

# The Round-Up



## Protecting the Nation

### SNPRC takes on expanded role in biodefense

Established in September by the National Institute for Allergy and Infectious Diseases, one of the National Institutes of Health, eight new Regional Centers of Excellence for Biodefense and Emerging Infectious Diseases (RCE) across the country are charged with the task of developing diagnostics, vaccines and treatments for possible bioterror agents and emerging diseases.

In times of national biodefense emergency, the RCEs will rapidly realign their activities to assist local response efforts within their region. Their responsibilities include making their facilities and other resources available to assist in the implementation of biodefense plans.

### A new type of RCE

The NIH establishes RCEs as a way of bringing together scientists and institutions with a unique combination of expertise and resources to help solve a pressing national or world health problem. The RCE program was expanded to include centers devoted to biodefense studies following the September 11, 2001, terrorist attacks and the anthrax incidents that occurred the next month.

The SNPRC is part of one of the new RCEs in Biodefense and Emerging Infections. Led by the University of Texas Medical Branch at Galveston (UTMB), this RCE includes a consortium of 16 collaborating institutions from Texas, Louisiana, Arkansas, Oklahoma and New Mexico. The Nonhuman Primate Core of the Region VI RCE is a joint effort between the SNPRC and the Tulane NPRC.

With funding provided by a \$48 million grant awarded to and distributed by UTMB, these institutions will work together to study agents the government has determined to be bioterror threats, often described as “select agents.” Examples include anthrax, bubonic plague, Ebola, tularensis, and viral hemorrhagic fevers. The RCE program, however, also addresses emerging infectious diseases such as dengue fever, monkeypox and SARS.

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## From the Director

As the Southwest National Primate Research Center approaches the end of its first 5 years, it is appropriate to reflect on our major accomplishments.

Scientific accomplishments have spanned diverse areas of biomedical research. Our published findings have contributed to the ongoing development of preventive strategies and treatments for cardiovascular diseases, hypertension, obesity, hepatitis C, AIDS, bronchopulmonary dysplasia, chronic lung disease of infancy, and mental disorders.

The research that contributed to progress in these and other areas was conducted by 40 investigators based at the Southwest Foundation, as well as 227 investigators based at other institutions. The success of the SNPRC outreach program has ensured our prominent role as a national resource that enables scientific accomplishments far beyond those made by our own staff.

Our pilot studies program also has been a great success. The peer review process is highly competitive; only one-third of applications have been funded. A total of 21 proposals have received funding, including six from investigators based at other institutions. The financial investment in pilot studies has been leveraged 7.4-fold in awards of major grants that support research at the SNPRC.

The demand for primates required for research projects at the SNPRC has grown substantially, so we have expanded our primate breeding colonies. The number of primates maintained

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# \$14.7 Million Grant Seeks to Explain Heart Disease

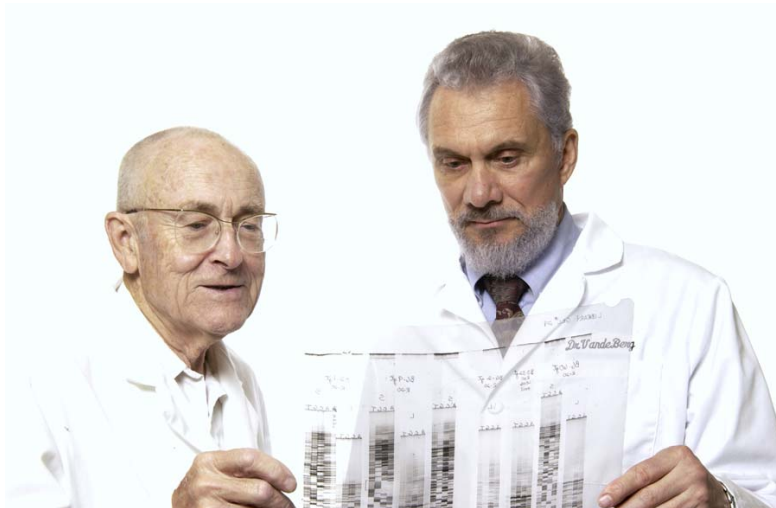
The longest-running grant at the Southwest Foundation for Biomedical Research became the largest grant in the Foundation's history when the Baboon Program Project was renewed this past spring by the National Heart, Lung and Blood Institute (NHLBI) for \$14.7 million over 5 years.

Officially titled "Diet and Genotype in Primate Atherosclerosis," the research program uses baboons to learn how diet and genes interact to determine an individual's risk of atherosclerosis, where fatty substances form deposits of plaque on the inner lining of arterial walls, contributing to heart disease.

The program aims to identify particular genes that contribute to atherosclerosis and its risk factors and then to learn how those genes function, eventually leading to the development of individually tailored diets and therapeutic drugs to help prevent and treat the disease.

The ultimate goal in all of this is to improve human health, says Dr. John VandeBerg, director of SFBR's Southwest National Primate Research Center and the grant's principal investigator. "Once we can identify a specific gene influencing a particular characteristic, we can do two things. One is to try to use that gene's mechanism of action as the basis for drug development to treat disease.

"The other thing, which we could do immediately, is to develop individually tailored dietary and lifestyle recommendations for people who carry that gene. This would help with public health efforts, because right now, for the most part, we give everyone the same recommendations, and people are less inclined to make the effort to follow them. But if we can tell someone that they have a gene that makes them highly susceptible to a particular disease and we have some specific recommendations to help offset that risk, we might be able to make a real impact on their lives."



*After seeing a large variation in development of atherosclerosis of animals consuming the same diets, Dr. Henry McGill, Jr. (left) developed a research project that would investigate the genetics of diet and cholesterol, which has evolved into the current program project. Dr. John VandeBerg (right), the current principal investigator, was the first geneticist recruited to SFBR to help in this effort.*

Initially funded by NHLBI in 1972, the research program began operation under its current grant number in 1982, making it the Foundation's longest-running grant.

The project utilizes SFBR's colony of baboons, which is the largest such colony in the world. It includes a unique pedigreed colony of some 2,400 animals (see story on facing page), for which scientists have maintained family, dietary and medical history and complete genetic information for six generations.

The colony provides a powerful tool for genetic analyses, especially since baboons are so genetically and physiologically similar to humans, being identical in approximately 96 percent of their DNA sequences.

Making the colony even more valuable is SFBR's selective breeding program and the ability to control the animals' diet, which cannot be done with a human population. This control allows scientists to see more clearly how diet and genetics work together to influence disease.

Over the past 5 years, Dr. VandeBerg has seen the rate of scientific discovery through this project advance at a record pace, beginning with a milestone achievement: the mapping of the baboon genome, published by SFBR scientists in the journal *Genomics* in the year 2000. To date, it is the only gene map of a nonhuman primate.

"The baboon gene map parallels the human gene map," Dr. VandeBerg explains. "It gives us enormous new opportunities for genetic research with baboons, not only on cardiovascular disease but on many other diseases, including diabetes, obesity, osteoporosis, behavioral disorders, really

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Southwest National Primate Research Center

# Primate Focus: Pedigreed Baboon Colony

Every year, over 2.4 million Americans die from cardiovascular disease. A majority of these people are unaware of the pedigreed colony of baboons housed at SNPRC and the role those 1,800 baboons are likely to play in improving their health and the well-being of many others not yet born.

Animals in the Pedigreed Baboon Breeding Colony are used for research into the cause and course of human conditions as diverse as premature birth, maternal-fetal passive immune transfer, neonatal programming, hypertension, obesity, type II diabetes, endometriosis, Chagas' disease, osteoporosis, osteoarthritis, sarcopenia, immune deficiency, and age-related reproductive changes.

The colony's complex genetic structure, planned and recorded over six generations, is uniquely suited to genetic research on normal and disease-associated traits. Thusfar, it has been used to localize genes that control lipoprotein, bone density, blood pressure, and adiposity phenotypes. Its value will increase as the pedigrees are expanded and as animals are characterized for an increasing array of health traits and genetic markers.

## History

In 1972, 200 feral baboons were gathered for a study of atherosclerosis that was funded by the NHLBI. The colony has been continuously supported by NHLBI (P01 HL15964, 1973-1976; P50 HL19362, 1976-1982; P01 HL28972, 1982-present), local private contributions, and institutional funds. Chance observations led to the development of other models of human disease, including hyaline membrane disease and bronchopulmonary dysplasia in the prematurely delivered baboon (NHLBI grant U10 HL52636, 1996-present). Other models developed included naturally occurring obesity (NHBLI grant P01 HL28972); glucose intolerance and type II diabetes, osteoporosis and osteoarthritis; and the perimenopausal syndrome.

## Powerful tools

An array of resources developed at the SNRPC maximize the contribution of each member of the colony to our research endeavors. The Primate Records Database holds a comprehensive life history of each animal. These records are valuable for both veterinary management and as a source of data for genetic and demographic analyses. The Pedigree Database helps scientists and veterinarians plan and manage extensive baboon pedigree structures, creating complex relationships that can be exploited effectively by genetic analyses.

A bank of biomaterials from 1,813 baboons representing five generations includes samples from animals currently in the colony and animals that have been sold or have died is maintained. Because they are collected during health checks, these materials provide an affordable way to test hypotheses in pilot studies. Details on the service may be accessed via the internet at <http://www.snprc.org/services/btvalidate.html>.

Finally, the 7.5-centimorgan baboon genetic linkage map, created from a panel of 294 human microsatellite loci, has been evaluated in more than 950 pedigreed baboons belonging to several large, four-generation families. Additional baboons are being added to the set of animals used for linkage mapping. Fine mapping will better localize individual genes that influence phenotypic variation associated with lipoprotein characteristics, blood pressure, and obesity. Like the animal records, this map is a constantly evolving resource that can be used to answer new questions as they arise.

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## Why baboons?

The baboon model of human disease shares many genetic, biochemical, physiological, and anatomical characteristics with humans, as do the popular macaque laboratory animal models, the rhesus (*Macaca mulatta*) and cynomolgus (*Macaca fascicularis*) monkeys. However, the baboon has a number of advantages over macaques.

- Baboons breed continuously throughout the year.
- The prominent sex skin of the female baboon enables easy daily assessment of reproductive status.
- Baboons are more resistant to tuberculosis than either rhesus or cynomolgus monkeys, are not susceptible to SIV, and do not carry the deadly Simian B virus.
- Baboons, like humans and unlike macaques, have four IgG subclasses. This is important for testing the efficacy of human vaccine regimens designed to enhance placental transfer of maternal antibodies to the fetus.
- Baboons tolerate extremes of weather better than macaques, are more predictable in their behavior, are generally calmer, and are easier to handle in captivity.
- The large size of baboons (by comparison with the macaques) is an advantage in many instances, such as in surgical procedures or repeated blood sampling. Medical devices sized for human use can often be used in adult baboons.



## Staff Focus: Luis D. Giavedoni, Ph.D.



In his search for clues to explain how simian immunodeficiency virus (SIV) thrives in rhesus monkeys, **Luis D. Giavedoni, Ph.D.**, SNPRC Core Scientist, starts small. He examines cells and their signaling products, chemokines and cytokines, to see how the virus and the immune system of the monkey interact during the course of infection.

One method that he uses is flow cytometry. Cells of interest are stained with fluorescent dyes and shot through a narrow path, where they are illuminated with lasers. The lasers excite the dyes, whose intensity indicates cell size, viability, and other qualities. This tool has been used in areas as diverse as vaccine studies, cancer drug discovery, and AIDS research. The equipment in the Department of Virology and Immunology, and operated by Giavedoni's laboratory, is available to SNPRC research projects through the Flow Cytometry Resource.

Increasingly sophisticated flow cytometry machines can measure more dyes concurrently. The newest one in Giavedoni's laboratory uses two lasers to detect up to seven dyes. While allowing for more complex analyses of cells, it also requires skilled operation to ensure that the dyes selected have distinct enough wavelengths so that the presence and intensity of each can be measured accurately while minimizing spectral overlap and interference from other dyes.

Giavedoni's laboratory also uses a Luminex 100 Multianalyzer, which can perform up to 100 tests on a single well of a microtiter plate or test tube. To measure the presence and intensity of expression of a certain molecule, color-coded microspheres coated with reagents such as antibodies or nucleic acids, specific for that particular analyte, are added to a sample. Since beads can be labeled with 10 concentrations of two different fluorescent dyes, there are 100 (10x10) possible bead colors, or "regions". Reporter reagents, antibodies or nucleic acids labeled with a third fluorescent dye, and specific for the same analyte (but different from those on the beads), are added to the mix. The instrument uses two lasers, one to illuminate the colors inside the beads, and the second one to activate the reporter dye. Then, a computer analyzes the intensity of the reporter dye within each different region. These data translate to real-time quantitative data for each reaction. "Assays require samples as small as 50 microliters, which is often a critical issue when working with small animals or animals that are sampled very frequently. This, and the ability to construct custom probes, make it a versatile tool for anything from infectious disease research to genetic research," Giavedoni explains.

While the Luminex system is currently used for research purposes only, Giavedoni has found that it holds promise as diagnostic tool. "Certain characteristics have correlated with

viral load and disease outcome in animals. We're waiting to see whether a trend develops over time." Giavedoni has also been funded by the National Institute of Health to develop a tissue typing technique for rhesus macaques using the Luminex platform.

In his role as AIDS Liaison, Giavedoni is a first contact for outside researchers hoping to use SNPRC resources for AIDS-related research. "The number of specific pathogen free (SPF) rhesus monkeys available to researchers is very limited nationally, so we are increasing our SPF rhesus colony population. I hope to be more active in connecting outside researchers with our staff to design and conduct experiments with our primates as the number of animals available from the breeding colony grows."

His own research focuses on the fine balance between provoking immunity and infection. He explains, "We try to make viral vaccines safer and more immunogenic. Historically, live-attenuated virus vaccines have been the most effective ones (i.e., polio, smallpox vaccines). But, since the risk of infection in humans from a live HIV vaccine is currently unacceptably high, we instead look at the mechanisms of action of the more effective live virus vaccines in rhesus monkeys in hopes of harnessing these mechanism by another means."

Giavedoni recently returned from a trip to Santa Fe, Argentina, under the auspices of the American Society for Microbiology's "Professorship for Latin America" Program. He co-taught a short course at his alma mater, the National University of Litoral, with a colleague based there and another one from the State University of New York Stony Brook, on the use of PCR for diagnosis of viral infections. Nineteen students from the graduate programs at the university participated in the 2-week course, which included lectures and laboratory work.

His laboratory is also working to share its findings on the reactivity of commercially available human antibody kits in nonhuman primates, but he observes, "Every time we think we've covered all of them, a new one comes out."

*Luis Giavedoni received his master's of science degree in biochemistry from the National University of Litoral, Santa Fe, Argentina and his doctorate degree in biochemistry from the National University of Buenos Aires, Argentina.*



*Members of the Giavedoni lab (left to right). Front row: Heather Vohs and Vida Hodara. Back row: Reddy Meka, Luis Giavedoni, Laura Parodi, and Shannon Keckler.*

## Protecting the Nation

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### SFBR fills need no one else can

The SNPRC's host institution, the Southwest Foundation for Biomedical Research, plays a key role in the Region VI consortium as the only institution in the country with both a functioning BSL-4 laboratory and a National Primate Research Center.

BSL-4 laboratories, also described as maximum containment laboratories, are specially equipped for the safe study of dangerous and infectious pathogens for which there is no known treatment or cure. Having such a state-of-the-art facility has allowed SFBR virologists to study select agents such as Ebola and Lassa fever since the laboratory "went hot" in 2000.

The SNPRC will provide animals, facilities and expertise to researchers developing vaccines and therapies to treat infections with select agents. The primate center's distinguished history in the humane and appropriate use of nonhuman primates in biomedical research becomes especially important in light of the FDA's "two animal rule."

"It is unethical to test the efficacy of select agent vaccines or treatments in humans," said Dr. Suzette Tardif, associate director of the primate center. "Scientists cannot, for instance, give a human a vaccine for Ebola and then challenge him or her with the virus."

For this reason, the Food and Drug Administration has ruled that new treatments and vaccines in the biodefense effort can forgo traditionally required human clinical trials if they prove safe and effective in two animals, one of which is expected to be a nonhuman primate. Because these

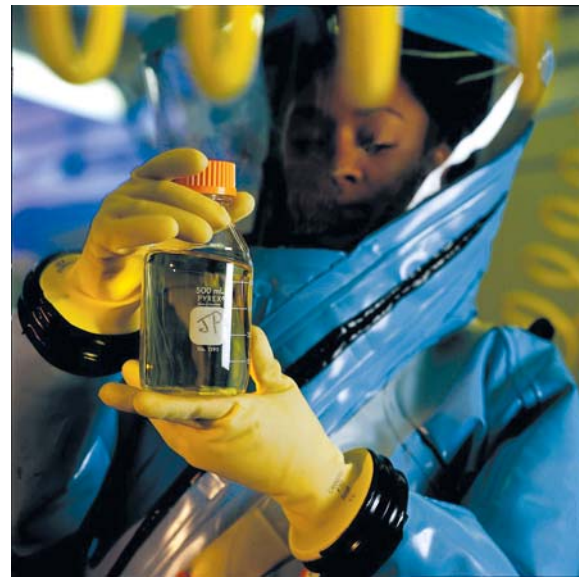
## Grant Seeks to Explain Heart Disease

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any basic human disease or disorder. We can use this map to find genes that control certain characteristics, such as blood cholesterol, and from there develop new drugs and therapies to treat disease."

Since mapping the baboon genome, SFBR researchers already have identified nine chromosomal regions containing genes that influence blood pressure, blood cholesterol and adiposity, or one's degree of fat. With statistical methodologies and a novel microarray strategy developed by scientists in the program, researchers are quickly honing in on one of those specific genes which affects HDL, the "good" cholesterol.

Over the coming 5 years, they aim to pinpoint at least two more disease-influencing genes, to identify new regions of the genome related to obesity and diabetes, and to determine how Vitamin E interacts with genes to influence oxidative damage.



*RCEs will provide assistance in the event of an emerging disease event within their region.*

animals' genetic and physiological systems are so much like our own, it is reasonable to assume that a drug that proves safe and effective with nonhuman primates will also be safe and effective in humans.

Commenting on the experience and capabilities of SFBR's Department of Virology and Immunology and the Southwest National Primate Research Center, Dr. Frank F. Ledford Jr., SFBR president, said, "The unique combination of expertise and resources available at SFBR should prove to be a tremendous asset to the nation's biodefense effort. We are delighted with this new opportunity to expand work we already are doing, unite it with the efforts of other respected organizations in our region, and hopefully make the world a safer place for us all."



*Baboons develop atherosclerotic lesions just as humans do.*

## PRESENTATIONS AND INVITED TALKS

April - December 2003

**Margaret R. Clarke, Ph.D.**, Department of Anthropology, Central Washington University, gave a talk entitled "Migration patterns of adults free-ranging howling monkeys" at the SNRPC on August 11, 2003.

**Jake Liang**, Liver Diseases Section, National Institute of Diabetes and Digestive and Kidney Diseases, NIH, gave a talk entitled "Hepatitis C virus like particles as a candidate vaccine for hepatitis C" at the SNRPC on August 14, 2003.

**John VandeBerg, Ph.D.**, SNRPC, gave a talk entitled "Quantitative trait loci for risk factors of cardiovascular disease" at the XIIth International Conference on Genes, Gene Families, and Isozymes in July of 2003.

**Hugh Notman**, University of Lethbridge, gave a talk entitled "Chimpanzee pant hoots and referential signaling: Is a fig sometimes just a fig?" at the SNRPC on December 11, 2003.

### Association of Primate Veterinarians Meet

The 31st annual meeting of the Association of Primate Veterinarians was held in Tacoma, Washington on October 10-12, 2003. SNRPC Veterinarians **Michelle Leland** (President-Elect for 2004) and **Pat Frost** (Trustee) helped to organize the meeting. The three-day event featured an opportunity for Primate Center veterinarians to meet, as well as presentations of over 20 case reports as well as a featured talk on "The role of veterinarians in the development of the National Primate Centers program" by Dr. Dennis Johnsen.

### AIDS Symposium Held

Several SNRPC investigators attended the 21st Annual Symposium on Nonhuman Primate Models for AIDS Meeting, held this October in Seattle. **Jeff Rogers, Ph.D.**, leader of the Genetics Group, discussed "Recent progress in mapping the genome of rhesus macaques and baboons" and **Jon Allan, D.V.M.**, affiliate scientist in the Virology and Immunology Group, gave a talk entitled "Determinants of natural host resistance to SIV-related disease." **Luis Giavedoni, Ph.D.**, SNRPC AIDS Liaison, will serve as Conference Chair for the 2004 meeting to be held in San Antonio on November 3-6, 2004.

### NCCR Primate Genomics Working Group

The SNRPC hosted a meeting the NCCR Primate Genomics Working Group on December 9-10, 2003. Representatives from the eight NPRCs summarized efforts underway at their institutions, and speakers addressed topics including microarray technology, gene mapping and sequencing, and databases. Baboon, rhesus, and vervet gene maps were discussed, with particular emphasis on the rhesus. Discussants also addressed future needs, novel approaches, and potential applications.

## Housing Upgrades Continue

Baboons and chimpanzees are enjoying spacious new homes this year, as construction and renovation efforts continue in SNRPC facilities.

- Baboon housing has been expanded. A new 10,000 sq. ft. indoor-outdoor complex of 20 cages for socially housing approximately 300-400 baboons (NCCR-NIH grant C06 RR14578) and a new 4,998 sq. ft. building complex for socially housing baboons have been completed (NCCR-NIH grant P51 RR013986). This new space paves the way for older baboon housing to be renovated (NCCR-NIH grant C06 RR015456).
- New construction of 14,274 sq. ft. of long-term indoor/outdoor housing for chimpanzees not on research protocols is nearing completion (NCCR-NIH grant C06 RR17332).
- Existing indoor housing for chimpanzees on research protocols is being enhanced with the addition of outdoor runs. Four of nine buildings have been completed and are occupied (NCCR-NIH grant G20 RR16329).



*Construction workers put finishing touches on long-term chimpanzee housing. The housing is designed to allow chimpanzees to climb and rest in high places, as they do in the wild.*

## Pedigreed Baboon Colony

*(Continued from page 3)*

### New Investigations

Some diseases that will be further examined with the help of the tools developed at the SNRPC include:

#### Genetics of obesity

Scientists will search for genes influencing adiposity-related phenotypes and will examine their effects on risk for diseases such as coronary heart disease and type 2 diabetes.

#### Endometriosis

Our identification of the baboon as a model of endometriosis was based on a review of records in the Primate Records Database. The disease develops spontaneously in baboons and shares important features with the disease in women.

#### Cerebral injury in premature baboons

Premature baboons develop lesions in the brain that are very similar to those that develop in very premature humans. The baboon model may help researchers to understand the nature of cerebral injuries in premature infants that may contribute to neurobehavioral deficits as they reach school age.

## MaRGA Meeting Set for 2004

The Marmoset Research Group of the Americas (MaRGA) will hold its first meeting June 13-14, 2004, in Madison, Wisconsin. MaRGA is an organization designed to bring together primatologists, biomedical researchers, and veterinarians with an interest in marmosets and tamarins. The three National Primate Research Centers that maintain marmosets (Southwest, New England and Wisconsin) have joined together in this effort to promote the improved use of marmosets in biomedical research.

The theme of the meeting, Marmosets in Life Span Research, will be introduced by keynote speaker Dr. Steve Austad, an international figure in the field of aging research. The 2-day meeting will include four half-day sessions focused on nutrition, clinical care and pathology, physiology and immunology, and behavior and neuroscience. Other invited speakers include Craig Ferris (University of Massachusetts), Claude Genain (University of California, San Francisco) and Michael Power (Department of Zoological Research, the National Zoo).

For further information on this meeting, contact Suzette Tardif at stardif@sfbr.org.

## From the Director

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at our center has grown from 3,600 five years ago to 4,700 today, an increase of 30%; that number does not include the 1,500 cynomolgus macaques that we maintain in a breeding colony under contract from a commercial company.

The increased primate census is a consequence of the acquisition of an SPF rhesus macaque breeding colony from the U.S. Air Force to help alleviate the national shortage of rhesus available to NIH investigators, expansion of the baboon breeding colonies required to meet demands placed on our center, and acquisition of a marmoset breeding colony which Dr. Tardif brought to our center when she joined us as Associate Director.

The expansion of our primate colonies was made possible by the construction of new facilities and the renovation of existing buildings, which were enabled by our aggressive efforts to seek NIH support as well as by financial support from the host institution. New facilities that have been completed or initiated include a long term chimpanzee housing facility, a biocontainment facility for chimpanzees used in research, outdoor runs added to existing chimpanzee research facilities, one baboon and two rhesus monkey outdoor facilities, and two biosafety level 3 facilities and one biosafety level 4 facility for housing monkeys used in research with infectious agents.

These accomplishments, together with the establishment of a strong administrative infrastructure, place the SNPRC in a superb position to achieve a new level of scientific accomplishment in the upcoming second 5-year period of the base grant.

I am grateful to the scientific and support staff who have worked so hard to bring the SNPRC to its current standard of excellence, to the administrative staff of the Southwest Foundation for their support of our center, and to the National Institutes of Health for the generous funding they have provided for our administrative and research activities, as well as for construction and renovation of primate facilities.

## OPPORTUNITIES AT SNPRC IN 2004

As part of the Southwest National Primate Research Center's continuing efforts to act as a resource for researchers and students, we are providing research and training opportunities in 2004, which are described below.

### Pilot Study Proposals

New, innovative pilot studies have the potential for developing into larger projects that can then compete for major NIH grants. Investigators interested in using SNPRC resources for a pilot study should mark February 15 and August 15, 2004, on their calendars. Those are the spring and fall deadlines for pilot study applications at the SNPRC.

Researchers beyond the postdoctoral rank and based at any non-profit academic or research institution may apply. Applicants who are not core staff at the SNPRC must be sponsored by a core staff member.

Pilot studies have a direct cost ceiling of \$50,000 per year for up to 2 years. In general, most if not all of the pilot study funding must be expended at SNPRC. Visit <http://www.snprc.org/pilotstudy.html> for more information and a complete application package. Funds for February 15, 2004 submissions will be available in May, 2004. Funds for the August 15, 2004 submissions will be available in November, 2004.

### Internship Candidates

The SNPRC provides educational and training opportunities for a limited number of students during an 8-10 week summer session. Both undergraduate and graduate (Ph.D. and veterinary) students at accredited academic institutions are encouraged to apply.

Applications for the Summer 2004 internship program must be received by February 15, 2004 and should include a name of an SNPRC mentor. Details and application forms are available at <http://www.snprc.org/internprogram.html>.

### COMINGS AND GOINGS

We extend a warm welcome to our newest Assistant Veterinarian, **Stephanie Butler, D.V.M.** She comes to the SNPRC from the Department of Comparative Medicine, University of Tennessee-Memphis, where she completed her residency. She will be primarily caring for our baboon colonies.

We also bid farewell to **Bennett Dyke, Ph.D.**, who retired in December of 2003. Dyke was one of the original members of the SFBR Department of Genetics and has overseen the development of the software programs PEDSYS and PEDIGREE DRAW, which are used by numerous institutions to manage and document colony pedigrees. Dyke will continue to serve as a consultant.

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