techtalk

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Peromyscus—A Fascinating Laboratory Animal Model

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You may ask, "What is a *Peromyscus*"? The word *Peromyscus* comes from the Greek word *pero,* meaning "boots," and *mys,* which refers to the mouse. Thus, it is the "mouse with boots," or the white-footed mouse. *Peromyscus* are the most abundant native American mammal. They are found from Alaska to Central America and play an important role in the ecosystem.

The white-footed mouse is very different than the laboratory mouse, *Mus*. They are not closely related to either *Rattus* or *Mus* and cannot hybridize with these 2 species. *Peromyscus* have 8 more chromosomes than *Mus*. *Mus* naturally inbreed, whereas *Peromyscus* disperse in the wild and avoid inbreeding.

Husbandry

Peromyscus can be easily maintained in the laboratory using standard operating procedures for rodents (Joyner, et al., 1998).

Personnel accustomed to handling *Mus* are surprised when dealing with *Peromyscus* for the first time as they are substantially more active. We therefore recommend using a "changing table" when handling these animals (Figure 1). This table, designed by our animal resources facility personnel, is on wheels for ease of movement and has 10-in. sides. It is made from polyurethane and is easily sanitized in the rack washer.

Fig. 1

To pick up a *Peromyscus*, cup your hand over the animal. It will turn around under your cupped hand, and you will then be able to grasp it by the base of the tail with your thumb and forefinger. Place the animal on a cage lid and as it pulls on the lid, grasp it by the scruff of the neck (Figure 2).

Fig. 2

If you are right-handed, make sure you have picked up the animal by the scruff in your left hand! This leaves your right hand free to manipulate the animal as needed. Individual mice can easily be identified by using an ear notch method (Figure 3).

Peromyscus are sexually mature by 60 days of age. The estrus cycle is 5 days, and the gestation is about 22 days excepting lactating females. This causes a delay of implantation of four to five days.

A light cycle of 16 hours daylight and 8 hours dark is important for breeding. Copulatory plugs are not easily seen in *Peromyscus* and are not a reliable indicator of pregnancy. Many *Peromyscus* species are monogamous and form mating pairs. Males assist in the rearing of the young.

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Research

In recent years, *Peromyscus* came to the nation's attention when they were recognized as the major reservoir species for 2 emerging infectious diseases—hantavirus pulmonary syndrome and Lyme disease. Hantavirus pulmonary syndrome is noted for the high mortality rate in humans which reaches nearly 40% of infected individuals. Lyme disease was first recognized during the late 1970s in Lyme, Connecticut. In 2004, over 19,804 cases of Lyme disease were reported, primarily in the northeastern United States.

Peromyscus are also recognized to be reservoirs for a number of other vector-borne diseases, such as ehrlichiosis, babesiosis, and even bubonic plague. Ehrlichiosis is a family of tick-born diseases for which *Peromyscus* may serve as a reservoir. The etiological agent is a rickettsia, *Ehrlichia* sp. Rocky Mountain spotted fever is a rickettsial disease believed to be carried by *P. leucopus.* Babesiosis is a malaria-like disease. In the United States, it is caused by *Babesia microti,* a protozoan that infects erythrocytes.

While science has made many advances in the study of the genus *Peromyscus*, there are still many avenues to explore (Dewey and Dawson, 2001). Apart from their roles in infectious diseases, *Peromyscus* are useful models for discovering the means by which species can adapt to different environments such as mountains, deserts, beaches, swamps, and from the southern tropics to the Canadian tundra. The basis of such adaptations is physiological and immunological, as well as behavioral. One *Peromyscus* species, which we call "the family values mouse," *P. californicus,* is unique among rodents for its monogamy. Most rodents are polygamous and *P. californicus* is a popular model for researchers interested in the genetics and neurobiology of partner fidelity. *Peromyscus* are also noted for their propensity to develop chronic repetitive movements including back flips, jumping, and circling. These mice are being studied as an animal model for repetitive movement disorders in humans. In contrast to *Mus,* which have a 2- to 3-year life span, *Peromyscus* species have life spans ranging between 5 and 8 years. As such, these species are considered good models for aging research.

Fig. 3

A great deal of laboratory-based *Peromyscus* research is carried out on mice provided by the Peromyscus Genetic Stock Center at the University of South Carolina. Established in 1985 by Dr. Wallace Dawson, the center maintains seven different *Peromyscus* species, two subspecies, and a number of behavioral, biochemical, and coat color mutants. The goal of our center is to provide healthy, uniform, disease-free and parasite-free *Peromyscus* to the research and educational community, and develop the genetic and molecular resources that will further enhance the research value of the species.

References

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Katrina & Rita: Girls Gone Wild

By Lynell M. Dupepe BS, RLATG, Assistant Director, Department of Vivarial Science and Research, Tulane University Health Sciences Center

"How'd ya do?" is the common question asked among survivors in the wake of destruction caused by Hurricanes Katrina and Rita. I have often jokingly commented that I should write a book about my experiences in the lab animal profession, but nothing to date has inspired me to do so until now and the "girls gone wild" experience of Katrina and Rita.

On Sunday, August 28, 2005, when residents of southeast Louisiana were given the order for mandatory evacuation due to the approaching unprecedented Category 5 hurricane, we all knew we were in for a ride. However, no one expected the roller coaster ride to last several months. At most, we all expected to be back, business as usual, in a couple of days. Instead, we came back to destruction of biblical proportions. In the hours following the storm, those of us who evacuated out of state watched in horror as the destruction unfolded on national television. I still don't know which was worse, helplessly watching the storm and post-storm events on television, or being helpless in the middle of the storms and not knowing what was happening all around.

Living in our area, we all knew the "big one" was coming one day, but never thought we'd live to see it, or that we'd actually live through it. The devastation to animal facilities caused by tropical storms affecting neighboring states in recent years prompted us to overhaul emergency disaster plans for our facilities. I can tell you now; a well-developed disaster plan is one of the best insurance policies an animal facility can have.

Our emergency disaster plan consists of tiers of essential personnel for each stage of the disaster: preparation and response, supplies for personnel and animals, contact information, evacuation plans for animals, personnel status reports, property loss forms, and business resumption planning. However, the best-laid plans of mice and men are ineffective if not backed by dedicated staff. Although our disaster plans were tested by the worst storm in recorded history, all of the planning and preparation paid off thanks to the tireless efforts of a hand full of brave and dedicated technicians. Armed with necessary supplies, these men remained in the