

## **Division of Comparative Medicine**

The Division of Comparative Medicine (DCM) provides animal husbandry and clinical care for all research animals on the MIT campus. Since its inception in 1974, DCM has evolved into a comprehensive laboratory animal program that provides a full range of veterinary and surgical support. Additionally, DCM has a National Institutes of Health (NIH) grant for training veterinarians for careers in biomedical research and is funded by NIH to introduce veterinary students to careers in biomedical research. The division also has an active research program funded by numerous R01 grants from NIH. DCM now has 165 personnel. DCM's administrative headquarters, along with its diagnostic and research laboratories, are located on the eighth floor of Buildings 16 and 56. Recent renovations in the summer of 2008, partially underwritten by a gift from the Mallory Foundation, converted lab space to offices in Building 16. Rooms on the contiguous eighth floor of Building 56 were converted to laboratory space to accommodate the division's quarantine, diagnostic, and research activities. The division now encompasses approximately 175,000 square feet devoted to animal research activities. The new Koch Institute for Integrative Cancer Research, currently being constructed, will contain a new vivarium comprising an additional 39,000 square feet.

### **Facility Management and Animal Care**

The average daily census of laboratory animals increased 4.5% in FY2009. Mice remain the primary species used by MIT investigators and represent more than 98% percent of DCM's animal population. The division has two core facilities to support transgenic and gene "knockout" in vivo experiments and performs a range of transgenic services, including in vivo embryo transfer for rederivation of mice with endemic disease that have been imported to MIT from laboratories worldwide, in vitro fertilization, and genotyping of mice. During the past year services were expanded to incorporate a full range of cryogenic services, including laser-assisted in vitro fertilization. Efforts are currently under way to perfect a technique of vitrification freezing that will allow us to freeze all stages of preimplantation embryos as well as a technique to freeze and successfully retrieve sperm. The transgenic core also provides genetically engineered mice to the investigative community at MIT. DCM staff provide colony management of mouse models for investigators using mice in their studies. In addition, they advise investigators on breeding paradigms and tracking systems to optimize efficiency of production colonies, as well as providing hands-on services for routine mating, weaning, genotyping, and culling.

### **Research Activities**

Currently DCM faculty and scientific staff have 12 NIH-funded grants supporting in vivo studies of nitrite carcinogenesis, *Helicobacter hepaticus*, tumorigenesis, pathogenesis of inflammatory bowel disease, and *H. pylori*-induced gastric cancer. Studies are also conducted involving diet and *H. pylori* infection, microflora-induced colitis, *Helicobacter* species-induced hepatocellular carcinoma, virulence factors of *Escherichia coli* O157:H7 genotypes, the role of probiotics in attenuating inflammatory bowel disease, and in vivo studies investigating CD4<sup>+</sup>CD25<sup>+</sup> regulatory cells' abilities to treat colon and breast cancer. Total research expenditures were \$2 million in FY2009.

FY2009 was the 21st year of the division's NIH postdoctoral training grant. This grant is funded through 2013. Our NIH three- to four-year sponsored postdoctoral training program has been completed by 38 trainees; 31 of the 34 individuals who have taken the examination have become diplomates of the American College of Laboratory Animal Medicine. An additional 15 DVM, PhD, or MD students completed postdoctoral fellowships sponsored by individual R01 or program project grants. Many former trainees hold leadership positions in academia as well as pharmaceutical and biotechnology companies. The NIH training grant also provides short-term training opportunities for veterinary students interested in careers in comparative medicine. During FY2009, DCM had six short-term trainees for periods ranging from four to 10 weeks. Seventy-two veterinary students have participated in the summer training program during the past 10 years. Also, three or four veterinary students per year elect to spend two- to four-week externships at DCM during the school year.

DCM faculty and staff published several book chapters, one book, and 26 papers in FY2009 and presented numerous research papers at national and international meetings.

### **Academic Activities**

The division was saddened by the unexpected death of professor David Schauer in early June. Dr. Schauer joined the division in 1993 with an appointment in DCM and as an assistant professor of biological engineering. He was promoted to tenured professor in 2005. Dr. Schauer was both a principal investigator (PI) and co-PI on a number of NIH research grants, was a valued member of the Committee on Animal Care, and served as a mentor to the division's postdoctoral trainees as well as serving as an academic advisor to numerous graduate and Undergraduate Research Opportunities Program students.

Professor James Fox was recently elected president of the Association of American Veterinary Medical Colleges. Dr. Fox received the 2008 Charles Griffin Award from the American Association for Laboratory Animal Science (AALAS). This award, considered the most prestigious award presented by AALAS, recognizes individuals who have made significant scientific contributions to the field. Professor David Schauer served on an advisory committee for NIH and the new MIT interdepartmental program in microbiology. Professor Schauer was also involved in the Singapore-MIT Alliance. Dr. Susan Erdman, principal research scientist and assistant director of DCM, was elected president of the American Committee on Laboratory Animal Diseases. Dr. Zhongming Ge, a molecular biologist in the division, was promoted to principal research scientist.

DCM faculty and staff taught two graduate subjects in the Department of Biological Engineering (20.202 In vivo models: Principles and Practices and 20.450 Molecular and Cellular Pathophysiology) and one undergraduate subject (20.106J Systems Microbiology). Dr. Robert Marini, assistant director and chief of surgical resources, serves as a lecturer in the Harvard-MIT Division of Health Sciences and Technology, where he is involved in the teaching of two courses (HST.542J Quantitative Systems Physiology and HST.090 Cardiovascular Pathophysiology).

### **Committee on Animal Care Activities**

All students, staff, visiting scientists, and principal investigators who use animals in teaching or research must be certified by the Committee on Animal Care (CAC). To enable protocol submission and personnel training, CAC's website provides required forms, continuing education material, and information about CAC activities. In conjunction with CAC, DCM staff have developed an online training program that is combined with individual orientation and training in animal use by the veterinary staff at the Institute. Individual and group didactic training sessions for Institute personnel on topics pertaining to the care and use of laboratory animals are also offered on a regular basis. In addition, CAC has developed an occupational health program for animal-related occupational health issues and periodically sponsors seminars on health issues such as zoonotic diseases. CAC continued to distribute to other institutions in the United States and abroad two instructional videos, one focusing on the role and responsibilities of institutional committees for the care and use of animals and the other on the use of anesthesia in laboratory animals. Both are available to MIT researchers at the division or in the Hayden Science Library.

**James G. Fox**

**Professor and Director, Division of Comparative Medicine**

**Professor, Department of Biological Engineering**

*More information about the Division of Comparative Medicine can be found at <http://web.mit.edu/comp-med/>.*