



Harvard University
Cambridge, Massachusetts
Volume 16, Number 2
Spring, 1986

MCZ newsletter

MUSEUM OF COMPARATIVE ZOOLOGY

Check-list of Birds of the World Completed



Raymond A. Paynter, Jr., (l.) and G. William Cottrell, two of the editors of the recently-completed Check-list of the Birds of the World.

MCZ to Celebrate Harvard's 350th Anniversary with *Birds-In-Art* Exhibit

Preparations are currently underway to renovate one of the MCZ's exhibit halls and create a new display area for changing exhibits. To inaugurate the transformed gallery, a special exhibit titled *Birds-In-Art*, featuring paintings by John James Audubon, James Coe, Alexander Wilson, and Julie Zickefoose, and sculptures by Charles G. Chase, Robert Braunfield, and Beverly Benson Seamans will be on display from September 4 to September 26, 1986. An exhibition of bird photographs, winners of a contest organized by Emily Hubbs Scott, Chair of the Advisory Board to the MCZ's Public Programs, will also be on display and will continue through November.

The gala opening reception will take place on Thursday, September

4 as part of the festivities marking Harvard's 350th anniversary.



Bonaparte's Gulls, bronze sculpture by Beverly B. Seamans

Drawing by Laszlo Meszoly

With the publication Volume XI, the final volume of the 15-volume *Check-list of Birds of the World*, the longest such MCZ project has come to a gratifying conclusion. "I feel like I got rid of the millstone or albatross—the reader can choose which—around my neck," is the reaction of Professor Emeritus Ernst Mayr who has been involved with the project since 1931 when James L. Peters enlisted his help. Peters, who had joined the MCZ's curatorial staff in 1924, decided to enlarge on his assignment of creating a card catalogue for all the birds in the collections. Thomas Barbour, who was Director at the time, encouraged Peters to embark on a revision of the existing *Hand-list*, published by the British Museum's curator R. Bowdler Sharpe from 1899-1912.

The undertaking of the project was inspired by ornithology's boom period. From the turn of the century until World War II the MCZ's bird holdings grew from a modest collection to a comprehensive global representation. World-wide there was a burst of new taxonomic information about birds rendering Sharpe's *Hand-list* hopelessly outdated. Even more important was a drastic change in the species concept. Sharpe called every distinct population a species, while Peters adopted a more modern concept in which geographic races (subspecies) were combined into broad polytypic species. Peters had completed the first seven volumes by the time of his death in 1952.

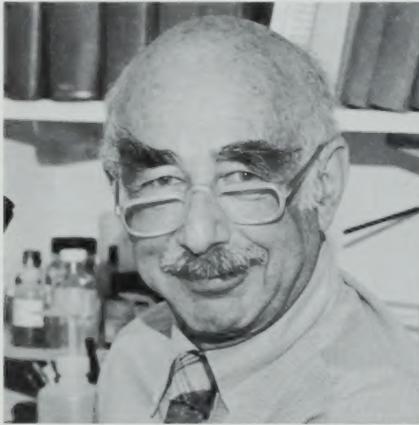
The ambitious project was taken over by Mayr, who came to MCZ in 1953, and James L. Greenway, until his departure from the MCZ in 1960. Raymond A. Paynter, Jr., now Curator of Birds, took over Greenway's duties upon the latter's departure. In

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Patterns of a Life in Science: Herbert W. Levi

by Hilary Hopkins

Six years ago, when I began to read avidly in science (the result of a journey to East Africa, but that's another story), it was not long before I discovered that at least as entrancing as the science itself were the lives of the people doing the science. I am a teacher of gifted children, and I became curious about the threads of science that so often appeared to spin out from the earliest experiences of scientists. I was interested to notice that passion for science, like that for music and mathematics, seemed to flow out of the childhoods of those who follow these callings in adulthood.



Herbert W. Levi

While investigating patterns of lives in science, I had the pleasure of speaking with Herbert W. Levi, Alexander Agassiz Professor of Zoology and Curator in Arachnology at the MCZ, whose specialty is spiders.

I met Professor Levi and his wife, Lorna Levi, one bright snowy Saturday morning at their home in the woods of Pepperell. We stopped on the front steps to admire the birds who sang songs among the trees. Inside, my sense of welcome in the coziness of a low-ceilinged living-room was deepened by the sweet scent of herbal tea and fresh-baked pastry.

Hilary Hopkins, a Friend of the MCZ since 1981, is a science enthusiast and educational consultant specializing in gifted children. This article is the first of two she has prepared for the MCZ Newsletter.

As we ate, Professor Levi spoke about the deepest joy of his childhood in Germany. "My grandparents bought a house in the country, and I spent all my happy days in childhood at the country house, all the summers, the weekends . . . I wasn't happy living in the city, and going to that house of my grandparents and just wandering around in the woods sort of channeled me in the direction of natural history."

Looking around at the plant-filled room and into the woods close beyond, I felt somehow that here was that same country house.

Professor Levi related one long-ago country house memory with an amused smile. "I remember one thing that bothers me still. At our country house there was a distant relative visiting about my age, who asked me, 'You don't know the bird songs?' How embarrassed I was at the time. But now I can recognize them!" He added, "But I have some trouble at present with the European finches.

"It was always one of my delights as a child," Professor Levi went on, "walking and hiking, going to one place and another, seeing different trees, discovering a lizard in one place—great discoveries!" He added, "I remember when I went to secondary school—I was 10 years old—I asked my mother what biology was. She said, 'Oh, that would be something you would really like.' And I did." And he does.

Professor Levi's pleasure in solitude and independence also emerged early in his life. He remembered, "I played with little ships in a brook in a meadow, completely isolated. I must have been 3 or 4 years old." Except for an older cousin, he had no childhood companions in natural history.

He recalled some troubles with his habits of independence in his early school life. "I remember as a kid the teachers thought I was lazy. I was always daydreaming."

I commented that the gifted students I teach are often described by their teachers as lazy daydreamers, when in fact they may be absorbed in their own ideas and interests. Professor Levi described how his

independent interests once coincided with the requirements of a special teacher. "I had a very good secondary school biology teacher who was inspiring. We were given walking-stick eggs, and we had to keep notes on them very strictly. Every year we had a similar project. I think I even still have the notebook I wrote about birds and the observations I had of them, when I was 11 years old."

His fondness for working alone with his questions continued in his college years, when "I always wanted to go my own way. When I was a graduate student, under pressure of teaching, all my imagination disappeared. After I was free from graduate school it reappeared. I ended up in the Extension Division of the University of Wisconsin at Wausau, with limited facilities, but I had a good microscope, I could work, and the director encouraged research." There he began his studies of the taxonomy of spiders. He commented, "There is always the problem, 'What is the beast?' before you can study it."

When I asked Professor Levi about his most useful abilities as a person doing science, he was quick to reply, "Being able to draw!" It turned out that this too was a thread of his life which began early and contributes importantly to his present work. He explained, "When I was about 12 years old, my parents, who were both amateur musicians, gave up on my music lessons in despair, and sent me to an artist to study painting. I was much happier with that. When I went to science, I found that I could use my ability to draw, and it's such a wonderful combination."

His study, flooded with natural light like a studio, was filled with elegant drawings and photographs of spiders. He showed me the Levi holiday card of 1985, a fine photograph of a handsome red and yellow

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The MCZ Newsletter is published two or three times a year by the Museum of Comparative Zoology, Harvard University, Oxford Street, Cambridge, Massachusetts 02138; James J. McCarthy, Director.

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Invertebrate Department Students Focus on Spiders

Wayne Maddison

Jumping spiders may well provide a lifetime of work for graduate student Wayne Maddison. His primary interests are in using the spiders' similarities and differences to differentiate species and reconstruct their phylogenetic relationships. In addition to using the more traditional clues in the form of the body and genitalia, Maddison has been using male courtship behavior as an indicator of relationships, illustrated in the photographs. The courtship behavior involves dancing and a sort of buzzing noise made by the male's vibrating the back part of his body.

Maddison's work presently focuses on a group of 40 species, but he is trying to gain some understanding of the relationships of a large group of 400 species. Considering that the family of jumping spiders has in total perhaps 5000 species and most have been studied only a few times from



Wayne Maddison with his collecting gear—a "beating sheet" and a stick.

pickled specimens, much work awaits him.

Maddison has done extensive collecting throughout the western U.S. and in Mexico in the last few years.



Metaphidippus flaviceps from Maine, female (l), and male (r)



Metaphidippus manni male (displaying to female) from California



Metaphidippus harfordi male (displaying to female) from California

The low position of the male's first legs in the courtship display of *Metaphidippus flaviceps* and *Metaphidippus manni* pictured above corroborates the morphological evidence that they are more closely related to each other than to *Metaphidippus harfordi*.

He uses a "beating sheet" which he places under a healthy tree or bush. Beating the plant usually causes dozens of spiders to drop on the sheet. Acquiring live spiders is important not only for the behavioral work but also for Maddison's work on the evolution of spider chromosomes.

Leticia Aviles

Of the over 40,000 species of spiders, only 16 are known to have a quasi-social level of behavior. These are found mostly in the tropics, and were a natural choice for Leticia Aviles, who is a native of Quito, Ecuador and received her undergraduate degree from Pontificia Universidad Catolica del Ecuador in Quito.



Photo by Wayne Maddison

Leticia Aviles

Aviles' initial interest was to study the evolution of social behavior and social spiders were not only convenient but also attractive because few people have thus far studied them. In the colony, spiders conduct the basic business of life communally. This includes brood care, food capture, and web construction and care. This communal activity allows them to capture prey larger than prey caught by solitary spiders and thus occupy a different ecological niche.

The observation of the intriguing fact that females in social spider colonies outnumber males by ten to one has led Aviles to focus her interest on the study of the relationship between the population structure, sex ratio, and the levels of selection. Aviles has proposed a model to explain why this bias exists in social spiders which is based on their population

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Leticia Aviles

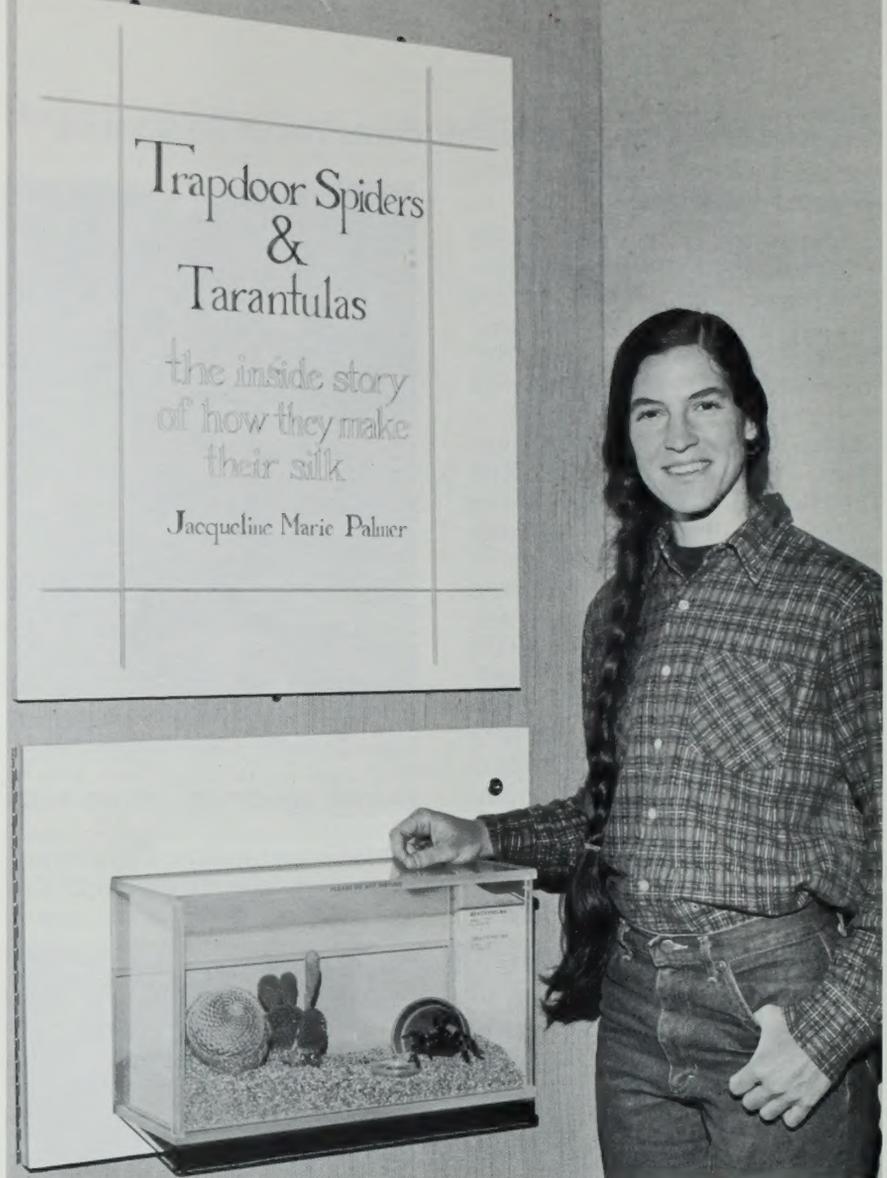
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structure and proposes that selection occurring at a level higher than the individual overrides the within-group selection that should otherwise produce a 1:1 sex ratio. The functional hypothesis is that the female bias, by increasing colony growth rate, increases the chances for colony survival and proliferation. Aviles has identified and marked a number of colonies in Ecuador which remain stable for a long period of time, providing an ideal situation for long-term studies. She has already conducted monthly observations of these colonies for a long enough period to compile detailed life histories. She is currently working with Professor William Bossert on a computer simulation to test the model.

Jacqueline Palmer

Jacqueline Palmer's comparative study of the silk and silk-production systems of mygalomorph spiders forms the basis of one of the most popular special exhibits, *Trapdoor Spiders and Tarantulas: the inside story of how they make their silk*. The success of the exhibit, which features live spiders (in ingenious plexiglas cases created by the MCZ's exhibit designer extraordinaire, Ed Haack) is a result of the hard work and dedication of Palmer and the Exhibits Departments to making an intrinsically fascinating subject intelligible to visitors of all ages.

Palmer's work with spiders is actually an extension of her interest in textiles and specifically natural fibers. The particular properties of each of the many different types of silk so beautifully perfected by the spiders, directly reflects the composition and technique of formation of the fibers. These properties correspond clearly to the uses of silk and the spiders' lifestyle and ecology. Palmer is investigating all aspects of silk and its production including the functional morphology of the spinning apparatus as well as the cell biology and biochemistry of protein secretion. She anticipates that the questions generated by her pre-



Jacqueline Palmer

liminary comparative descriptions will provide her with ample material

to occupy the remainder of her professional career.

Herbert W. Levi

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spider. A mystery spider, it turned out: inside the card he'd written "Genus?" before sending it off to his friends. In due course, back came an identification from one of them.

Near the end of our conversation, I asked Professor Levi how much play is a part of his work. "Oh, my work is almost—recreation," he responded. "Since I've been ill (he was recovering at home from a serious infection), I have nurses coming in to measure my blood pressure, and it's clearly lower after I do some scientific work."

Nature, independence, art: these threads play through one life in science.

Staff Notes

Graduate student **Kimberlyn Nelson** has been awarded a National Science Foundation grant to support her doctoral research on mitochondrial DNA variation in mammalian hybrid zones. **Laurie Sanderson** is the recipient of an American Fellowship for predoctoral research from the American Association of University Women Educational Foundation for the coming academic year. The \$10,000 stipend is to cover her academic and living expenses during her final year of doctoral work on the functional morphology and ecology of prey capture and generalization of specialized and generalized fishes. (See *MCZ Newsletter*, Fall, 1985.)

Fossil Finds Make Headlines

Graduate student Neil Shubin has received a great deal of publicity for the vertebrate fossils he and the MCZ's Vertebrate Paleontology field crew discovered in the Nova Scotia coastal rock formations during the last two field seasons. How these exciting finds came about make an interesting, though not atypical, behind-the-scenes story at a natural history museum.

It started three summers ago when Shubin was participating in Professor Farish A. Jenkins' field expedition in the Kayenta Formation of Arizona and speculating how pleasant it would be to have a field season closer to home and in a more temperate climate. Although the east coast, which contains rocks of the same age as the richly-fossiliferous Kayenta Formation, is distinguished historically as the site of the first United States dinosaur find, in recent years restricted access to interesting sites has interfered with progress on the paleontological front.

Shubin decided to study an east coast map to see if there were any likely areas and discovered that there



Photo by Paula Chandoha

William A. Amaral (l.) and Neil Shubin hammering out fossils from the Nova Scotia rock, summer, 1985

was a lot of exposed rock right next to the waters of the Bay of Fundy. Coincidentally, Shubin found that

Columbia geologist Paul Olsen was already investigating the area and had found some small bones. So with the support of the MCZ's Barbour Fund, Shubin, together with Charles Schaff and William A. Amaral of the MCZ's Vertebrate Paleontology Department, set off on an initial three-week collecting trip. They found many rock exposures but no bones. They telephoned Olsen to find out where he had located bone and in the final two days Amaral decided on just the right point where bone should be. He pointed to the spot and proclaimed: "I'm going to dig right here." There, indeed, was a bone which they tentatively identified as a small rib. It turned out that they had found a bonebed and they proceeded to dig up and ship back to the MCZ's preparation lab as much of the bone-bearing rock as they could in the time remaining. It wasn't until Amaral prepared some of the material he had found that they realized that they had brought back a jaw of a rare trithelodont, an extinct reptile that is closest to mammals in the fossil record.

Last summer the original trio, plus former MCZ graduate student Dr. Hans Sues, a specialist on reptiles, returned to the area with funding from the National Geographic Society only to find that the area had been bulldozed. They continued their search in an area 200 yards away from the original site and there discovered large quantities—a veritable treasure trove—of fossil vertebrate material embedded in sandstone and shale. Now that the area has been confirmed as an extremely abundant locality, plans for the coming season, again with funding from the National Geographic Society, will be to work towards the ultimate objective of calibrating the area accurately through time.

Sues, who will join the Department of Paleobiology at the U.S. National Museum in the fall, plans literally to follow the fossils across the Atlantic ocean to the east coast of the African continent which split with the coast of North America approximately 165 million years ago.

Sally Richardson 1944-1986

Visiting Scholar Sally Richardson died unexpectedly on May 15 during a brief stay in Mississippi. She was planning to represent the MCZ at the Tenth Annual Larval Fish Conference at the University of Miami in Coral Gables. As reported in the Fall, 1985 *MCZ Newsletter*, Richardson was working on establishing a major archival center of fish larvae at the MCZ with the support of a grant from the Biological Resource Research Program of the National Science Foundation.

In his "Message of Condolence from Friends and Co-Workers of the Museum of Comparative Zoology," Professor Karel F. Liem, Curator of Ichthyology noted: "Sally Richardson came to the Museum of Comparative Zoology as a Visiting Scholar in March 1985. She quickly established herself as a quiet, self-effacing woman, who despite her

many accomplishments, never sought accolades. Instead she worked diligently to get things done in the fish department. In record time she single-handedly transformed the large collection of larval fishes into an internationally acclaimed major archival facility. In less than a year she examined nearly 90,000 unidentified larval specimens. She furnished us with the driving force to expand the use and research of the larval fish collection at Harvard . . . In the short time at Harvard, she has made many friends . . . She leaves a void that will become more widely sensed as time passes and the magnitude of her contributions can be seen more clearly. The project envisioned by her will be brought to completion. For this, we are deeply indebted to Sally."

Mammal Department Takes Steps to Protect Its Specimens of Endangered Species

The curatorial staff of the Mammal Department has recently completed a listing of all the endangered and protected species that are represented in its collections. Using this list, the systematic records of species have been annotated with color-coded signal dots. The status of individual specimens can be easily checked by using this system, and, it is hoped, damage can be minimized by controlling their use.

"We always knew that we had endangered species specimens and each of us was more familiar with one or a few groups than with others," said Curatorial Associate, Maria Rutzmoser, "so the protection we could offer was spotty. Now that we have a list, we can be more consistent in our policies throughout the collection and be sure of the status of each species.

We have had some really bad experiences in the past, loaning primate material and having it come back broken or damaged in some way. These are specimens which we simply cannot replace, and we felt that we really needed some way of identifying them in the collection. Now, when we receive requests for loans or other usage, we can easily tell if the specimen is of a species that is protected. If it is, we then ask if we can substitute a specimen from a common animal. The endangered species specimens are still available to researchers visiting our collection but are no longer sent through the mail."

The Mammal Department has in its collection over 400 species and subspecies of extinct, endangered, and rare mammals. These include skeletons and skins from mammals



Photo by Jane Reed

Mountain gorilla, one of the endangered species on exhibit in the MCZ's Mammal Hall.

such as the thylacine or marsupial wolf, the black-footed ferret, and the mountain gorilla. These specimens were trapped many years ago, before the vulnerability of these and other rare species was appreciated, and they now represent a planetary treasure of importance to scientific research.

Cambridge Schools Science Program

In the fourth year of the MCZ's science program with the Cambridge Schools, the number of schools served grew from the original four to seven schools. The Harrington, Morse, and Fletcher schools joined the Agassiz, Peabody, Harrington, and Graham and Parks schools and a total of 623 students from the third and fourth grades took part in the year-long program. Funding to support the program came from several new sources this year including several Cambridge corporations—Arthur D. Little, Polaroid, Draper Labs, and Biogen—and several generous individuals. A contribution was received from the Harvard Cooperative Society and the Cambridge School Department underwrote a portion of the costs. In addition, the Harvard Office of Government, Community and Public Affairs again contributed to the program. As in past years, grants from the Massachusetts Council on the Arts and Humanities accounted for approximately half of the program funds.

This year, for the first time, Por-

tuguese bilingual classes, from the Harrington School, participated in the program. Museum teacher Maureen McDonald used a visual approach to reach these students, as well as students from the Morse and Fletcher schools who come from a wide spectrum of cultural backgrounds, and the resultant art work was one of the main attractions at the open houses held for the students and their parents at the museum.

Student interviews with MCZ curatorial and research staff members and graduate students have been arranged by teacher Wendy van Dyke for her classes at the Agassiz, Peabody, Longfellow, and Graham and Parks schools. Fourth-grade students will be exposed to a wide range of science disciplines and be introduced to a variety of role models. Participants in this program include: Scott Shaw and Charles Vogt (Entomology), Jose Rosado (Herpetology), Laurie Sanderson (Ichthyology), Ardis Johnston, and Laura Leibensperger (Invertebrates), Maria Rutzmoser and Jane Winchell (Mammals), David Backus (Mollusks), Leonard Diggins, Anna Haynes, and Ken Weber (Population Genetics), and Charles Schaff (Vertebrate Paleontology).

Museum Guide Program Passes 10-Year Mark

Started in 1976 as an intern project by Kate Walton O'Connell, then a student in the Museum Studies at George Washington University, the Museum Guide program continues to provide museum programs and guided tours to both adults and school groups of all ages. Of the 25 current guides, who all volunteer their time and talent after a seven-week initial training period, one—John Slavinsky—is from the original January, 1976 group and three—Linette Elliot, Anita Lewtas, and Louise Randall—joined the program in the October, 1976 training session.

The Guide Program, which is part of the Museum Education Department under the direction of Arlene Nichols, has been steadily growing and is currently operating at capacity level. In 1984-85, 368 groups participated in the program and the number for this academic year will exceed 400 by the end of June. Staff Assistant Elisa Karnofsky manages the complex task of matching groups to guides and is adept at improvising when unavoidable circumstances delay either the group or the guide.

Check-list of Birds

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1974, G. William Cottrell, who was previously Editor in the Harvard University Library, was lured back to the editing task after his retirement; his meticulous attention to detail contributed greatly to the thoroughness of the work. The fifth editor, Melvin A. Traylor, Jr., Curator of Birds at the Field Museum, joined the project in 1978. Thirty-three ornithologists from around the world have made contributions to the work

in what Mayr terms "a triumph of international cooperation."

Birds are the group of organisms thus far best-known to science and consequently the *Check-list of the Birds of the World* represents the most detailed and comprehensive survey currently achievable. Each entry includes the original citation, (i.e., the name first published), a list of all the synonyms, its current name, as well as the geographic range. According to Mayr: "To the best of my knowledge we haven't overlooked a single previously-published

species. World-wide only about three new species are discovered each year. Our knowledge of birds is very mature and we do not expect that there will be many changes. There might be a few on the family level but not on the species level. We now have a tool which is invaluable as a basis to a great deal of research on speciation, ecology and biogeography."

Paynter adds: "It is also an important conservation tool because it provides a complete inventory of an animal group."

Ruth Turner Co-Chairs Conference in India

Professor Ruth D. Turner, Curator of Malacology, has just returned from her most recent extended trip to India (where she served as co-chairman of an international conference), Pakistan (where she presented a paper at the International Conference on Marine Science of the Arabian Sea), and Australia, where she visited colleagues and collaborators on some of her far-flung projects.

A prime mover in the organization of the second International Conference on Marine Biodeterioration in Goa, India, Turner presented an overview of "Future Directions in Marine Biodeterioration Research." The conference, which was attended by an approximately equal number of Indian and American scientists, was aimed at facilitating the exchange of "Advanced Techniques Applicable to the Indian Ocean."

Turner's remarkably active role in

her field was recognized in the recent dedication of the symposium volume titled *Marine Biodeterioration: An Interdisciplinary Study, Proceedings of the Symposium on Marine Biodeterioration* published by the Naval Institute Press. The dedication reads in part: "Far too often we wait until colleagues leave the active roles of scientific research before recognizing their contributions and leadership. This symposium volume is dedicated to Dr. Ruth D. Turner of Harvard University in recognition both of her many contributions to the Navy and the field of research on marine biodeterioration, and of her leadership and ability to stimulate many of her colleagues to embark on related research projects . . . As a worker, she has brought a sense of indefatigable dedication to the pursuit of scientific understanding. As a colleague, she has inspired, taught, aided, and cajoled a large number of

current workers in marine biodeterioration research. Always ready to help and give of her time and ideas, her impact on her colleagues continues unabated. Typically, Turner was too busy to notice the dedication and only realized that she was being so honored when a colleague congratulated her after she received the volume.

Her current research, a continuation of work originally reported in a 1983 joint paper with John B. Waterbury and C. Bradford Calloway in *Science*, is concerned with "a novel bacterium that has been isolated in pure culture from the gland of *Deshayes* in six species of tereidid bivalves. It is the first bacterium known to both digest cellulose and fix nitrogen, and it is a participant in a unique symbiotic relation with shipworms that may explain how tereidids are able to use wood as their principal food source."



Ruth D. Turner lecturing . . .



at the University of Karachi

Travel Program

1986 Round-Up

Zambia, Zimbabwe, and Botswana continue to be very popular with the Friends of the MCZ. The January trip was extremely successful despite, and to some minds because, of the rainy season which made for excellent birding conditions. Two more departures are scheduled for this summer. **The Nature and Culture of India** in February took participants to national parks and temples in both the north and the south of this ever-fascinating country. While the **Circumnavigation of Madagascar**, also in February, did not entirely live up to expectations, it proved to be an enjoyable and extremely educational experience for the combined group of Friends of the MCZ and Harvard Alumni. The **Provincetown Whale-Watching Weekend** was among the



Photos by Dotte Larsen

A couple of gentoo penguins exchange nest duties in Niko Cove, Antarctica peninsula. Note the chick under the penguin on the left.

best ever in the 11 years we have been sponsoring this program with a breaching humpback calf on the Saturday excursion and unusual close encounters with two minke whales on Sunday.

Current Status of 1987 Programs

Only a few spaces remain on the two-week January **Antarctica** expedition led by Director James J. McCarthy. Reservations are coming in for the visit to the lagoons and islands off **Baja California**, led by Leslie Cowperthwaite and Bruce Wellman, in March. Brochures will



Photo by Sheffield Hale

Escort Tony Kang boards the Friends of the MCZ bus on this year's India trip.



A few adult adielie penguins remain with a creche of chicks on Torgersen Island off the Antarctica peninsula. The Society Explorer is in the background.

be mailed in early September for a new itinerary to **Kenya**, led by Mark W. Skinner and Gabrielle Dundon, which features visits to the best remaining game parks and culminates in a three-day stay at Masai Mara. An optional extension to visit the home of the mountain gorillas in **Rwanda** is also planned. A comprehensive tour of **Borneo** is scheduled for August to be jointly sponsored by the MCZ and the Arnold Arboretum. Dr. John C. Constable, a member of the Faculty of the MCZ, and Arboretum Director Peter Ashton have

planned a unique itinerary and will co-lead this trip which features an optional visit to Professor Mark Leighton's study site and ends with three days in Bali. An August tour of **Malawi, Luangwa National Park and Lake Tanganyika, Zambia**, led by Professor Melanie L. J. Stiassny and Gabrielle Dundon, will introduce Friends to parts of Africa seldom visited by American tourists. Participants will have an opportunity to see the incredibly diverse cichlid fish populations of two lakes and a variety of terrestrial habitats.



MCZ newsletter
 Harvard University, Museum of Comparative Zoology
 MUS 4890.1a
 Harvard University, Museum of Comparative Zoology, Ernst Mayr
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 Jan 14, 2014

