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Obituary: Terry Lamon Yates, 1950-2007.

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OBITUARY

TERRY LAMON YATES: 1950–2007

*Life is short, the art long, opportunity fleeting,
experience treacherous, judgment difficult.*
— Hippocrates (Greek, ca. 460–370 BC)

On 11 December 2007, the science of mammalogy lost one of its most valued and influential leaders. Terry Lamon Yates succumbed to complications of treatments for an aggressive form of brain cancer after a brief but courageous fight. He was born on 17 March 1950, in Mayfield, Kentucky, the oldest son of Ellen Wanda Byrd and William Hanley Yates. Terry's only sibling was a brother, Johnny. He is survived by his wife Nancy Fennell, his 2 sons Brian Christopher and Michael Ryan, and daughter-in-law Laura Manchéno Macia.

Over the last 30 years, Terry, usually accompanied by Nancy, his bride of 36 years, attended all but 1 of the annual meetings of the American Society of Mammalogists (ASM). It was not uncommon to hear comments about how well Nancy and Terry enjoyed each other's company. Their relationship was special. Terry and Nancy 1st met when she was a junior in high school, and he was a freshman at Murray State University in Murray, Kentucky. Terry convinced Nancy, who lived in Houston, to attend Murray State, and they later married on 7 August 1971, when Terry was a senior and Nancy was a sophomore. Terry raised the money to buy Nancy's engagement ring by returning soft drink bottles collected from dorm trash cans, roadsides, and other places, and by running a trapline before class. Their oldest son, Brian, was born in Lubbock, Texas, on the night Terry passed his oral comprehensive exams for his Ph.D. Michael was born in New Mexico after Terry was a faculty member at the University of New Mexico.

Terry's education as a biologist began with his bachelor's degree from Murray State University in 1972. Terry then completed his master's degree in biology from Texas A&M University in 1975, studying North American moles under the guidance of David J. Schmidly. He later received his doctorate in biology from Texas Tech University in 1978, studying systematics of moles of the family Talpidae under the direction of Robert J. Baker. Dr. Yates spent his entire professional career, 1978 until his death, in the employment of the University of New Mexico. Terry was hired at the University of New Mexico when James Findley was departmental chair. The formal job description for Terry's new position was to teach anatomy and physiology for nursing and pharmacy students. Hiring Terry to teach this course embraced Findley's philosophy that if you want a job done right, hire a mammalogist.



Terry Yates was the Vice President for Research and Economic Development at the University of New Mexico at the time of his death. Among other accomplishments, his efforts led to the \$10 million renovation of facilities for the Museum of Southwestern Biology. Terry also was no stranger to Washington, D.C. He led a number of efforts on behalf of mammalogists, including 2 stints as Program Director at the National Science Foundation and as President of the National Collections Alliance.

Terry directed the programs for 9 M.S. students, 19 Ph.D. students, and 7 postdoctoral associates. His Ph.D. students included David W. Reduker (1984, coadvised with Don Duszynski), Sarah B. George (1984), Dwight W. Moore (1986), Laura Janecek (1987), Robert M. Sullivan (1987), Scott L. Gardner (1988, coadvised with Don Duszynski), Joseph

A. Cook (1990), Brett R. Riddle (1990), Gregory D. Hartman (1992), Jennifer K. Frey (1994), R. Eduardo Palma (1994), Jorge Salazar-Bravo (2000), M. Scott Burt (2000), Travis Perry (2001), Andres Garcia (2003), Gerardo Suzán (2005), Gabor Racz (2006), Christa D. Weise (2007), and Larisa Harding (2008, coadvised with Felicia Smith). These graduates have held professional positions at such institutions as Colorado State University, Emporia State University, Furman University, New Mexico State University, Savannah River Ecology Laboratory, Texas A&M University–Kingsville, Texas Tech University, Truman State University, Universidad Católica de Chile, Universidad de Colima, University of Nebraska–Lincoln, University of Nevada–Las Vegas, University of New Mexico, and University of Utah. His postdoctoral associates were Jerry Dragoo, Jennifer Frey, David Hafner, Chris Hice, Shahroukh Mistry, Luis Ruedas, and Jorge Salazar-Bravo. The success of these mentees will insure that Terry's philosophy and ideas will impact future generations of mammalogists.

Terry taught mammalogy and 9 other courses in biology, plus a number of seminars and symposia on a variety of topics. The 1st course he taught at the University of New Mexico was anatomy and physiology for nursing and pharmacy students. Terry's mammalogy course was traditional in the sense that it 1st surveyed mammalian diversity on a global scale and then focused intensively on the ecology and evolution of local mammals through multiday expeditions to favorite southwestern sites. Each year, Terry loved to take a fresh set of students "to the field." For many, this was their only hands-on introduction to field biology and their 1st quality experience with a university professor. His enthusiasm for field mammalogy was infectious and several undergraduates altered their professional trajectory due to their association with Terry's course. In recognition of his contributions to the education of future scientists, Dr. Yates received the Robert L. Packard Outstanding Educator Award from the Southwestern Association of Naturalists in 1995.

Jennifer Frey, now an Associate Research Professor at New Mexico State University, recalls: "Terry loved going into the field to catch mammals, and trips with him are among my best memories. Like his approach to the rest of life, Terry always included both hard work and fun in field trips. Invariably, he was the first one to rise in the morning, and one of the last ones up at night. He led in the field by doing, not by telling. That was an important lesson, and one that I try to follow today with my own students." But probably even more important to her: "Terry demonstrated to me how it was possible to juggle numerous complex tasks at the same time. Moderation was not part of his vocabulary. Perhaps more than anything, he demonstrated that it is possible to both immerse oneself in the joy of work, while always making time for, and appreciating, family and friends. Terry was an important role model in showing me how to lead a full, complex, and meaningful life." Scott Burt, now an Associate Professor at Truman State University, believes: "Simply put, I would not be where I am today without Terry's help. He knew exactly what I wanted in my career and handed me the letter announcing the position I

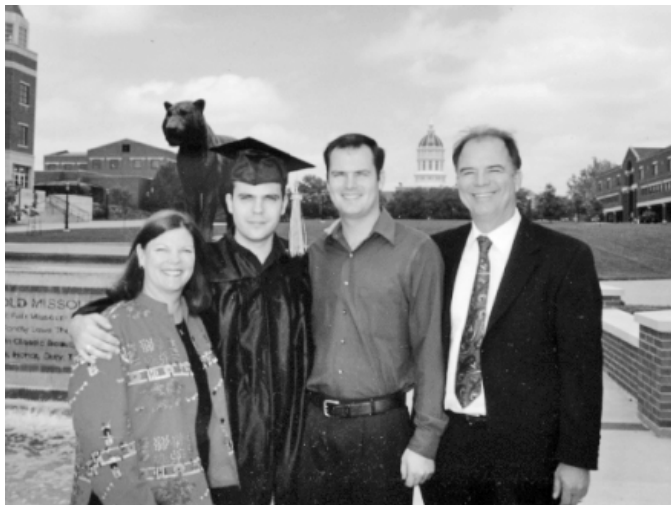


The Museum of Southwestern Biology and American Museum of Natural History collaborated on a large-scale integrated survey of mammals and associated parasites in Bolivia. Terry Yates, Sydney Anderson, Joseph Cook, and Scott Gardner led a series of expeditions throughout Bolivia between 1984 and 2003. In 1985, the crew explored Parque Nacional Amboró (from left, Bismarck Montalvan, Rolando Urjel, Cook, Otto Carlos Jordan, Brett Riddle, Gardner, Yates, Anderson, Isabel Mercado, and Alan Dickerman).

currently hold with a 'Scott, you need to apply for this position, it is perfect for you!' "

Terry published 130 papers (see bibliography below), which appeared in such diverse nationally and internationally recognized journals as *Proceedings of the National Academy of Sciences of the United States of America*, *Science*, *BioScience*, *Journal of Theoretical Biology*, *Journal of Mammalogy*, *Journal of Neotropical Mammalogy*, *Ecological Monographs*, *Bulletin of Mathematical Biology*, *Biochemical Systematics and Ecology*, *Virology*, *Journal of Virology*, *Journal of General Virology*, *American Journal of Tropical Medicine and Hygiene*, *Journal of the American Medical Association*, *Journal of Medical Entomology*, *Infection*, *Genetics and Evolution*, *Vector Borne and Zoonotic Diseases*, *Emerging Infectious Diseases*, and *Journal of Vector Ecology*. In an overview of Terry's published work, he was a creative, big-picture thinker. He saw the linkages in natural history, evolution, chromosomes, and phylogenetics, as well as environmental changes and human health. His ability to think "big and broad" allowed him to bridge fields of study and approach complex issues.

This characteristic of Terry's persona was regularly recognized by an array of organizations, which saw fit to bestow him with numerous awards, for example, the Nature Conservancy, which recognized Terry with the Leopold Conservation Award in 1991, and the American Institute of Biological Sciences, which recognized Terry as the 53rd recipient of the distinguished scientist award in 2008, posthumously. In this latter award, Terry is accompanied by a number of individuals who have played a significant role in



Terry Yates is survived by his wife Nancy and sons Michael and Brian. Photograph at Michael's graduation from the University of Missouri (photographer unknown.)

understanding mammalian evolution, ecology, and conservation, including W. Frank Blair, E. O. Wilson, Gene and Howard Odum, George Gaylord Simpson, A. Starker Leopold, Steven J. Gould, and Ernst Mayr. Terry's seminal research also was noted by an obituary in the *Washington Post* on 23 December 2007.

Terry's teams' work in the plains of Mongolia was selected by National Geographic for a special entitled "Plagues: The Invisible Riddle/Part Two—The Ebola Riddle," which is available as a video. As is the case of most National Geographic specials, this is a wonderful teaching resource; however, there must be some significance that when we googled the Web for available copies, the only source was an adult bookstore in Memphis. Terry would've loved it.

An excellent example of how Terry's leadership and vision impacted our thinking involves studies of reservoir species of rodents and their associated viruses. He established himself as a major contributor to our understanding of the relationships among small mammals, ecology, and emergent zoonotic diseases. An overview of the work by Terry and his team on hantavirus were best summarized in a paper published as a cover story in *BioScience* in November 2002 (92). This paper synthesizes systematic mammalogy, systematic virology, co-evolution, ecology, weather, ocean currents, and human health issues into predictive models to better understand the complex relationships between biology and risk of infection. In a paper published in *Proceedings of the National Academy of Sciences of the United States of America* (98) Terry and coauthors presented a model effective at predicting hantavirus infection rates in mice as well as potential risk. In July 2006, *Occasional Papers, Museum of Texas Tech University* published a paper (123) that employed a more sophisticated model based on satellite imagery interpretation to predict an elevated risk of hantavirus in a very well-defined area of New Mexico for 2006–2007. The predicted period of risk has passed and it is now possible to review the number of human pulmonary

syndrome cases that occurred in the predicted target areas. The following is taken from the annual report to the National Science Foundation (NSF) for the ecology of infectious diseases grant in 2007, as provided by Robert R. Parmenter, "... there were 9 documented human HPS cases within the prediction area during 2006. The 'normal' average number of cases should have been 4. So the prediction was accurate, with more than twice the average number of cases being reported within the target area."

Terry and colleagues chose the *Occasional Papers* as an outlet because the time of submission to publication can be short, and because the series is online, with full access, on the date of publication. This meant that the information could be available online before the actual period of risk was reached. Publication of predictions before the period of risk had 2 notable features. First, individuals who might visit these well-defined geographic sites could be advised of potential risk and thereby reduce human exposure. Second, to predict risk before it occurs validates the science if the risk proves to be as outlined. This paper was placed as the number 1 news story on the NSF Web site at the time of publication and received extensive news coverage.

In addition to the results of predicting human risk using the relationships of global weather and local rainstorms, there were other noteworthy databases on results generated by the hantavirus team from the studies on rodent systematics and viruses. These include a phylogeny of the rodents that serve as reservoir species, a phylogeny of the viruses that are present in the rodent species, a geographic range of the reservoir mammalian species, as well as a geographic range of the viruses (117). From this database comes another influential conclusion, that there is geographic information (analogous to postal zip codes that can be used to pinpoint geographic origin) in the DNA from the mammalian species or RNA sequence from the viruses. This work by Terry and his coinvestigator Robert Parmenter was recognized by the NSF (2000) in their "Nifty Fifties" as 1 of the 50 most significant discoveries with societal benefit that had resulted from 50 years of NSF funding of United States science. The *BioScience* article was recognized on 4 August 2008 by the Ecological Society of America as the recipient of the 2007 Annual "Sustainability Science Award," for making the greatest contribution to the emerging science of ecosystems and regional sustainability through the integration of ecological and social sciences. Terry's ability to organize teams of broadly trained scientists to address complex issues such as the hantavirus study was the strength of his personality. For example, the *BioScience* paper had 5 authors from the Departments of Biology and Pathology and the Museum of Southwestern Biology at the University of New Mexico in Albuquerque, New Mexico; 4 from the Center for Disease Control and Prevention in Atlanta, Georgia; 2 from the Arthropod-borne and Infectious Disease Laboratory, Foothills Campus, Colorado State University in Fort Collins, Colorado; 1 from the Department of Biology at Yavapai College in Prescott, Arizona; 1 from the Department of Wildlife and Fisheries Sciences at the University of Arizona in Tucson, Arizona; 1 from the Department of Biology and the Museum at

Texas Tech University in Lubbock, Texas; and 1 from the Department of Pathology at the University of Texas Medical Branch, in Galveston, Texas. A review of the author lines in Terry's other publications also documents the team philosophy he embraced.

There were a significant number of other research areas in which Terry played a major role. These included systematics and evolution of mammals, especially of moles and tuco tuco, involving studies of similar lifestyles and natural history components in shaping patterns of speciation, population genetics, and chromosomal evolution; describing the biodiversity of mammals and their parasites and diseases in such diverse geographic areas as Bolivia, Japan, and the western Mongolian Desert; and developing museum collections and associated genomic tissues in the context of an appropriate database so that new molecular methods can be used to address issues important to science and society.

Terry's 1st published paper was on the karyotype of the eastern mole, which not only represented the 1st published karyotype for any New World mole species, but utilized a new trap and trapping technique that he developed. This trap led to more than a decade of research by Terry and his students on the evolution of moles (1, 3, 4, 5, 8, 9, 10, 13, 14, 20, 21, 25, 35, 74, 75, 76, 77, 105, 111). Evidence of a continued interest was a symposium on talpid systematics held in 2005 at the International Mammal Congress in Japan. Using the relatively new techniques of the mid-1970s of chromosome banding, Terry studied *Peromyscus* systematics and published the 1st cladistic analysis of chromosome bands in *Peromyscus* and documented that without the inclusion of *Neotomodon*, *Peromyscus* was paraphyletic (7). E. O. Wiley at the University of Kansas (1981. *Phylogenetics: the theory and practice of phylogenetic systematics*. Wiley Interscience, New York) chose to reprint Terry's phylogeny on *Peromyscus* in his book on phylogenetic systematics as an example of the need for multiple outgroups.

Using the question "What problems does society have that answering systematic questions could solve?" he began to study endangered species (17, 22), as well as to work with the New Mexico Department of Game and Fish promoting the idea that properly designed fundamental systematic research could provide critical information needed to make decisions for game management. On his return to New Mexico in late 1992 from a term at the NSF, he published a series of papers focusing on the genetics of endangered species mostly in the southwestern United States (42, 53, 68) that had direct management implications (involving students Jennifer Frey, Brett Riddle, Robert Sullivan, and Joseph Cook).

One study in particular brought substantial recognition critical to the development of genetic resource collections. Conventional wisdom at the time was that to be useful for electrophoretic analysis, tissues must be obtained from specimens immediately after death and frozen quickly, preferably in liquid nitrogen or on dry ice. Terry and one of his early graduate students, Dwight Moore, designed an experiment to test this paradigm. Their paper, published in the *Journal of Wildlife Management* (18), revealed that tissues that were days



Terry Yates at his home in Placitas, New Mexico. Terry hosted a weekly informal seminar series at his home on Thursday nights (the Placitas Symposium) that ran for 50 consecutive semesters and featured a mix of presentations by renowned mammalogists to beginning graduate students.

old still had proteins that could be visualized by starch gel electrophoresis. This observation changed the way tissues were collected and undoubtedly saved mammalogists a considerable amount of data and a few individuals from sleepless nights.

Terry and Sydney Anderson of the American Museum of Natural History received an NSF grant in 1984 to study the mammals of Bolivia. The project was remarkably successful and their studies of Bolivian mammals extended well into the 21st century. Despite the challenging logistics and inherent danger it involved, the team was able to survey much of the country, tripling the number of localities sampled for mammals and doubling the number of mammal species known to occur there (Anderson, S. 1997. *Mammals of Bolivia: taxonomy and distribution*. *Bulletin of the American Museum of Natural History* 231:1–652). Foremost, the project was a melting pot of undergraduate and graduate students (both Bolivian and American), which fostered an academic environment of true collaboration that still persists; by one account, some 50 undergraduate Bolivians and 30 Americans participated in the project.

In addition, this project allowed the development of a new standard for survey and inventory work that would have a profound influence on what the NSF would require of other investigators. The Bolivian project set a standard for survey and inventory research that involved collecting as much ancillary material from each specimen as possible, including endo- and ectoparasites, chromosomes, tissues, and skins and complete skeletons as vouchers. This practice has been adopted by most other researchers doing this type of research and has proven incredibly valuable for the study of evolutionary processes as well as substantially increasing the value of voucher specimens. This trend continues as Terry's students along with researchers worldwide use specimens and tissues collected on this project. A series of papers have resulted involving the systematics of Bolivian mammals (33, 34, 39, 46, 54, 61, 65, 80, 87, 103), many accompanied by parallel papers on their parasites. According to former student Scott Gardner,

who lead the studies of Bolivian parasites: “Terry was not only one of my mentors, and perhaps the most important mentor in the field in my early adult life, but he also allowed me to attain ‘colleague status’ as we worked together in New Mexico, Bolivia, South Africa, and eventually Mongolia.” Because tissues were saved on these specimens, the 1st hantavirus known from South America was isolated from a Bolivian mammal (Hjelle, B., N. Torrez-Martinez, and F. T. Koster. 1996. Hantavirus pulmonary syndrome-related virus from Bolivia. *Lancet* 347:57). Notable among publications from this period were those contributing to our knowledge of fossorial mammals, which was Yates’ initial interest in the project. The genus *Ctenomys* was found to have enormous chromosomal variation with diploid numbers in Bolivia alone ranging from 10 to 70 (34, 39, 44, 46).

During the late 1980s, Terry made a decision that would prove instrumental in the success of his career but in a totally unexpected way. Having a need for a local research effort to support his students that were not interested in South American work, he joined a group of mostly ecologists led by Jim Gosz, Cliff Dahm, Cliff Crawford, Bruce Milne, and Manuel Molles to create a new Long-Term Ecological Research site in New Mexico. An NSF grant was funded and they began a long-term monitoring program on the 230,000-acre Sevilleta Wildlife Refuge in central New Mexico, which resulted in critical data to understand the hantavirus cycle.

In 1993 while on his 1st sabbatical, Terry received a phone call from United States Agency for International Development by way of the Centers for Disease Control and Prevention, stating that the government of Bolivia had requested his help in investigating a potential outbreak of a deadly disease caused by the rodent-borne Machupo virus. Ironically, it was an outbreak of this disease in the 1960s that had initially interested Sydney Anderson in Bolivian mammals. This was Friday and by Monday Terry and his Bolivian graduate student, Jorge Salazar-Bravo, were in Bolivia. There they were met by C. J. Peters, then director of Special Pathogens Branch of the Centers for Disease Control and Prevention. From La Paz they flew to Trinidad and then by single-engine plane to the flooded Amazon Basin in the northern department of Beni. For 2 weeks they searched for the virus and discussed the science of the disease. Two months later, Yates, now back in Bolivia, received a call from C. J. Peters, who basically said: you need to come home and help with a problem in your own backyard—the newly identified Sin Nombre strain of hantavirus. His return ultimately resulted in the prediction of human risk model, as discussed above.

Terry’s understanding of the effectiveness of broadly educated research teams now supplied the experience to bring together a diverse but highly focused research effort that would soon bring a predictive understanding to zoonotic disease. This team provided the foundation for an increased appreciation of basic research in the eyes of the public as well as government agencies regarding the relevance of systematics, mammalogy, and museum collections. Yates and his students, along with Peters and others within and outside of University of New Mexico, quickly discovered the new hantavirus causing the

problem and far more. By utilizing museum specimens at the Museum of Southwestern Biology and at the Museum of Texas Tech University (most collected and archived for other reasons), they were quickly able to show that this virus had been around for a long time. By using phylogenies from the mammalian hosts they were able to correctly predict that new strains of hantavirus would be present in other areas of the Western Hemisphere. Later, by using the now large set of ecological data from the Long-Term Ecological Research project, El Niño weather conditions were implicated in triggering the outbreak in 1993 (58, 59, 66, 67, 69, 71, 72, 73, 74, 84, 85, 86, 87, 89, 90, 91, 92, 95, 98, 99, 101, 106, 109, 110, 111, 112, 114, 117, 118, 119, 120, 121, 122). In addition to systematics, ecology, parasitology, and policy, he now added infectious disease to the program, and spent the next year learning how to effectively communicate with virologists and other related medical researchers, setting the stage for an almost continuous stream of funding for further research.

First as a faculty member and more recently as Vice President for Research and Economic Development at the University of New Mexico, Terry was singularly successful at raising the necessary funding to support scientific research across the university, including traditional systematic and museum-based mammalogy. By our calculations, Terry was the principal investigator or co-principal investigator on grants with a total approaching \$50 million from such agencies as the NSF, National Institutes of Health, National Institute of Allergy and Infectious Diseases, Public Health Service, Centers for Disease Control and Prevention, Indian Health Service, United States Department of Defense, Office of Naval Research, Defense Threat Reduction Agency, Los Alamos National Laboratory, United States Department of the Interior, United States Fish and Wildlife Service, New Mexico Game and Fish Department, New Mexico Department of Health, and New Mexico Department of Finances and Administration. However, beyond sheer numbers Terry created an outstanding record of building research infrastructure that addressed questions with both biological and societal significance. His ability to convince graduate students, colleagues, and funding agencies of the relevance of basic research was a unique aspect of his work.

Terry’s service to the ASM was exemplary. He gave 56 committee service-years on 8 committees, including Animal Care and Use (4 years), Development (8), Editorial (5), International Relations (17, with 4 as chair), ad hoc Officers Manual (2), Planning and Finance (8), Program (3), and Systematics Collections (9, with 4 as chair). He served as Editor for Reviews for the *Journal of Mammalogy* from 1993 to 1998 and was an elected member of the Board of Directors for 6 years. He served as an officer of the ASM as Recording Secretary from 1984 to 1992. Terry served as chair of the Local Committee for 2 annual meetings, hosting the ASM in Albuquerque in 1987 and 2007, the latter less than a month before his cancer was diagnosed. This is a contribution matched by few in the history of the ASM. According to Jerry Choate, a fellow Trustee, when Terry was appointed a Trustee in 1996, the gross value of the Reserve Fund of the ASM was \$1,363,749, whereas the end-of-year value of the Reserve Fund

a few months before Terry died was \$3,417,301. Jerry's observation on the inner working of the Trustees is: "As a trustee of ASM, Terry, one of the few entrepreneurs in science, was always looking for bargains and risky tech stocks with phenomenal upside potential. I regarded it as part of my job to rein him in, but I admit that many of Terry's stock picks proved to be big winners." Robert Baker recalls that this entrepreneurial spirit manifested itself early because even as a graduate student, Terry read the stock market page daily. "He wrote on the blackboard in one of our research labs the name of a stock, Control Data, and he marked buy at 9, sell at 15. I believe he did this on three different occasions during his tenure as a graduate student at Texas Tech." The more than doubling of the Reserve Fund of the ASM in a little over 10 years is a record of service that is certainly worthy of the tradition of H. H. T. Jackson. The Board of Directors upon learning of his terminal illness took the unique step of holding a special election for Terry as an Honorary Member, the highest recognition offered by the ASM. President Robert Timm awarded the Honorary Membership medallion to Terry at the Yates' home in Placitas, New Mexico, in July, less than a month after Terry's cancer was diagnosed. Terry's Honorary Membership was confirmed by the membership at the 2008 annual meeting in Brookings, South Dakota.

Terry's service to professional organizations extended well beyond the ASM, serving on the Board of Governors and Trustees of the Southwestern Association of Naturalists, Trustee of the Society of Systematic Biology, Research Needs Committee of the Ecological Society of America, Board of Directors of the *Peromyscus* Stock Center, Species Survival Commission for the Insectivora, Tree Shrew, and Elephant Shrew Specialist Group and the Rodent Specialist Group of the International Union for the Conservation of Nature and Natural Resources, and the International Commission on Systematic Collections of the Section of Theriology of the International Union for Biological Sciences. He served as President of the National Science Collections Alliance, which promotes natural science collections (see Table 1). According to Michael A. Mares, a fellow mammalogist and current president of the National Science Collections Alliance: "Terry Yates was a vital force in promoting collection issues at the National Science Foundation and across the nation through the Natural Science Collections Alliance. His unflagging dedication to museums and collections—whether testifying before Congress or working to increase collaboration across institutions—gave an enormous boost to museums of all sizes. Few people transcend their discipline and work effectively at different levels of science and service, but Terry was surely one of these rare individuals. We were lucky to have him with us and we will surely miss his guiding hand and absolute dedication."

Terry made major contributions as a science administrator. This is not an area of accomplishment that has received much recognition or appreciation in recent years, but this may be because so few people are truly skilled as science administrators. Terry's administrative skills were recognized by his home institution, as well as by the NSF and many national and regional boards. His greatest skill may have been as a facilitator

who was capable of bringing together disparate groups to accomplish major projects of mutual benefit. As a team-builder, Terry created partnerships and research projects among New Mexico's 3 major research universities—University of New Mexico, New Mexico Institute of Mining and Technology, and New Mexico State University—which led his counterpart at New Mexico Tech, Van Romero, to observe: "Terry was quick to realize that we were much stronger as partners as opposed to individual institutions."

At his home institution, he held the position of Vice President for Research and Economic Development from 2004 until his death. Preceding this service, Terry held the administrative positions of Vice Provost for Research (2001–2004), Chair of the Department of Biology (1995–1999), Director of the Museum of Southwestern Biology (1993–1995), and Associate Dean of Arts and Sciences (1988–1990). At the end of his career, he held the academic positions of Professor of the Department of Biology and Department of Pathology and Curator of Genomic Resources in the Museum of Southwestern Biology. The collection of mammals at the Museum of Southwestern Biology may well house the largest frozen tissue collection present at any institution in the world, with tissue samples from more than 120,000 mammals linked through an online database to voucher specimens deposited in the Museum of Southwestern Biology, American Museum of Natural History, and collections in Bolivia and other places in the world. This frozen tissue collection will continue to be a valuable research resource in understanding genetic species, reservoir species for zoonotic issues, pollution, systematics, and other studies that have yet to be formulated. Terry served on vital institutional committees, such as the Institutional Animal Care and Use Committee, Academic Freedom and Tenure Committee, Strategic Planning Committee, and the Steering Committee for Electronic Management Information Systems. In recognition of his service, the University of New Mexico presented him the Regents Meritorious Service Award in August 2007 for "... extraordinary and distinguished service to UNM as a presidential lecturer, scientific researcher, mentor to graduate students, published scholar, museum curator, and leader as Vice President for Research and Economic Development."

From August 1990 until July 1992, Terry temporarily left New Mexico to take up the position of Director of the Systematic Biology Program with the NSF. As part of his duties he established a new program in Biological Surveys and Inventories, with the 1st review panel held in early 1991. Terry also was instrumental in beginning an effort to unify the systematics community in an initiative that would eventually be called Systematics Agenda 2000 (authored in 1994). In 2000–2001, Terry once again returned to the NSF, this time at the request of Director, and infectious disease specialist, Rita Colwell, to become Director of the Division of Environmental Biology. His duties included development of a new initiative called NEON and serving as the NSF's representative to the White House subcommittee on weapons of mass destruction. Terry's efforts were critical in convincing Colwell and the NSF that it was time to assemble a universal view of life on earth and he was instrumental in securing \$50 million in new funds

TABLE 1.—Some of the national, regional, and state scientific boards on which Terry L. Yates served.

Board or organization	Position	Purpose of organization
National Science Collections Alliance	President	A nonprofit association that supports natural science collections, their human resources, the institutions that house them, and their research activities for the benefit of science and society
Board of Life Sciences, National Academies of Sciences	Board member	Serves as a focal point for a wide range of technical and policy topics in the area of life sciences, including bioterrorism, genomics, biodiversity conservation, and key topics in basic biomedical research, such as stem cells
American Institute of Biological Sciences	Board member	A nonprofit scientific association dedicated to advancing biological research and education for the welfare of society
Council on Research Policy and Graduate Education of the National Association of State Universities and Land-Grant Colleges	Executive board member and Chair-elect	Monitors government rules and regulations affecting campus scientific and technical research and those concerning graduate education
New Mexico and National LambdaRail Inc.	Board member	A major initiative of United States research universities and private sector technology companies to provide national-scale infrastructure for research and experimentation in networking technologies and applications
All Species Foundation	Board member	To promote and raise funds for surveys and inventories of plants and animals
Ibero-American Science and Technology Education Consortium (ISTEC)	Board member	A nonprofit organization composed of educational, research, industrial, and multilateral organizations throughout the Americas and the Iberian Peninsula, established to foster scientific, engineering, and technology education and joint international research and development efforts among its members
National Center for Genome Resources	Board member	A nonprofit life sciences research institute with a mission to improve human health and nutrition by genome sequencing and analysis, resulting in improved diagnosis, control, and cure of disease, and better nutrition
New Mexico Consortium Inc.	Board member	The consortium integrates the strengths of New Mexico's research universities and builds strategic connections with scientific institutions throughout the world in order to support and promote scientific research and education in the state
Science and Technology Corporation, UNM	Executive board member	Nonprofit corporation formed by and owned entirely by the University of New Mexico to protect and transfer its faculty inventions to the commercial marketplace
New Mexico Technology Research Collaborative	Board member	Collaborate for the acceleration of new technology business formations and expansions that benefit research programs of member institutions, entrepreneurs, industry, investors, and the state of New Mexico
La Semilla Institute	Board member	A nonprofit organization to provide collaborative leadership and foster development and implementation of creative and innovative environmental programs at La Semilla, Albuquerque, New Mexico
Manzano Conservation Foundation	President	Protection of the natural and cultural resources of the Rio del Oro in the vicinity of Belen, New Mexico
Biological Society of New Mexico	President	Promotion of the biological sciences in New Mexico

to start the Tree of Life program at the NSF. The NSF officially recognized him for his outstanding administrative performance.

After it became widely known that Terry had a terminal brain cancer, he received literally hundreds of cards and letters from friends and colleagues from around the world. Often, these cards expressed thanks to Terry for what he had done for these individuals. An example was a card from Mike Arnold, of the University of Georgia, who wrote, "I think of you every time I submit, or 'especially resubmit!!!" a NSF proposal. You went to bat for me when you were a program officer at NSF at a critical time in my career. In fact, my tenure decision was up for grabs until you argued on my behalf and helped me get funding . . . I want you to know that I appreciate your impact on where I am today." In a world of predicting risk, global impacts, and zoonotic diseases, we should not forget that Terry

always took the time to assist young scientists, and that he was a compassionate person.

His positions on national, regional, and state boards provide insight into the breadth and depth of Terry's impact on American science (see Table 1). Although in many of these positions and those at the NSF he was representing science and biology in general, Terry was an unapologetic mammalogist, systematic biologist, and collection promoter. He used these positions to strengthen the voice of mammalogy and natural history collections. Until the end of his life the ASM was HIS professional society. Terry's reflected success in these important administrative positions and his contributions to our science has certainly enhanced all our statures.

Terry and Nancy had a close relationship with a Jicarilla Apache medicine man, Felipe Ortega. Mr. Ortega played an

important role in family matters as well as was a frequent guest at the Yates' home in Placitas. At Terry's insistence, Nancy and Terry renewed their marriage vows on their 25th wedding anniversary in a ceremony conducted by Mr. Ortega and attended by Brian, Michael, and close friends and family.

No matter how long he lived in New Mexico, Terry's love for his native Kentucky was marked by family trips to Kentucky Lake to fish for catfish, bass, and crappie, and by the annual "Derby Day" celebration in Placitas with hundreds of his closest friends and neighbors. As Terry's illness was diagnosed, his son Michael and his future daughter-in-law Laura decided to hold their wedding ceremonies in Placitas, New Mexico, because Terry's radiation therapy would not permit him to attend the long-planned wedding in Spain. Within a week of making this decision and without sending a single invitation, 250 people arrived at the Yates home at the appointed time for a wedding conducted by Mr. Ortega. Terry's observation was that he wasn't the least surprised because this group was "Derby trained."

Terry's final services truly captured his essence. The University of New Mexico held a memorial service attended by 700, featuring praise for his scientific success, value system, mentoring skills, and his last elk hunt a week after 7,000 rads of radiation, all spiced with humor and respect. The spreading of his ashes the next day was announced as a private affair for family and special friends. More than 300 family and special friends came to Terry's home, bringing food and drink, told their favorite Terry stories, and participated in the spreading of ashes by Mr. Ortega. There is no denying that all members of this gathering believed they were part of Terry's family and were special friends.

POSTSCRIPT

Terry believed in science and the scientific method. During his treatment for cancer (glioblastoma multiforme), he made it clear that if he could not beat the cancer, he wanted to make sure that his life contributed to a cure for future people who might encounter this disease that affects 6,000–9,000 new people annually in the United States (Piccirilli, M., et al. 2006. Treatment of Glioblastoma multiforme in elderly patients. Clinico-therapeutic remarks in 22 patients older than 80 years. Tumori 92:98–103). Upon his death, tissue biopsies from his brain were collected and flown to laboratories conducting experimental tests (including a new herpes treatment that holds great promise) on the type of brain cancer that Terry had. Terry's final act captured much of his essence: to contribute to good science and scientific breakthroughs, and to develop new frontiers that would benefit those he had never met as well as be unselfish. An appropriate capstone for a most unique scientist and individual.

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