

# ORIP

OFFICE OF RESEARCH  
INFRASTRUCTURE PROGRAMS



Photo provided courtesy of the California National Primate Research Center.

## NONHUMAN PRIMATE RESOURCES

## 2019

### ORIP'S MISSION

*The Office of Research Infrastructure Programs (ORIP) enhances biomedical research in all disease areas and across basic, translational, and clinical research through its support of research infrastructure and resource programs. ORIP grants enable biomedical researchers to purchase state-of-the-art instruments; validate and disseminate research models, materials, and genetic stocks; and establish specialized research resource centers. ORIP also supports training and career development of individuals with DVM/VMD degrees, as well as predoctoral veterinary students.*

<https://orip.nih.gov>

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## OVERVIEW

The Division of Comparative Medicine (DCM), within the Office of Research Infrastructure Programs (ORIP), Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI), National Institutes of Health Office of the Director (NIH/OD), advances biomedical research by supporting models of human disease using animals and cultured cells.

Due to their genetic, physical, and physiological similarities to humans, nonhuman primates (NHPs) are often the best models for human disease research when studies in humans are not ethical or feasible. Among other important medical advances, NHPs played key roles in the understanding and treatment of a variety of infectious diseases, such as Acquired Immune Deficiency Syndrome (AIDS) and Zika virus, treatment of type 2 diabetes and glioblastoma (brain cancer), and the development of organ transplantation and deep brain stimulation. NHPs help determine the safety and efficacy of vaccines, devices, and therapies before they are used in humans. Unfortunately, costs and stringent breeding and housing requirements limit access to NHPs throughout



Photo provided courtesy of the Wisconsin National Primate Research Center.

the biomedical research community. To mitigate these problems, ORIP's DCM supports multiple NHP colonies and research-related resources that are available to the research community. These NHP Resources support biomedical research across scientific disciplines, with studies supported across the NIH Institutes, Centers, and Offices.

## NHP RESOURCES



### National Primate Research Centers

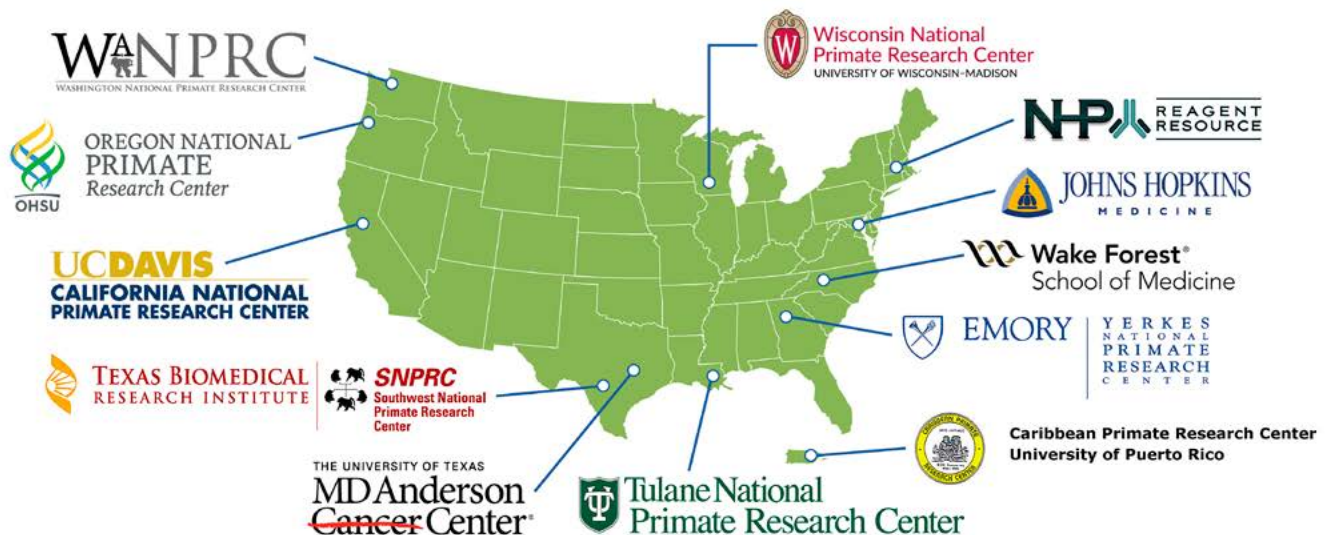
The [National Primate Research Center \(NPRC\) Consortium](#) is a collaboration across seven Centers

to increase access and promote sharing of valuable NHP-related resources among biomedical researchers. Additionally, the NPRCs advance the missions of NIH Institutes, Centers, and Offices by providing the animals, facilities, expertise, and resources required by investigators in disease-specific areas. ORIP's DCM funds NPRCs located in California, Georgia, Louisiana, Oregon, Texas, Washington, and Wisconsin.

Each Center provides expertise on the use of various NHP species as models of human disease to address specific

research projects. Each provides a variety of services both individually and through inter-NPRC collaborations. The NPRCs provide services for research funded by other Federal agencies, nonprofit foundations, and the private sector. Additionally, the program offers a Pilot Research Program for new investigators or high-risk exploratory research and a Visiting Scientist Program that offers advanced training and research. The NPRCs have scientific programs addressing major research fields, such as infectious diseases, aging, cardiovascular disease, diabetes and metabolic disorders, neuroscience, pediatrics, regenerative medicine, reproductive health, and women's health. For detailed information on NPRC capabilities and programs visit: [NPRCresearch.org](#). Recent advances by the NPRCs can be viewed at [nprc.org](#).

### Nonhuman Primate Research Resources Supported by ORIP



## Specific Pathogen-Free (SPF) Macaque Colonies

Macaques are the premier research model for Human Immunodeficiency Virus (HIV)/AIDS. For example, rhesus macaques infected with the simian immunodeficiency virus (SIV)—the NHP equivalent of human HIV—are used to address basic research questions on viral infection routes and reservoirs as these cannot be explored in humans. Likewise, the SIV-infected macaque serves as a model for developing vaccines, infection prevention barriers/devices, and new therapeutics that are not readily studied in human patients. The presence of certain viruses in experimental animals can confound the results of AIDS-related investigations. Therefore, a consortium of ORIP-funded SPF macaque colonies was developed that provides SPF macaques for AIDS research that are free of SIV, Type D simian retrovirus, simian T-lymphotropic virus, and herpes B virus. In addition, SPF macaques are characterized for major histocompatibility class I alleles known to be associated with SIV viral load and rate of disease progression. ORIP supports SPF rhesus macaque colonies at the California, Oregon, Southwest, Yerkes, and Tulane NPRCs and at the Caribbean Primate Research Center in Puerto Rico. Additionally, SPF pigtail macaque colonies are maintained at the Washington NPRC and at the Johns Hopkins University School of Medicine. Visit the [ORIP website](#) for more details on supported SPF macaque resources.

## Other Nonhuman Primate Research Resources

**Baboon Research Resources:** Relative to most other NHP models, baboons share the greatest similarity to humans in

terms of their size, year-round breeding, and placental biology. Of existing NHP models used for research in the U.S., baboons have the most similar immune system to humans and are critical for vaccine development, xenotransplantation, and studies of infectious disease and bacterial sepsis. The [baboon colony](#) at MD Anderson Cancer Center's Michale E. Keeling Center for Comparative Medicine and Research (KCCMR) is maintained free of infection from an extensive list of viruses, bacteria, and parasites and is a valuable research resource for studies requiring their unique similarities to humans without the complicating influences of coinfections.

## The Caribbean Primate Research Center (CPRC):

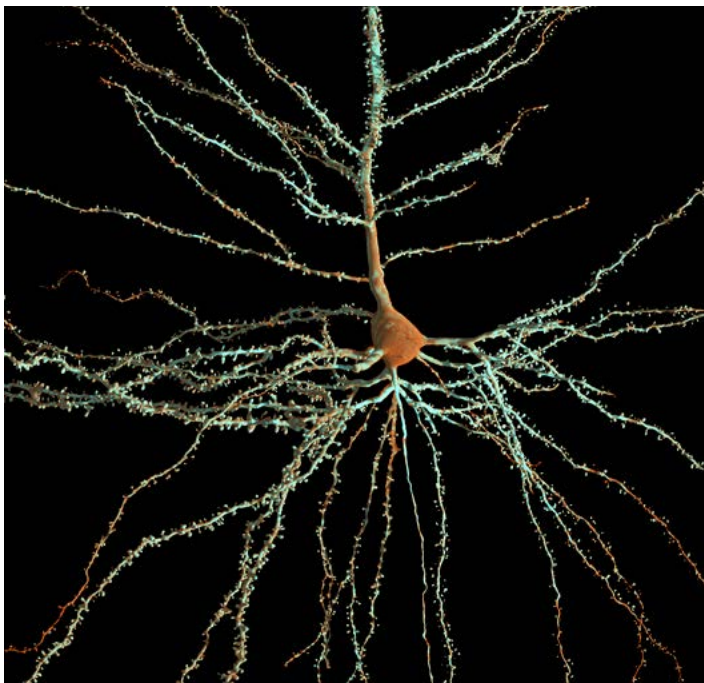
The CPRC maintains conventional and SPF macaque colonies. Additionally, the [CPRC](#) maintains a free-ranging colony of rhesus macaques of purely Indian origin. This colony was established over 70 years ago from a substantial founder population and has maintained relatively low levels of inbreeding. This colony provides a unique resource for research in a naturalistic setting. The CPRC supports researchers at other institutions and collaborations onsite and has active programs in virology (especially SIV and West Nile, dengue, and Zika viruses), genetics, diabetes, parasitology, behavior, cognition, and anatomy.

**Vervet Research Colony:** Vervets, or African green monkeys, exhibit similarities to humans, such as their reproductive biology, development of cardiovascular disease and type 2 diabetes on a Western diet, and growth of amyloid plaques with age. These features have made the Caribbean-origin [vervet](#) colony located at Wake Forest University Primate Center a valuable model that has demonstrated particular advantages in the study of cardiovascular, neurological, and metabolic diseases of humans.

**Squirrel Monkey Breeding and Research Resource:** Also housed at KCCMR, this is the only national [squirrel monkey](#) breeding and research resource available for biomedical research. The combination of their small size and greater similarities to human brain structure relative to non-primate small mammals makes squirrel monkeys particularly valuable for neuroscience research.

**NHP Reagent Resource (NHPRR):** The [NHPRR program](#) at the University of Massachusetts Medical School is an essential source of antibodies, immunoglobulins, cell lines, and recombinant proteins specific to NHPs. The NHPRR has provided reagents to more than 100 independent research projects and has served to increase the precision and predictability of NHP research and the use of NHPs as models of human disease. This resource offers reagents for *in vitro* diagnostics or *in vivo* administration in NHPs.

Visit the [ORIP website](#) for more details on other supported NHP research resources.



Pyramidal cell from the prefrontal cortex of a macaque. The NPRCs offer a wide variety of resources for research with nonhuman primates, including advanced microscopy.

Photo Credit: John Morrison of the University of California at Davis