Possum championed as new guinea pig

In the last four months, the thriving opossum population of John L. VandeBerg's Texas laboratory has almost doubled. He now has about 1,100 animals on hand. Luckily they are not the large Virginia opossum, but its small Brazilian relatives. "The gray short-tailed opossum [which weighs only 80 to 150 grams as an adult] appears to have most, if not all, of the desirable attributes of a laboratory animal," VandeBerg says.

Biologists have been eager to have a standard laboratory marsupial, because marsupials are uniquely suited for certain facets of biomedical research, according to VandeBerg. They have such a short gestational period that the newborn is still in a semi-embryonic state, equivalent in some respects to a 4- to 6-week human embryo. Questions about development can be explored much more easily by examining the young marsupials than by invading a mammal's womb.

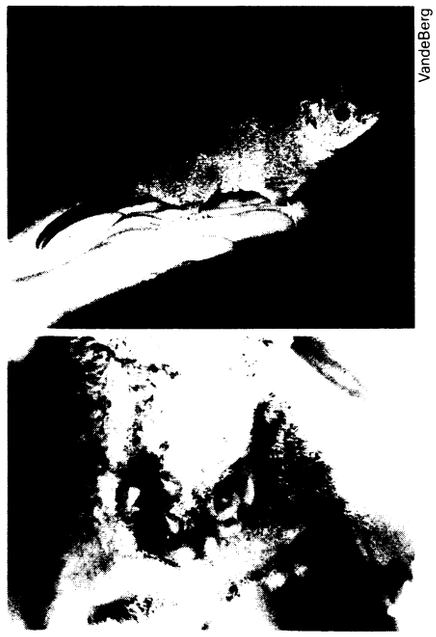
The short gestation gives marsupials other features intriguing to scientists. Newborns can regenerate limbs, and they lack any immune response. In addition, marsupial cells contain a small number of large chromosomes, which can be easily examined.

Most marsupial species, such as the Virginia opossum, are unsuitable for widespread laboratory use because of their large size or other problems. But the gray short-tailed opossum *(Marmosa domestica)* seemed promising when five females and four males imported by the National Zoological Park in Washington in 1978 produced 70 progeny, all healthy, in the first year.

VandeBerg, who is at the Southwest Foundation for Research and Education in San Antonio, began his breeding project with 20 descendants of the original zoo specimens. The gestation period is about two weeks and the young are dependent on the mother for another 7 weeks. Thus, a female can have up to four litters annually of 2 to 14 young. Sexual maturity takes 4 to 5 months, so there are two generations each year.

Newborn opossums weigh only 100 milligrams and have well-developed shoulders and forelimbs, but most other structures are unformed. After crawling to the mother's nipples, they remain attached for about 2 weeks, until developmentally equivalent to newborn rodents.

The animals have proved to be relatively docile and easy to handle, VandeBerg reports. Adult pairs or juveniles can share a small indoor plastic cage peaceably. The opossums have been reared on meat, or wet dog or cat food, but recently VandeBerg has had success feeding them a less expensive, dried food marketed for foxes. The animals in captivity survive up to 4 years. The oldest show such signs of aging as hair loss, unsteady gait and sometimes cataracts.



VandeBerg

The Brazilian gray short-tailed opossum is small and easy to raise in a laboratory. After a 2-week gestation period, the semi-embryonic newborns, 1 centimeter long, of this pouchless marsupial attach to their mother's nipples.

This summer VandeBerg plans to obtain more gray short-tailed opossums from Brazil to increase the genetic diversity of the colony. He and colleagues are also developing inbred strains. They have just mated the second generation in the program, which is expected to go 20 generations (or 10 years).

The marsupials are already being used in several research projects. For example, VandeBerg has supplied animals to a laboratory investigating sexual development. The opossum is not yet sexually differentiated at birth. In VandeBerg's laboratory, investigators are studying the inactivation of X chromosomes in the cells of females. In marsupials the X chromosome derived from the father is always the one inactivated, whereas in mammals inactivation of the maternal and paternal chromosomes have equal probability.

In another project in VandeBerg's laboratory, researchers are investigating the marsupial immune system. One current theory is that the marsupial gives birth so early because its fetuses are not protected from the maternal immune response.

In the spring issue of ILAR News (of the Institute of Laboratory Animal Resources, National Academy of Sciences), VandeBerg says, "The expansion of our colony and others over many generations indicates that a laboratory marsupial is available at last. *M. domestica* can be maintained under simple and inexpensive conditions, so that large-scale investigations are practical." *— J.A. Miller*

Interstellar grains found in meteorite

Pure stardust — individual, solid grains that condensed from material ejected by distant stars — has been identified in a laboratory for the first time, according to a group of U.S. and British scientists. The existence of these "interstellar grains," thought to be the stuff from which planets and new stars are formed, has been hypothesized for decades, but with only the indirect support of astronomical observations. Now researchers have reported actually isolating some of the tiny fragments in samples from the interior of one and possibly a second meteorite.

A decade ago, scientists at the University of Chicago found certain meteorite samples to contain traces of oxygen whose isotope ratios suggested the oxygen to have come from outside the solar system. Since that time, "extra-solar" components of a dozen more elements have been added to the list, though they have generally shown "contamination" from solar-system material. The newly reported grains, however, appear to be virtually pure.

In 1978, members of the Chicago group reported that samples from the oft-studied carbon-rich Murchison meteorite contained traces of the rare-gas element xenon whose isotopes were in a ratio believed to be produced in the interiors of red giant stars. The researchers reasoned that, in order for such "exotic" xenon to have been incorporated into the meteorite, it must have been "packaged" in similarly exotic carbon, characterized by a higher ratio of carbon 13 to carbon 12 than does the terrestrial or solar-system variety. The problem was that about 99.99 percent of Murchison's carbon is of the conventional sort, so it was necessary to isolate the tiny percentage of exotic carbon from the rest in order to make its ^{13}C:^{12}C ratio measurable by a mass spectrometer. Fortunately, says Edward Anders of the University, heating the samples to carefully controlled temperatures will drive off most of the fine-grained solar-system carbon while leaving the larger-grained exotic carbon grains intact. Using this technique, he and colleague Roy S. Lewis prepared the samples, and sent them off to P.K. Swart and colleagues at Cambridge University in England, who could study them with a particularly accurate mass spectrometer.

The analysis, reported in the April 22 Science, indeed showed an enrichment of ^{13}C. In fact, the ^{13}C:^{12}C ratio of the grains was roughly twice that of solar-system carbon, strong evidence for its exotic origin. A similar analysis was done on samples of the Allende meteorite (also a carbonaceous chondrite), though its lower percentage of "heavy" carbon produced less-clear results. *—J.Eberhart*