus hudsonicus grahamensis. Found nowhere else on Earth, the squirrels live in the highest-elevation forests favored by astronomers for clear, unobstructed visibility.

I had studied these and other montane populations of mammals during graduate school, focusing on their evolutionary origins. Overwhelming evidence suggests that montane mammals colonized isolated mountain ranges of the Southwest during the Pleistocene Epoch, 12,000 – 2 millon years ago. Advancing continental ice sheets brought cool, moist climates to this region, permitting coniferous forests to become established at low elevations. Montane mammals used these low-lying forests as corridors to reach what are currently isolated peaks. With the retreat of continental glaciers and the return of hot, dry climates at lower elevations, the intervening forests disappeared. Now isolated from all other populations, montane mammals (and other organisms in their habitats) diverged from each other, in some cases differentiating as new species or subspecies.

Two mammals living on Mt. Graham had attained such evolutionary distinction, the red squirrel and a long-tailed vole or meadow mouse. Both were named as endemic subspecies of wider-ranging forms, the squirrel being restricted to high-elevation forests and the vole to high-elevation meadows. Given their restricted distributions and small initial population sizes, it was perhaps inevitable that 20th-century developments would imperil both creatures. In the early 1980s, both were placed "Under Notice of Review" by the U.S. Fish & Wildlife Service, empowering that agency to collect information necessary to determine their status and, if necessary, to list them as endangered or threatened. Sufficient evidence for listing was obtained only for the red squirrel.

At the symposium, I learned the true limitations of the Endangered Species Act, with its restrictive focus on mitigating impacts on listed species. Roads to the observatory, and construction at the site, were to minimize impact on the forest habitat. This was achieved, of course, by maximizing use of the open meadows. This development is certain to have adverse effects on vole populations, as both federal and state wildlife officials acknowledge. However, only when vole populations reach a critical stage of vulnerability recognized officially will they be entitled to protection under the Endangered Species Act.

The Babbitt initiative would seek to anticipate such problems by developing baseline information on all of the nation's biotic diversity. Faced with proposals for land development on Mt. Graham, the Interior Department could consult map libraries of red squirrels, long-tailed voles, and dozens of other species of plants and animals restricted there, assessing vulnerabilities of populations to development. With a national database at hand, conceivable outcomes of the observatory proposal might include either development plans that distributed risk among Mt. Graham's endemic species or the identification of alternate sites within the region whose development would not be so costly biologically.

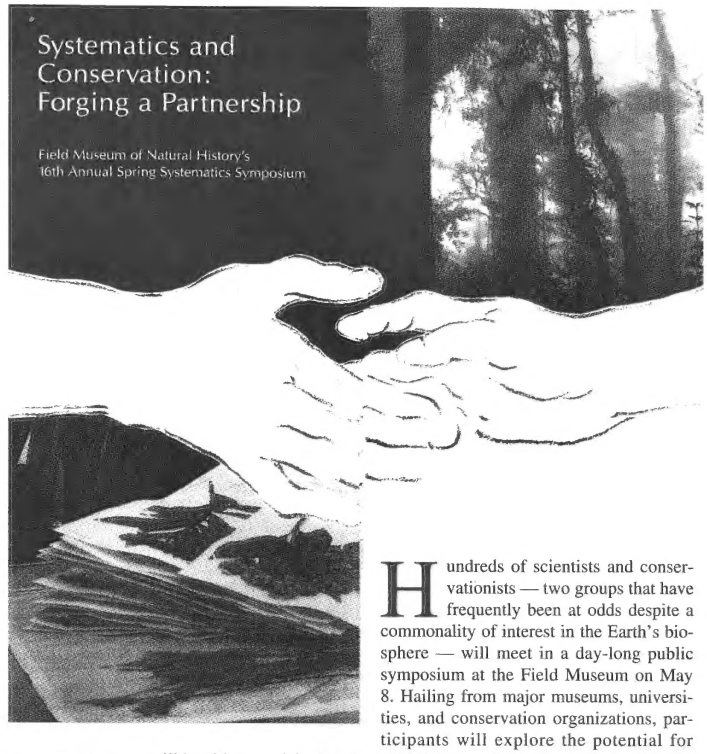
Babbitt's plan to initiate a national biological survey reflects prevailing scientific opinion concerning environmental needs. By mapping species and their habitats, and combining these data with patterns of human use and development, our government will be able to anticipate environmental problems and work towards coordinated solutions to them. The goal of the program will be an up-to-date, evolving picture of the nation's diversity and the ecological and land-use changes that affect it.

A national biological survey will extend and coordinate a process now being carried out piecemeal by diverse state and local government agencies and private organizations. Usually such surveys are initiated by governments or foundations, but are executed in association with museums and universities. Collections of natural history museums often contain the most comprehensive records available on plant and animal distributions. Assembled over decades or even centuries, such collections afford unique insights into historical range changes as a result of modern development. This crucial role for collections is even more pronounced outside the U.S. For many areas of the tropics — home to more than half the world's plant and animal species — museum collections provide the only distribution records now available. Babbitt's plan for a national survey may even help to fuel much-needed coordination efforts at an international scale. As environmental conditions in eastern Europe grimly attest, environmental problems do not recognize national boundaries, and coordinated international solutions are needed to resolve them.

U.S. Lags in Inventory Effort

Until the Babbitt initiative, the U.S. has lagged behind other developed and developing nations in efforts to inventory its natural resources. During the 1980s, federal funding for such efforts (mainly grants from the National Science Foundation) was so limited that only one percent of the world's diversity was under active systematic study. Relatively huge outlays of funds were focused on a handful of highly vulnerable species requiring "emergency room care," and not all of the programs proved successful. Babbitt's plan to reallocate $12 million from within the Interior Department's diffuse research budget reflects considered scientific opinion that "an ounce of prevention is worth a pound of cure."

Thomas Lovejoy of the Smithsonian Institution and Peter Raven of the Missouri Botanical Gardens are scientific advisors for the Babbitt initiative. Raven cites this as "truly a historic moment," similar to the founding of the U.S. Geological Survey in 1879. The U.S.G.S. is now one of the nation's premier research organizations. One can only hope that the biological survey achieves a similar level of funding and success.



Hundreds of scientists and conservationists — two groups that have frequently been at odds despite a commonality of interest in the Earth's biosphere — will meet in a day-long public symposium at the Field Museum on May 8. Hailing from major museums, universities, and conservation organizations, participants will explore the potential for establishing collaborative relationships to formulate practical and effective means of addressing pressing environmental concerns.

The event is the Museum's 16th annual Spring Systematics Symposium, and the topic this year is "Systematics and Conservation: Forging a Partnership."

Scientists who practice systematic biology — the science of biological diversity — agree with conservationists that environmental health can be sustained only by protecting the biological diversity the Earth's various ecosystems support. They also recognize that they should assume more responsibility for using systematic information in the context of protecting biodiversity. Traditionally, however, this responsibility has been shouldered by conservationists, who must deal with environmental issues in the real world of political pressures and shifting governmental priorities. As a result, the two groups have sometimes been in conflict, with systematists criticizing the conservationists for making decisions that are unduly influenced by political expediency, and the conservationists reproaching the systematists for their failure to be more responsive to societal needs.

Finding common ground between systematists and conservationists is a primary objective of the symposium, which is expected to act as a catalyst for speeding the dissemination of baseline information, and thus enhance cooperation on all pertinent matters.

The symposium will be held in Simpson Theater from 8:30 a.m. to 5 p.m. and will be followed by a reception in the Webber Resource Center. Registration (at the West Door) is $20 for students and $35 for others.

BRACHIOSAURUS . . .

(Continued from page 1)

In its prehistoric heyday, the Field Museum *Brachiosaurus* was a terrestrial animal measuring 75 feet from head to tail, with a head-height of 40 feet. By contrast, *Apatosaurus* — commonly known as *Brontosaurus* — weighed 35 tons and stood 15 to 20 feet tall. A member of the plant-eating sauropod family of dinosaurs, *Brachiosaurus* was shaped something like a giant giraffe, with a long neck, small head, long forelimbs and relatively short hind limbs, and a brain no bigger than a man's fist. It lived during the Jurassic Period, becoming extinct sometime before that geological period ended 140 million years ago.

The Field Museum's *Brachiosaurus* was excavated in 1900 by paleontologist Elmer Riggs, who discovered the fossilized remains in a hill just outside Grand Junction, Colorado. Among the bones that Riggs found were a rib nearly ten feet long and a six-foot, eight-inch–long femur that weighed 600 pounds. Judging by the size and shape of these and other bones, Riggs determined that not only had he found a dinosaur of monstrous proportions, but one whose very existence had been previously unsuspected. His *Brachiosaurus* became the "holotype," the reference specimen first scientifically described and identified as a new dinosaur species.

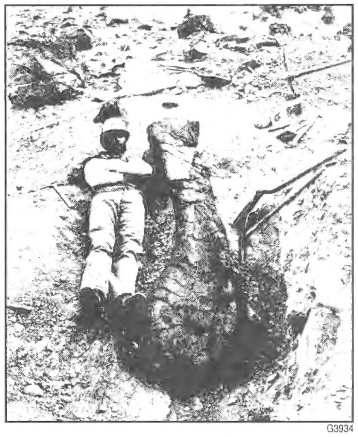
The original bones are too fragile to be mounted and in any case must be kept available for research, but they will be placed on public display along with the reconstructed skeleton. Only one other *Brachiosaurus* has been mounted, in Germany, and the Field Museum mount will be the largest dinosaur ever displayed in the Western Hemisphere.

The fiberglass casting and reconstruction of the *Brachiosaurus* was done by Field Museum preparators and specialists at PAST, Inc. (Prehistoric Animal Structures, of Alberta, Canada). PAST has been working with Museum staff for a year and a half on the installation of seven dinosaurs that will appear in the exhibit "Life Over Time," scheduled to open in June 1994.

Mounting of the *Brachiosaurus* is being made possible in part by the Museum's "Own a Bone" campaign (see coupon, page 7), through which individuals or groups can sponsor a specific bone — as little as $5 for a tooth or small tail vertebrae and as much as $1,000 for the skull or foreleg. Contributors will be recognized with a certificate and on a plaque in Stanley Field Hall.

G2956

Curator of Geology Elmer Riggs, below, lies next to a* Brachiosaurus *femur on site in Colorado, 1900. At left is his assistant, preparator H.W. Menke, standing next to the animal's humerus.



G3934

BRACHIOSAURUS

FUN FACTS:

First found in the summer of 1900 by Field Museum paleontologist Elmer Riggs, this fossil was given the name *Brachiosaurus* (pronounced brake-ee-o-sawrus) for its long front legs — the name derives from the Greek *brachion* (arm) and *sauros* (lizard). *Brachiosaurus* was a member of the Sauropoda, the long-necked dinosaurs.

Brachiosaurus lived from 153 to 110 million years ago during the late Jurassic and early Cretaceous periods and has been found in the western United States, Tanzania, Portugal, and Algeria.

Estimates for the weight of *Brachiosaurus* range from 40 to 90 tons. If you accept an 85-ton weight estimate for *Brachiosaurus*, the dinosaur may have been about 50 tons heavier than *Apatosaurus*, 78 tons heavier than *Tyrannosaurus*, 78 tons heavier than *Triceratops* and 82 tons heavier than *Stegosaurus*.

At 85 tons, a full-grown *Brachiosaurus* would be equal in weight to:
680,000 McDonald's Quarter Pounders
2,982 eight-year-old boys and girls

At 85 tons, *Brachiosaurus* would outweigh the U.S. Army's 70-ton M-1A1 Abrams heavy tank by 30,000 pounds (15 tons).

A single *Brachiosaurus* egg could make an omelet weighing 15 pounds.

The rib of a *Brachiosaurus* is almost three feet taller than Michael Jordan.

Tipping the scales at 675 pounds, *Brachiosaurus*'s thigh bone is heavier than the combined weight of Trace Armstrong and William "The Refrigerator" Perry.

Field Museum's *Brachiosaurus* is longer than seven African elephants standing end to end.

As many as 12 seven-year-olds would have to stand on each other's shoulders to equal the 40-foot height of a *Brachiosaurus*.

Brachiosaurus was tall enough to look into the window of a 4th-floor apartment.

A *Brachiosaurus* might have lived for as long as 100 years (if it didn't get eaten, first!).

Richard Ruth

TALKIN' ABOUT T. REX

Saturday, May 22, 10 a.m.
James Simpson Theatre
$7 ($5 members)

John Horner, Ph.D., Curator of Paleontology at the Museum of the Rockies, discusses the excavation of the nearly complete specimen of *Tyrannosaurus rex* he found three years ago in the hills of eastern Montana. Very few complete *Tyrannosaurus* skeletons have been found — its mystique making it one of the most popular and least studied of the dinosaurs. He recently co-authored a new book with Don Lessem entitled *The Complete T. rex.* He will discuss their latest findings including *Tyrannosaurus rex*'s morphology as well as the possibility that it could have been the largest scavenger that ever lived Dr. Horner will explain the problems with considering *T. rex* an active hunter and killer, as well as other interesting features of this fascinating animal. Copies of his new book will be available for purchase and signing after the lecture. Call (312) 322-8854 for ticket information.