

5P51RR000165-42

REPORT PERIOD: 05/01/2002-04/30/2003

COPY

Final

**NATIONAL INSTITUTES OF HEALTH  
DEPARTMENT OF HEALTH AND HUMAN SERVICES**

**NATIONAL PRIMATE RESEARCH CENTERS (NPRC) PROGRAM  
DIVISION OF COMPARATIVE MEDICINE  
NATIONAL CENTER FOR RESEARCH RESOURCES**

5P51RR000165-42

**YERKES NATIONAL PRIMATE RESEARCH CENTER**

Final

**EMORY UNIVERSITY**

**EMORY UNIVERSITY WOODRUFF HEALTH SCIENCES CENTER**

**ANNUAL PROGRESS REPORT**

Reporting From: 05/01/2002

Reporting To: 04/30/2003

47.408% AIDS Related



Signature

Date

**STUART M ZOLA, PHD  
DIRECTOR, YERKES REGIONAL PRIMATE  
RESEARCH CENTER,  
Phone: 404-727-7707  
Fax: 404-727-0623  
e-mail: zola@rmy.emory.edu**

Patent or Copyright was not awarded this grant year.

Printed on: 4/30/2003 11:42:15AM

**COLONY STATISTICS****Base Breeding Colony Only**

Note: These animals are supported by NCRR Comparative Medicine.

| <sup>1</sup> Genus Species     | May-02       | <sup>2</sup> Live Births | <sup>3</sup> Other Additions | Exper. Use | <sup>4</sup> Other Reduct. | <sup>5</sup> Sold or Trans. | <sup>6</sup> Trans. in Center | Apr-02       |
|--------------------------------|--------------|--------------------------|------------------------------|------------|----------------------------|-----------------------------|-------------------------------|--------------|
| <b>CERCOCEBUS ATYS (SPF)</b>   |              |                          |                              |            |                            |                             |                               |              |
| Adult Females(SPF)             | 28           | 0                        | 0                            | 0          | 0                          | 0                           | 0                             | 28           |
| Adult Males(SPF)               | 22           | 0                        | 0                            | 0          | 0                          | 0                           | 0                             | 22           |
| Infants/Juveniles(SPF)         | 32           | 1                        | 1                            | 0          | 1                          | 0                           | 0                             | 33           |
| <b>MACACA MULATTA</b>          |              |                          |                              |            |                            |                             |                               |              |
| Adult Females                  | 163          | 0                        | 0                            | 0          | 1                          | 0                           | 14                            | 148          |
| Adult Males                    | 26           | 0                        | 0                            | 0          | 1                          | 0                           | 0                             | 25           |
| Infants/Juveniles              | 136          | 67                       | 0                            | 0          | 5                          | 0                           | 13                            | 185          |
| <b>MACACA MULATTA (SPF)</b>    |              |                          |                              |            |                            |                             |                               |              |
| Adult Females(SPF)             | 259          | 0                        | 0                            | 0          | 4                          | 0                           | 44                            | 211          |
| Adult Males(SPF)               | 18           | 0                        | 0                            | 0          | 1                          | 0                           | 5                             | 12           |
| Infants/Juveniles(SPF)         | 422          | 195                      | 42                           | 0          | 74                         | 0                           | 66                            | 519          |
| <b>MACACA NEMESTRINA</b>       |              |                          |                              |            |                            |                             |                               |              |
| Adult Females                  | 41           | 0                        | 0                            | 0          | 5                          | 0                           | 7                             | 29           |
| Adult Males                    | 12           | 0                        | 0                            | 0          | 0                          | 0                           | 1                             | 11           |
| Infants/Juveniles              | 46           | 13                       | 0                            | 0          | 2                          | 0                           | 4                             | 53           |
| <b>MACACA NEMESTRINA (SPF)</b> |              |                          |                              |            |                            |                             |                               |              |
| Adult Females(SPF)             | 51           | 0                        | 0                            | 0          | 2                          | 0                           | 14                            | 35           |
| Adult Males(SPF)               | 10           | 0                        | 0                            | 0          | 0                          | 0                           | 7                             | 3            |
| Infants/Juveniles(SPF)         | 87           | 31                       | 6                            | 0          | 24                         | 0                           | 20                            | 80           |
|                                | <b>1,353</b> | <b>307</b>               | <b>49</b>                    | <b>0</b>   | <b>120</b>                 | <b>0</b>                    | <b>195</b>                    | <b>1,394</b> |

1 - Animals that are known free of SIV, STLV, SRV/D and Herpes B

2 - Live birth defined as inflated lungs

3 - Purchased from outside Center or transferred from another colony within the Center

4 - Includes deaths due to intercurrent diseases and other causes

5 - Permanent transfer or sale to outside the Center

6 - Transferred to another colony within the Center

## Research Colony Only

Note: These animals are supported by NCCR Comparative Medicine.

| <sup>1</sup> Genus Species | May-02       | <sup>2</sup> Live Births | <sup>3</sup> Other Additions | Exper. Use | <sup>4</sup> Other Reduct. | <sup>5</sup> Sold or Trans. | <sup>6</sup> Trans. in Center | Apr-03       |
|----------------------------|--------------|--------------------------|------------------------------|------------|----------------------------|-----------------------------|-------------------------------|--------------|
| <b>CEBUS APELLA</b>        |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 14           | 0                        | 0                            | 0          | 0                          | 1                           | 0                             | 13           |
| Adult Males                | 8            | 0                        | 0                            | 0          | 0                          | 3                           | 0                             | 5            |
| Infants/Juveniles          | 8            | 4                        | 0                            | 0          | 0                          | 2                           | 0                             | 10           |
| <b>CERCOCEBUS ATYS</b>     |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 101          | 0                        | 0                            | 0          | 15                         | 0                           | 0                             | 86           |
| Adult Males                | 94           | 0                        | 0                            | 0          | 7                          | 0                           | 0                             | 87           |
| Infants/Juveniles          | 3            | 0                        | 0                            | 0          | 1                          | 0                           | 0                             | 2            |
| <b>MACACA ARCTOIDES</b>    |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 1            | 0                        | 0                            | 0          | 0                          | 1                           | 0                             | 0            |
| <b>MACACA FASCICULARIS</b> |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 1            | 0                        | 0                            | 0          | 0                          | 0                           | 0                             | 1            |
| Adult Males                | 17           | 0                        | 0                            | 0          | 0                          | 0                           | 0                             | 17           |
| <b>MACACA MULATTA</b>      |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 489          | 0                        | 62                           | 30         | 22                         | 7                           | 0                             | 492          |
| Adult Males                | 393          | 0                        | 23                           | 69         | 4                          | 5                           | 0                             | 338          |
| Infants/Juveniles          | 374          | 143                      | 133                          | 42         | 40                         | 2                           | 0                             | 566          |
| <b>MACACA NEMESTRINA</b>   |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 70           | 0                        | 21                           | 5          | 9                          | 25                          | 0                             | 52           |
| Adult Males                | 33           | 0                        | 10                           | 8          | 1                          | 9                           | 0                             | 25           |
| Infants/Juveniles          | 41           | 22                       | 24                           | 7          | 6                          | 42                          | 0                             | 32           |
| <b>PAN TROGLODYTES</b>     |              |                          |                              |            |                            |                             |                               |              |
| Adult Females              | 82           | 0                        | 0                            | 1          | 2                          | 0                           | 0                             | 79           |
| Adult Males                | 63           | 0                        | 0                            | 0          | 2                          | 0                           | 0                             | 61           |
| Infants/Juveniles          | 9            | 0                        | 0                            | 0          | 0                          | 0                           | 0                             | 9            |
| <b>PAPIO</b>               |              |                          |                              |            |                            |                             |                               |              |
| Adult Males                | 24           | 0                        | 0                            | 12         | 0                          | 0                           | 0                             | 12           |
| Infants/Juveniles          | 16           | 0                        | 0                            | 4          | 1                          | 0                           | 0                             | 11           |
| <b>SAIMIRI SCIUREUS</b>    |              |                          |                              |            |                            |                             |                               |              |
| Adult Males                | 39           | 0                        | 0                            | 0          | 2                          | 0                           | 0                             | 37           |
| Infants/Juveniles          | 15           | 0                        | 10                           | 0          | 0                          | 0                           | 0                             | 25           |
|                            | <b>1,895</b> | <b>169</b>               | <b>283</b>                   | <b>178</b> | <b>112</b>                 | <b>97</b>                   | <b>0</b>                      | <b>1,960</b> |

1 - Animals that are known free of SIV, STLV, SRV/D and Herpes B

2 - Live birth defined as inflated lungs

3 - Purchased from outside Center or transferred from another colony within the Center

4 - Includes deaths due to intercurrent diseases and other causes

5 - Permanent transfer or sale to outside the Center

6 - Transferred to another colony within the Center

An Optix Imaging System was ordered to image and archive records, and imaging has begun for some of the oldest records. Many of the older records (some created as long ago as 1929) are in fragile condition and need attention before they deteriorate further. The Optix system will allow old records to be stored electronically, with easy access, while the original records will be conserved and archived. Records that are more recent can be imaged and stored off-site as well to allow for easy access without the space required to store paper records.

- **Primate Enrichment**

The Primate Enrichment Unit is headed by Dr. Mollie Bloomsmith, who was recruited subsequent to Dr. Baker's departure in August, 2002. Dr. Bloomsmith began on a part-time basis, while continuing her work at Zoo Atlanta, before beginning full time in April, 2003.

Daily enrichment is implemented by Animal Care and Primate Enrichment personnel. The Primate Enrichment Unit has two research and two animal care technicians. The effectiveness of environmental enrichment activities depends upon collaboration between the Enrichment Unit, Veterinary Medicine and Animal Care. It also requires careful coordination with research personnel. Therefore, inter-departmental communication and continued training and development are key. Relevant efforts in 2002 - 2003 reporting period include:

- Drs. Bloomsmith (August, 2002 onwards) and Baker (prior to August, 2002) reviewed 110 protocols before applications were submitted to the IACUC Committee. Through this mechanism of Enrichment Consultations, the appropriateness of scientific justifications for research-required enrichment restrictions was evaluated. This process also ensures that investigators are aware of the widening options for enrichment implementation, and permit increased tailoring of enrichment implementation to specific research projects.
- Information related to behavior and enrichment is now discussed at least once per month at routine meetings of the animal care staff.
- A full-day orientation to the enrichment program and procedures is now a part of initial on-the-job-training for new animal care staff members.
- A formal process has been set-up to review and approve or disapprove suggestions for new types of enrichment.
- Documentation of daily implementation of enrichment interventions is required and these data are routinely compiled and distributed by the Enrichment Unit.

The Yerkes Environmental Enhancement Plan involves a number of strategies that are implemented according to animal needs and research requirements. Several enrichment techniques are used concurrently with each individual primate, scaled to the

number and intensity of other feasible elements. The enrichment program was enhanced in the 2002 - 2003 reporting period in the following ways:

- **Conspecific social contact:** A top priority is to increase social housing in our primate population, particularly at the Main Center, the focus where traditional cage environments predominate. Introductions of just under 250 animals were conducted during the reporting period. The goal of each introduction was the greatest extent of social contact permitted by research protocol. Some projects required partial-contact panels or intermittent social housing, while others were compatible with full-access social housing. While not all introduction attempts were successful, to date these interventions have resulted in an increase in the percentage of the Main Center primate population that is socially housed, from 27% to 34%.
- **Feeding enrichment:** Forage boards continue to be used as the primary feeding enrichment vehicle. Hard plastic balls with holes drilled are frozen with small bits of food inside and are also used. Several new feeding enrichment devices are being tested—a simulated termite fishing device that will allow chimpanzees to use tools to work for food, a "pump feeder" that allows monkeys to work for small amounts of food using a pumping action, and a feeder board with many small holes to elicit time consuming foraging from caged monkeys.
- **Structural enhancements:** A number of structures were installed in several Field Station compounds and runs. These included additional privacy walls, PVC structures with barrels and swings attached, and other swings and tarps to give shade to run-housed animals in the warm months. We continued to use "privacy panels" for some caged monkeys that provide them with a visual barrier from aggressive social interaction with others within visual contact, or from research- or husbandry-related procedures.
- **Manipulable objects and devices:** Approximately 3,670 toys were purchased in during the reporting period. Manipulable objects are an important component of standard enrichment for every primate at the Center. During the reporting period, evaluation of hand-held mirrors as enrichment for great apes was initiated and 12 new mirrors were ordered. Enrichment options that do not involve foraging are particularly valuable for providing extra stimulation to animals on research protocols with standard feeding enrichments, and for animals that are overweight.
- **Sensory enrichment:** Radios are routinely used in many animal areas. Videotapes are shown as enrichment to all great apes temporarily housed inside in single caging, at both the Main Center and Field Station.

## RESEARCH RESOURCES

The Division of Research Resources is primarily a service unit that includes the following activities and units: (1) Office of the Associate Director for Research Resources, (2) Service Pathology, (3) Research support for onsite and off-site investigators, (4) Collection and distribution of nonhuman primate biological specimens, (5) Occupational Health and Initial Orientation/Training Program and (6) Environmental Health Safety Program and (7) Regulatory Compliance.

### Office of Associate Director for Research Resources

The Office of the Associate Director for Research Resources provides centralized administration and coordination of the Center's research support services. This entails (1) monitoring of our animal care and use program and facilities to insure compliance with all regulations and requirements of USDA, NIH, AAALAC and other regulatory agencies, (2) provision of a diagnostic pathology service to the Center in support of the clinical care of the animal colony as well as support for ongoing research projects, (3) provision of research support, as needed, to investigators in support of their ongoing research, (4) collection and distribution of nonhuman primate biological specimens (blood, tissues, etc.) to Yerkes and non-Yerkes investigators, and (5) provides oversight and coordination of the Center's Occupational Health Program, the Environmental Health and Safety Program, and the initial orientation and training of all new employees and students who work at the Center. Our overall goal is to provide the resources, services and support structure needed to enhance and facilitate research at the Center.

### Service Pathology

**Necropsy Service:** During the reporting period, 412 nonhuman primates were submitted for postmortem examination, and 86 biopsies were submitted for histopathologic evaluation. When compared to the preceding year (2001), this represents an increase of 1.7% (7 cases) in the number of necropsies; the number of biopsies decreased 52% during the same period.

Postmortem examinations done in 2002 can be categorized as follows:

| <u>Category</u>                                | <u>Total #</u> | <u>% Total</u> |
|--|----------------|----------------|
| Deaths Associated with Experimental Procedures | 192            | 46.6           |
| Deaths During Quarantine Period                | 0              | 0              |
| Deaths Associated with Clinical Problems       | 109            | 26.4           |
| Abortuses/Stillbirths                          | 52             | 12.6           |
| Neonatal Deaths                                | 37             | 9.0            |
| Deaths Due to Accidents/Fights/Trauma          | 20             | 4.9            |
| Necropsies on Other Than Center Animals        | 2              | 0.5            |

| <u>Observation</u>                       | <u>Total #</u> | <u>% Total</u> |
|--|----------------|----------------|
| Animals with Parasite Infections         | 14             | 3.4            |
| Animals with Pneumonia                   | 19             | 4.6            |
| Animals with Gastritis/Enteritis/Colitis | 94             | 22.8           |
| Animals with Tumors                      | 13             | 3.1            |
| Animals with Tuberculosis                | 0              | 0              |
| Animals with Mycobacteriosis             | 3              | 0.7            |
| Animals with Shigellosis                 | 4              | 1.0            |
| Animals with Salmonellosis               | 0              | 0              |
| Animals with Amyloidosis                 | 18             | 4.4            |
| Animals with Yersiniosis                 | 9              | 2.2            |
| Animals with Campylobacteriosis          | 70             | 17.0           |
| Animals with Listeriosis                 | 7              | 1.7            |

Selected postmortem observations recorded during the reporting period are summarized as follows:

Thirteen animals (3.1% of necropsies) were found to have neoplasms. Tumors encountered included:

| <u>Species</u>     | <u>Sex</u> | <u>Age</u>      | <u>Tumor Type</u>   |
|--------------------|------------|-----------------|---|
| Squirrel<br>Monkey | M          | 20 yr.<br>7 mo. | Adenocarcinoma,<br>Biliary, Liver, Interstitial Cell<br>Tumor, Testicle |
| Mangabey<br>Monkey | F          | 27 yr.<br>6 mo. | Carcinoma, Cervix with Lung<br>Metastasis                               |
| Mangabey<br>Monkey | F          | 25 yr.<br>8 mo. | Adenocarcinoma,<br>Nasal Cavity   |
| Mangabey<br>Monkey | F          | 10 yr.<br>1 mo. | Carcinoma, Gastric  |
| Mangabey<br>Monkey | F          | 24 yr.          | Lymphoma, Multifocal  |
| Mangabey<br>Monkey | M          | 11 yr.<br>5 mo. | Carcinoma, Gastric  |
| Rhesus<br>Monkey   | F          | 19 yr.<br>8 mo. | Carcinoma, Ileo-colic Junction  |
| Rhesus<br>Monkey   | F          | 19 yr.<br>3 mo. | Carcinoma,<br>Cecal-colic Junction                                      |
| Rhesus<br>Monkey   | F          | 21 yr.<br>6 mo. | Carcinoma, Disseminated*  |
| Rhesus<br>Monkey   | F          | 16 yr.<br>5 mo. | Carcinoma, Ileo-colic Junction  |
| Rhesus             | F          | 18 yr.          | Carcinoma, Ileo-colic Junction  |