

# Louisiana State University, Museum of Natural Science

*J. V. Remsen, Jr. and Robert M. Zink*

SINCE ITS FOUNDING IN 1936, THE Louisiana State University Museum of Natural Science (hereafter, LSUMNS) has played a prominent role in ornithology. Its founder, George H. Lowery, Jr., was elected President of the American Ornithologists' Union in 1959, and two of his former students have served as President in recent years. Nine former LSUMNS graduate students are now Fellows of the American Ornithologists' Union and ten are Elective Members. Lowery's studies of bird migration in Louisiana received much acclaim, and were partially responsible for his appointment as Boyd Professor, LSU's highest professorial rank. Lowery's two books, *Louisiana Birds* (1974) and *Mammals of Louisiana and Adjacent Waters* (1976) received several awards.

Much has changed at the LSUMNS since the 1971 review by Robert J. Newman in "The Centers of Learning" series (*Am. Birds* 25: 691-692, 805). The staff has more than doubled in size and its roster has changed substantially. Lowery died in 1978 and was succeeded later that year by John P. O'Neill as Director and J. V. Remsen as Curator of Birds. Three additional faculty positions have been added in the last eight years. In 1979 a full-time appointment in Mammalogy was added (Mark S. Hafner); in 1984, a position in Biochemical Systematics was created (Robert M. Zink); and in 1987, a position in Amphibian Biology was added (David C. Cannatella). A permanent Collections Manager for birds and mammals was added in 1983 (Steven W. Cardiff). These appointments complemented the already existing positions in Herpetology (Douglas A. Rossman) and Ichthy-

ology (J. Michael Fitzsimons). The intellectual atmosphere in ornithology now benefits greatly from the presence of an active group of resident research associates: John P. O'Neill (former Director and Curator of Higher Vertebrates at the LSUMNS), H. Douglas Pratt, Theodore A. Parker III, and Donna L. Dittmann.

### Current emphases and strengths

The strength of the LSUMNS program in ornithology lies in three distinct but interrelated areas of graduate training: a continuing program of fieldwork in the tropics; a museum collection that is extraordinarily rich in potential research projects, thus providing extensive training in specimen-based research; and a program in biochemical systematics that combines modern methods of protein and DNA analysis with an unmatched collection of bird tissue samples.

**Fieldwork in the tropics.** The LSUMNS field program in the tropics began in the late 1940s with Lowery's and Newman's trips to Mexico. Through the years, staff and students have undertaken research in many Latin American countries, as well as the Philippines and the tropical Pacific. In recent years, our main program has concentrated on Peru and Bolivia, which, ornithologically, are two of the richest and least known countries in the world. An exciting by-product of this fieldwork has been the discovery of numerous species new to science; John O'Neill and others at the LSUMNS have described 14 new species of birds from Peru, with descriptions of two others in progress;

among the 14 are four of the five new genera of birds discovered in the last 25 years. Numerous other species previously known from only a handful of old specimens have been rediscovered by LSUMNS personnel in remote areas of South America. Fieldwork in Peru and Bolivia has included projects in deserts, savannas, montane scrub, deciduous forests, and high elevation "puna" grassland, but most of the effort has been focused on humid forests, from the cold, mist-covered slopes of the high Andes to the lowlands of Amazonia.

The LSUMNS field program in the tropics is unique, in that field stations or habitations are not relied upon as bases of operations. Most fieldwork is carried out from temporary campsites, some used for as long as three months and some so remote that direct contact with the outside world is impossible. Thus, graduate students gain intensive field experience in areas inaccessible to researchers restricted to field stations. This flexibility in location of sites allows us to undertake studies that require geographic comparisons among bird populations or communities. For example, recent doctoral student Angelo Capparella studied the effects of river barriers on differentiation of Amazonian undergrowth birds by sampling populations on opposite banks of rivers of differing widths, with control sites on the same banks. Such rigorous field studies capitalize on our use of trained Peruvian field-assistants, graduate students at early stages in their training, and LSUMNS research associates to provide the manpower required for such endeavors. Recent fieldwork in Peru and Bolivia has involved collaboration with scientists of these host countries.

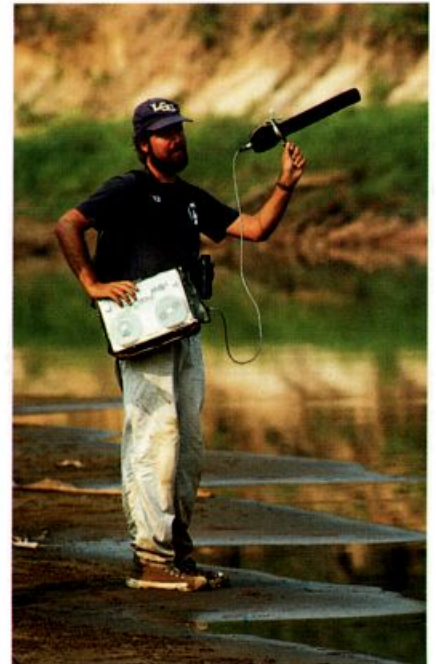


*An undescribed species of parakeet of uncertain generic affinities discovered on an LSUMNS expedition to Amazonian Peru in 1987. Photo/Peter P. Marra*

Although most studies have depended on the mobile “expeditions” noted above, several projects that have required extensive behavioral observations have used field stations in the Amazonian lowlands of Peru, namely Explorer’s Inn in the southeast and Explornapo Lodge in the northeast. The Museum has sponsored graduate student research in Peru or Bolivia every year since 1964. Graduate students who participate in LSUMNS trips may re-

ceive six hours of graduate credit, as official academic recognition for the training received.

Louisiana State University is a member of the Organization for Tropical Studies, which means that a student’s chances are much improved for acceptance into the semiannual, 3-month Organization for Tropical Studies courses in Costa Rica. These provide an intensive introduction to tropical ecology. At least five graduate students from



*LSUMNS staff research associate Ted Parker recording bird vocalizations along the Rio Heath, Peru—Bolivia border. Photo/Peter P. Marra*

LSU have participated in Organization for Tropical Studies courses in the last four years.

**Specimen-based research.** Our policy is that all ornithology graduate students must use specimens in their research to some extent. In addition, every graduate student has the opportunity to work as a Curatorial Assistant, either in the bird collection or the frozen tissue collection. These assistantships, equivalent to teaching assistantships in pay, provide critical job experience in two of the most active, rapidly growing research collections in the world (see Collections section below), and, therefore invaluable training for those interested in professional museum positions. The extensive training received in methods of specimen preparation, both at the Museum and in the field, also provides valuable experience.

Graduate students have the opportunity to receive firsthand training in the analytical tools essential to modern specimen-based research. Zink's course in systematic biology presents theoretical treatments of geographic variation, speciation, biogeography, and phylogenetic inference, as well as the latest in computer-assisted, quantitative methods of data analysis.

**Biochemical systematics.** Modern systematic studies are becoming increasingly "molecular." At the Museum, students can learn techniques of protein electrophoresis, restriction endonuclease analysis of DNA (especially mitochondrial DNA), and DNA-sequencing. Such studies are directed at population genetics, species limits, and determining phylogenies, as well as learning about the nature of genomic evolution in birds. Biochemical characters are analyzed with various computer-assisted algorithms. We encourage studies that combine molecular and morphological analyses.

#### Faculty advisors

Graduate students in ornithology may work with either Remsen or Zink. Remsen's research interests concern the ecology, zoogeography, and geographic variation of tropical birds. Recent publications that reflect these interests are:

- Remsen, J. V., Jr. and T. A. Parker, III. 1983. Contribution of river-created habitats to Amazonian bird species richness. *Biotropica* 15:223-231.
- Remsen, J. V., Jr. 1984. High incidence of "leap-frog" pattern of geographic variation in Andean birds: implications for the speciation process. *Science* 224: 171-173.
- Remsen, J. V., Jr., and T. A. Parker III. 1984. Arboreal dead-leaf-searching birds of the Neotropics. *Condor* 86:36-41.
- Remsen, J. V., Jr. 1984. Geographic variation, zoogeography, and possible rapid evolution in some *Cranioleuca* spinetails. *Wilson Bull.* 96:515-523.
- Remsen, J. V., Jr. 1985. Community organization and ecology of birds of high elevation humid forest of the Bolivian Andes. Pp. 733-756 in *Neotropical Ornithology* (P. A. Buckley et al., Eds.), *Ornith. Monogr.* No. 36.

Zink's research interests focus on the evolutionary biology and molecular systematics of birds. Some recent publications are:

- Zink, R. M. 1986. Patterns and evolutionary significance of geographic variation in the Schistacea group of the Fox Sparrow (*Passerella iliaca*). *Ornith. Monogr.* No. 40.
- Zink, R. M., and J. V. Remsen, Jr. 1986. Evolutionary processes and patterns of geographic variation in birds. *Current Ornith.* 4:1-69.
- Zink, R. M., and D. J. Watt. 1987. Allozymic correlates of dominance rank in sparrows. *Auk* 104:1-10.
- Zink, R. M., D. F. Lott, & D. W. Anderson. 1987. Genetic variation, population structure, and evolution of California Quail. *Condor* 89:395-405.
- Zink, R. M. 1988. Evolution of Brown Towhees: morphology, allozymes, and species limits. *Condor*. 90:72-82.

Other faculty members at LSU who sponsor bird-oriented research are:

Dominique Homberger, Department of Zoology and Physiology, who studies functional anatomy of birds (e.g. see Homberger, D. G. 1986. The lingual apparatus of the African Grey Parrot, *Psittacus erithacus* Linné (Aves: Psittacidae): description and theoretical mechanical analysis. *Ornith. Monogr.* No. 39).

Albert J. Meier, Department of Zoology and Physiology, who studies circadian rhythms (cf. Meier, A. H., and A. C. Russo. 1985. Circadian organization of the avian annual cycle. *Current Ornithol.* 2:303-343).

Robert H. Chabreck, School of Forestry, Wildlife, and Fisheries, who studies waterfowl ecology (cf. Chabreck, R. H. et al. 1985. Vegetational characteristics and duck food availability and use in a Louisiana marsh. *Proc. 4th Coastal Marsh and Estuary Manag. Symp.*, pp. 17-25).

Robert J. Hamilton, School of Forestry, Wildlife, and Fisheries, who studies feeding behavior and population ecology of birds (cf. Hamilton, R. B. 1975. Comparative behavior of the American Avocet and the Black-necked Stilt (Recurvirostridae). *Ornith. Monogr.* No. 17).

Robert E. Noble, School of Forestry, Wildlife, and Fisheries (cf. Noble, R. E., F. J. Vilella, and P. J. Zwank. 1986. Status of the endangered Puerto Rican Nightjar in 1985. *Caribbean J. Sci.* 22: 137-143).

Other faculty at Louisiana State University outside the Museum whose research emphasis is in ecology and evolutionary biology are:

Kenneth M. Brown, Department of Zoology and Physiology, population and community ecology (cf. Brown, K. M. 1985. The relative importance of proximal and evolutionary explanations for life-history variation in *Lymnaea elodes*. *Evolution* 39:387-395).

John W. Fleeger, Department of Zoology and Physiology, marine ecology (cf. Fleeger, J. W., and J. M. Gee. 1986. Does interference competition determine the vertical distribution of meiobenthic copepods? *J. Exp. Mar. Biol. Ecol.* 95:173-181).

David W. Foltz, Department of Zoology and Physiology, population genetics (cf. Foltz, D. W., and J. L. Hoogland. 1983. Genetic evidence of outbreeding in the Black-tailed Prairie Dog *Cynomys ludovicianus*. *Evolution* 37: 273-281).

Kam-Biu Liu, Department of Geography and Anthropology, paleoclimatology (cf. Liu, K.-B. and P. A. Colinvaux. 1985. Forest changes in the Amazon Basin in the last glacial maximum. *Nature* 318:556-557).

Dorothy P. Pashley, Department of Entomology, evolutionary biology (cf. Pashley, D. P., K. S. Rai, and D. N. Pashley. 1986. Patterns of allozyme relationships compared with morphology, hybridization, and geologic history in allopatric island-dwelling mosquitoes. *Evolution* 39:985-997).

W. J. Platt, Department of Botany, plant ecology (cf. Platt, W. J., and J. M. Weiss. 1985. An experimental study of competition among fugitive prairie plants. *Ecology* 66:708-720).

G. Bruce Williamson, Department of Botany, tropical plant ecology (and Vice President for Education of Organization for Tropical Studies), (cf. Williamson, G. B. et al. 1986. Effects of repeated fires on tropical páramo vegetation. *Tropical Ecol.* 27:62-69).

Elizabeth A. Zimmer, Dept. of Biochemistry, molecular evolution (cf. Zimmer, E. A. et al. 1980. Rapid duplication and loss of the genes coding

for the alpha chains of hemoglobin. *Proc Natl. Acad. Sci.* 77:2158–2162).

## Facilities

### 1. Collections

The LSUMNS bird collection is one of the most important research collections in the world for those interested in neotropical ornithology. Having doubled in size since the 1971 write-up, its 142,000 specimens make up the fourth largest university-based collection in North America, and it is the fastest-growing collection in the world, adding about 5800 specimens per year. It has the largest collections in the world from Peru, Bolivia, and the West Indies, as well as Louisiana, and among the top five in the world from Mexico, Belize, Guatemala, Honduras, Costa Rica, Ecuador, and Argentina, as well as Mississippi and Tennessee. Since the majority of its specimens have been collected in the last few decades, the average data content per specimen label is rivaled only by one or two other collections. The skeleton collection, with over 2800 species represented, is the third richest in the world. The collection of fluid-preserved specimens, with over 1700 species, is the fifth richest in the world. The collection of egg sets is the 18th largest in the world. The stomach contents collection, with several thousand samples representing over 1000 species, is a unique resource for those interested in diet studies of tropical and Louisiana birds. The bird collections are used actively by LSUMNS graduate students and staff, as well as by numerous outside researchers. Remsen is the Curator of Birds.

The LSUMNS collection of frozen tissues of birds is an unparalleled research tool. With nearly 2000 of the species of birds of the world represented among its 15,000 specimens, it is by far the largest of its kind in the world. Zink is the Curator in Biochemical Systematics.

### 2. Laboratories

The Museum has a protein electrophoresis laboratory used for biochemical studies of avian relationships. Museum personnel also use modern molecular biology techniques, including DNA sequencing, to study avian evo-

lution. The LSUMNS also has a karyology laboratory.

### 3. Computer Facilities

Several microcomputers are available for student use. The computer room also has a terminal that provides direct access to a modern, IBM mainframe computer, which affords a wide variety of statistical and analytical packages.

### 4. Libraries

The Museum maintains modest holdings of technical literature, primarily reference works and a reprint collection of 28,000 papers. Within a few yards of the Museum, however, is the main library of the university, which is particularly strong in ornithology, evolutionary biology, and ecology, and maintains subscriptions to almost every periodical that carries citable scientific research on birds. The McIlhenny Natural History Collection contains one of the foremost collections of rare natural history works in the nation, including a bound set of Audubon "Elephant Folio" engravings and an outstanding selection of Gould plates.

### 5. Exhibits

The Museum maintains a public-exhibit area that features several dioramas, a synoptic series of mounted Louisiana birds, mammals, reptiles, and amphibians, and concept-oriented exhibits on subjects such as geographic variation, speciation, eggs, and the origin of birds.

### Finances

The LSUMNS staff has obtained \$493,000 in competitive grant funds in the last two years, mainly from the National Science Foundation and the National Geographic Society. Graduate students in ornithology, in addition to benefiting from grants to staff members and from private donations, have contributed to financing their own research by obtaining ten competitive research grants totalling \$7500 in the last two years.

Although we cannot guarantee assistantships, in practice every eligible graduate student in the last ten years has received a full assistantship. These

presently pay \$8065 (after tuition) for 12 months (Ph.D. students) or \$6000 (after tuition) for nine months (M.S. students); duties involve either teaching laboratory sections for courses offered by the Department of Zoology and Physiology (the departmental affiliation of all Museum faculty) or curating in the bird or frozen tissue collection.

Applicants for the Ph.D. program with outstanding records are encouraged to apply for an LSU Alumni Federation Fellowship, which currently pays \$15,000 per year for four years and allows the student to do research full-time without teaching or curatorial obligations. Two ornithology students, Ken Rosenberg and Peter Scott, have held such fellowships. The Museum also awards an annual \$1000 fellowship (the Charles M. Fugler Fellowship) to a student doing research in the tropics.

### Application procedures

Students interested in graduate studies at the LSUMNS are encouraged to correspond with the prospective major professor in advance of the application. Minimum admission standards are a combined (verbal + quantitative) GRE score of 1100 and a GPA of about 3.0, although in some cases low scores in one area can be outweighed by high scores in another. Application forms may be obtained from the Graduate Secretary, Dept. of Zoology & Physiology, LSU, Baton Rouge, Louisiana 70803. The academic department with which all Museum graduate students are affiliated is the Department of Zoology and Physiology. No formal deadlines are maintained, but assistantships for the academic year are usually allocated in February of the preceding year. Prospective students are encouraged to correspond with a potential advisor far in advance. Students from Latin American countries are especially encouraged to apply.

### ACKNOWLEDGMENTS

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