

## Perspectives in Veterinary Medicine

# Vets in Space: Exploring the Frontiers of Science

By Dr. Donald F. Smith  
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As many of us visit theaters to follow the Bullock-Clooney drift through space,<sup>1</sup> we are reminded that 20 years ago one of our colleagues defied gravity and became the first veterinarian in space.

Martin Fettman, then only 36 years old and having received his DVM just 13 years earlier,<sup>2</sup> climbed aboard the Columbia spacecraft on the morning of October 18<sup>th</sup>, 1993. As the prime NASA payload specialist for Spacelab Life Sciences-2 (SLS-2), he departed Earth's gravity with six others on STS-58 and returned 14 days later.



*Dr. Martin Fettman (upper right) and the rest of the space shuttle Columbia team, October 1993*

(Photo by NASA)

Dr. Fettman's role in the flight<sup>3</sup> was to conduct biomedical experiments on his crewmates, on himself, and on the 48 rodents that accompanied them, as well as to provide veterinary care for the animals. He spent two years training for the mission, including standard astronaut training for the maintenance and troubleshooting of life support, computer and electrical systems in the

shuttle, weightlessness training in parabolic flights,<sup>4</sup> water survival training,<sup>5</sup> centrifuge training,<sup>6</sup> and flight training in NASA T38s.

Dr. Fettman visited most of the NASA space flight centers around the country, learning how each of the orbiter and spacelab systems were designed and put together. His payload specialist training required mini-sabbaticals in the university research laboratories of each of the dozen or so principal investigators throughout the US, perfecting the specialized techniques needed to conduct their studies in space. He made frequent trips to Ames Research Center for training to conduct the animal experiments and to maintain and troubleshoot their support systems. Most of Fettman's time was spent in simulation training in a Spacelab mock-up at the Johnson Space Center, where each experiment planned for space flight was repeated over and over again to maximize efficiency and scientific productivity.



*Blood collection of Dr. Martin Fettman (upper left)  
by Columbia team physician, October 1993*

(Photo by NASA)

This was the first time hands-on biomedical experiments were conducted on animals in space, affording a unique opportunity to compare human and animal physiologic responses to microgravity both before and after return to Earth's gravity. The tissues obtained from in-flight rodents and their controls on the ground were subsequently shared with scientists around the world. Five years later, Fettman was pleasantly surprised to see electron micrographs of the rat cerebella he had removed in flight during a Russian scientist's presentation at a scientific conference!

Dozens of scientific articles from their work were also published in major journals, presenting the findings from both the animal and human subjects studied during this space flight. Those results have helped guide subsequent medical support, weightlessness countermeasures, experimental planning for longer shuttle flights, stays on the Russian space Station Mir, and the long term operations of the International Space Station currently in orbit. Many of the findings from SLS-2 have also influenced ground-based research into animal and human diseases associated with disorders of the physiological systems studied during the flight.

Since his 1993 flight, Fettman has made over 200 public appearances around the world representing space life sciences research before higher education, medical, veterinary, and lay organizations. He has also visited over thirty K-12 schools across the United States and Canada. He served as chair of the Space Station Biological Research Project, and as chair of the National Space Biomedical Research Institute External Advisory Council. He is the recipient of numerous honors and awards, including the Colorado Veterinary Medical Association's 2003 Veterinarian of the Year and 2006 Presidents' Award, in addition to serving as a member of many NASA Advisory Committees on Biomedical Research.

When asked how his space flight experience changed him and the profession of veterinary medicine, he replied,

*I would have never thought a wannabe dairy practitioner from New York would wind up serving such a unique role in the advancement of veterinary medicine. I always wanted to do my best at whatever I've attempted and I'm very proud of my career achievements, before, during, and after SLS-2. I learned that no great endeavor can succeed without the extraordinary efforts of many people seeking to push the limits of what's possible together. I certainly couldn't have achieved a fraction of what I did without all those who mentored me and supported me on Earth and in space. Imagine what more veterinarians can accomplish individually and as a profession, given their unique multidisciplinary training and experience!*

Three years after Dr. Fettman's historic flight, Rick Linnehan, DVM, a 1985 graduate from the Ohio State University College of Veterinary Medicine,<sup>7</sup> became the second veterinarian to fly in space. His first and second missions (1996 and 1998) involved life science experiments, including metabolic studies and the effect of zero gravity on the central nervous system.<sup>8</sup>

Linnehan made three space walks to the Hubble Space Telescope during his third flight in 2002. His fourth and final flight, in 2008, was to the International Space Station where he traveled and interacted with astronauts representing several countries, including Russia and Japan. His combined flights logged 58 days in space and six space walks that totaled over 42 hours.



*Dr. Linnehan during one of his several Extra-Vehicular Activities (space walks).*

Photo by NASA

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<sup>1</sup>Gravity, 2013 science fiction movie starring Sandra Bullock and George Clooney.

<sup>2</sup>Dr. Fettman received both DVM and MS degrees at Cornell in 1980, and the PhD two years later from Colorado State University. He is a Diplomate of the American College of Veterinary Pathologists.

<sup>3</sup> Fettman, Martin, DVM (retired Colorado State University Faculty and NASA payload specialist), personal conversation with Donald Smith (Cornell University) October 16, 2013; email to Donald Smith, October 17, 2013.

<sup>4</sup> [of the KC135 (vomit comet)]

<sup>5</sup> [in the Johnson Space Center Weightless Environment Training Facility (WETF) and at Pensacola Naval Air Station on the Gulf coast]

<sup>6</sup> [at Brooks Air Force Base for hyper gravity exposure during launch and return]

<sup>7</sup> Dr. Linnehan also holds the MPA from Harvard University's Kennedy School of Government. He is currently an adjunct professor at North Carolina State College of Veterinary Medicine.

<sup>8</sup> [Veterinarian performs maneuvers at space station](#). JAVMA news, May 15, 2008.

#### KEYWORDS:

History of Veterinary Medicine  
Martin Fettman  
Rick Linnehan  
Astronaut  
Payload Specialist  
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Space Walk

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TOPIC:

Careers in Veterinary Medicine

ABOUT THE AUTHOR:

Dr. Donald F. Smith, Dean Emeritus of the Cornell University College of Veterinary Medicine, had a passion for the value of the history of veterinary medicine as a gateway for understanding the present and the future of the profession.

Throughout his many professional roles from professor of surgery, to Department Chair of Clinical Sciences, Associate Dean of Education and of Academic Programs and Dean, he spearheaded changes in curriculum, clinical services, diagnostic services and more. He was a diplomat of the American College of Veterinary Surgeons and a member of the National Academy of Practices. Most recently he played a major role in increasing the role of women in veterinary leadership.

*Perspectives in Veterinary Medicine* is one of his projects where he was able to share his vast knowledge of the profession.