ENVIRONMENTAL ENRICHMENT PLAN FOR NON-HUMAN PRIMATES

PERFORMANCE STANDARD: Nonhuman primates housed at the Duke University Medical Center (DUMC) and Duke University will be provided with species-appropriate enrichment and opportunities to express species-specific behaviors that meet or exceed regulatory requirements. Primates will be managed according to a humane and enriched environment.

ROLES:
1. Research and DLAR/DLC staff will abide by the institution’s policy as described in this document unless PRIOR approval for an exemption has been obtained from the IACUC.
2. Researchers will submit an annual exemption with the Annual Progress Report for each protocol request if they desire continuation of the exemption to environmental enrichment.
3. The DLAR Enrichment Committee consists of members from DLAR and OAWA as well as protocol personnel. DLC communicates with the DLAR Enrichment Committee, as needed.
4. For more information on single housing, please refer to the Policy “Social Housing of Animals.”

PROTECTIVE POSTURES REQUIRED: Personnel Protective Equipment (PPE) routinely required for normal activity in animal rooms is also required when individuals are providing enrichment.

DEFINITION:
- Non-human primate: For purposes of this policy non-human primates include prosimians and monkeys.

BACKGROUND: Primates have unique and special requirements to assure well-being and adequate care. These may be defined in a variety of ways, to include:

1. Social Environment: Non-human primates are housed with other members of their species in a limited number of social contexts. These include small, full-contact groups housed in interconnected cages, pairs with varying levels of social contact, single cages within sensory contact of other animals, and free-range opportunities. In addition, many of the primates have regular periods of human interaction in training sessions with members of the Principal Investigator’s staff, the veterinary staff, behavioral & enrichment staff, and animal husbandry staff.

2. Structural Environment:
   a. Structure and substrate: The structure and substrate found within each non-human primate housing environment allows for the expression of species typical activities. DLAR/DLC provides each nonhuman primate with an elevated perch, and may provide other perching and climbing apparatuses when appropriate. Additionally, Aotus spp. and marmosets may be maintained in a reverse light cycle to allow for more natural feeding and activity patterns. Activity units have an elevated perching platform. Gang cages have elevated perching platforms and visual blocks within the enclosure.
   b. Manipulanda: Each non-human primate is provided with manipulanda specific to its housing environment. These include filler toys such as plastic jingle balls, Kong toys®, and dental ball chews, hanging toys (e.g. tug toys, rattles), and may also include additional hanging apparatuses such as mirrors, acrylic toys, puzzle feeders, and foraging boards.
3. **Sensory Environment:**
   
   c. **Television/Radio:** A television, radio/CD player, or digital media may be rotated through primate rooms on a regular basis.
   
   d. **Food Items:** Each non-human primate receives a relatively novel food item at least three times weekly. Novel foods are any food other than the animal’s standard feed, and can include fruits (such as apples, applesauce, bananas, oranges, grapes, raisins, or dry preserved apricots, mango slices, cherries, pineapple bits, etc.), vegetables (such as leafy greens, carrots or sweet potatoes), nuts (such as sunflower seeds or peanuts), manufactured treats (such as Primatreats®, foraging crumbles, foraging discs, sweetened cereals, marshmallows), or other treats (such as popcorn).

4. **Animal Training:** Certain non-human primates are trained by the Principal Investigators' staff members or the DLAR/DLC behavior & enrichment staff. These training sessions are focused on cooperation of the non-human primates with regular procedures, treatments, and study-related activities. These may include, but are not limited to, activities such as pole and collar training, accepting intramuscular injections, jumping into transfer boxes or chairs, moving joysticks to align light patterns, and recognition of light patterns. Many of these training protocols are based on IACUC-approved positive reinforcement schedules that use liquids and/or food as a reward. These are interactive sessions with the goal of facilitating research or veterinary procedures.

5. **Documentation:** The Principal Investigators maintain records on individual non-human primates to document daily food and fluid intake (when the animals are on IACUC approved, metered food and/or water provisions), body weights and performance on training procedures. In addition, the DLAR/DLC maintains permanent individual medical records of all non-human primates and environmental enrichment.
SPECIAL NOTES:

A. **RESEARCH EXEMPTIONS:** Exemptions to enrichment based upon research needs must be considered and approved by the IACUC before initiation of the exemption. The consideration of the exemption requires Full Committee review. The exemption must be reconsidered annually by the Full Committee.

B. **POST SURGICAL CARE:** Researchers DO NOT require an exemption for restricted cage sizes less than the recommended caging size (e.g. ICU caging) of immediate post-operative recovery patients. Post-operative recovery is defined as from the time of surgery up to 7 days post-surgery. Animals should retain the ability to make normal postural adjustments with adequate freedom of movement, including sitting, standing, and turning around.

C. **CLINICAL VETERINARY CARE:** The Attending Veterinarian or his designee (see veterinary authority policy) may modify animal care provisions for issues based on animal health, animal condition, or animal well-being. When the modifications are not part of the approved protocol, they must be in writing, specific for the affected animal(s), and written in the animal’s medical record. Clinical veterinary care modifications longer than 60 days require IACUC notification.

D. **FORAGING SPECIES:** Feed on the cage floor, on top of cage, or placed in the bedding is considered a positive animal welfare activity that encourages species-specific foraging behavior. Feed must be monitored for fungus, mold, or wetness and replaced when these conditions exist.

APPENDIX A: DLAR Socialization Plan
THE PLAN FOR SOCIALIZATION AND PAIR HOUSING IN NHP (EXCLUDING BABOONS):

Socialization of Non-human Primates

1. All non-human primates being considered for socialization are assessed for the following criteria (in order):
   - Exemption status
   - Species of animal
   - Viral status (SRV, SIV, STLV1, HERPES B, HERPES papio)
   - Current protocol
   - Age, weight, and sex of animal
   - History of social/individual housing
   - Current health status
   - Behavioral Observations

2. The Principal Investigator and/or their staff, DLAR Operational manager, and DLAR veterinarian will all be consulted before any non-human primate socialization.

3. Non-human primate socialization will be coordinated with tuberculin testing and cage wash schedule where possible.

4. Formation of pairs, trios, and other cage-housed groups:
   - Socialization is conducted in five steps, with the goal being continuous pair-housing for as many animals as possible. If possible, different combinations of animals may be tried to find the best partner for each animal and to maximize the number of individuals that can be pair-housed. Animals are allowed to advance to subsequent steps in the procedure as long as they exhibit consistent, directional dominant/subordinate behavior towards one another, as measured by approach/retreat interactions and threat/submission gestures. Pairs may be considered incompatible if one partner continually attempts to escape from the other, the aggression is severe and does not decrease, or, in later stages, the dominant animal exhibits inadequate food sharing. The timeframe for moving animals to subsequent levels is determined on a case-by-case basis. Pairs that cannot safely proceed to the next step and cannot be paired with any other individuals may be halted indefinitely at one level in order to provide those pairs with the most socialization possible without endangering the animal's health. In addition, pairs that have reached advanced stages may be demoted to an earlier stage if they have been separated for long periods of time or if they exhibit incompatibility. Details on the socialization process are maintained on the socialization log (e.g. forming a new pair or re-socialization). Example Figure 1.

The steps:
   a. Observation of animal personality and social interactions: Personnel observe animals as they interact with each other through their cage walls. Animals have no physical contact during this time.
   b. Limited-contact familiarization: Animals can touch one another through a partition but can retreat if they feel threatened.
   c. Supervised pairing: Animals are allowed physical access to one another while personnel monitor them continuously. At least two, trained individuals will be present during the initial, supervised introduction period. A net, glove, hose, air horn, etc. is readily available to separate the animals in case severe aggression occurs. In order for the animals to establish dominance, some aggression is tolerated at the discretion of the person monitoring.
   d. Pairing with intermittent supervision: Animals are paired for part of the day and are checked periodically.
   e. Continuous pairing: Refers to pairing animals 24 hours a day (minus the time an animal is taken out of its cage for research/medical purposes) or for weekends. Animals are checked at least once daily, and compatibility is reevaluated on a regular basis.
5. The staff will observe any new socialization continuously for at least one hour after the animals are first given contact and then periodically throughout the day. The behavior staff will then monitor the socialization closely for at least one week.

6. The staff will post a notice indicating the date and applicable animal numbers on the door of any room in which a new socialization has been formed.

7. If severe fighting or wounding occurs during a socialization, animals are separated and the DLAR veterinary staff is notified of any injuries. A baseline chart of compatible pairs and those in progress will be maintained.

8. The staff will make an entry in the permanent medical record (pair housing log and/or behavioral log) of any non-human primate socialized, including the identification numbers of those with whom it has been socialized.

9. When experience or data are inadequate to determine the effects of the socialization procedure on the psychological or physical well-being for a given species, the socialization process may be more gradual and guarded. In these cases, a specific socialization plan will be reviewed by the IACUC and the plan will be included as an addendum to this environmental enrichment plan.

Behavioral Record Keeping for Non-human Primates: A monthly behavioral management tracking form will be maintained for each nonhuman primate (Example Figure 2A). This form will contain the non-human primate number, name, sex, date, time observed, and normal & abnormal behaviors observed. The abnormal behaviors observed will then be rated mild, moderate, or marked. The severity of these abnormal behaviors coincides with the Behavioral Response Plan sheet (Example Figure 2AB) which gives a planned outline of activities in order to help combat the abnormal behaviors. The response plan will commence after communication with the clinical veterinarian and the lab staff. Each individual medical record will be used to chart any behavioral problems that are observed. The record will contain the date the abnormal behavior is noted, the health status by observation, and any recommendations for improvement of the behavior as it coincides with the behavioral response plan. The medical records will be updated on a regular basis until the abnormal behavior has abated. The record will be kept 'open' if a behavior is an ongoing problem. Any problem noted will be brought to the attention of the veterinary staff and the lab staff. Both parties will be in agreement of the behavior modification. This modification may include: more manipulanda, foraging boards, pair housing if possible, more sensory contact, or other treatments that are agreed on.

Exemptions from the DLAR Enrichment Plan:

Note: In accordance with 9 CFR § 3.81, Environmental enhancement to promote well-being, a non-human primate may be exempted from some or all of an environmental enrichment plan for health or experimental reasons.

Section 9 CFR § 3.81, Environmental enhancement to promote psychological well-being states: "(e) Exemptions:

1. The attending veterinarian or designee may exempt an individual non-human primate from participation in the environment enhancement plan because of its health or condition, or in consideration of its well-being. The basis of the exemption must be recorded by the attending veterinarian for each exempted non-human primate. Unless the basis for the exemption is a permanent condition, the exemption must be reviewed at least every 30 days by the attending veterinarian.

2. For a research facility, the Committee may exempt an individual non-human primate from participation in some or all of the otherwise required environment enhancement plans for scientific reasons set forth in the research proposal. The basis of the exemption shall be documented in the
approved proposal and must be reviewed at appropriate intervals as determined by the Committee, but not less than annually.

3. Records of any exemptions must be maintained by the dealer, exhibitor, or research facility and must be made available to USDA officials or officials of any pertinent funding Federal agency upon request.

4. Approved exemptions and changes to exemption status are filed with the protocol.

5. The DLAR Behavior and Enrichment staff reviews and documentation of exemptions annually.
Environmental Enrichment Plan for Non-Human Primates
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Date of last IACUC approval: 07-23-15

**Figure 1**

**DLAR Non-Human Primate Enrichment Log**

<table>
<thead>
<tr>
<th>Animal ID &amp; Name</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Sat.</th>
<th>Sun.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>T</td>
<td>S</td>
<td>PC</td>
<td>EE</td>
<td>SE</td>
<td>F</td>
</tr>
</tbody>
</table>

**INITIALS**

**M = Manipulanda**: At least two different toys should be available inside each NHP’s cage daily. Toys include but are not limited to: jingle bells, lollipops, dental chews, hard rubber chews, tug toys, solid balls, swing, dumbbell, tie, football, PVC tube, nesting boxes, perches, and items that hang outside of the cage (mirrors, acrylics, etc) are extra. (Check box if manipulanda is OK, or record item code as appropriate)

**T = Toy Rotation**: At least two different toys should be available inside each NHP’s cage daily. Toys include: jingle bells, lollipops, dental chews, hard rubber chews, tug toys, solid balls, swing, dumbbell, tie, football, PVC tube, nesting boxes, perches, and items that hang outside of the cage (mirrors, acrylics, etc) are extra. (Check box if manipulanda is OK, or record item code as appropriate)

**TR = Toy Rotation, CC = Cage Change out**: Aotus, Squirrel Monkeys, and Marmosets should always have a Nest Box

**A = Aotus**: At least two different toys should be available inside each NHP’s cage daily. Toys include: jingle bells, lollipops, dental chews, hard rubber chews, tug toys, solid balls, swing, dumbbell, tie, football, PVC tube, nesting boxes, perches, and items that hang outside of the cage (mirrors, acrylics, etc) are extra. (Check box if manipulanda is OK, or record item code as appropriate)

**R = Room**: Animals may have full contact, partial contact during the day, or protective contact when properly socialized by Enrichment Staff. (Check box as appropriate)

**PC = Play Cages**: Animals have access to larger area than required by USDA & The Guide (Check box as appropriate)

**EE = Extra Enrichment**: EE includes but is not limited to: Frozen fruit, Ice-cubes, Frozen Juice, Enrichment in bowl/bottle, Jellies, Puzzles, Cups, Puzzle Feeders, Bags/Boxes, Paper, New Toys, Food, Enrichment devices, etc. (Check box as appropriate)

**G = Grana**: Animals have access to larger area than required by USDA & The Guide (Check box as appropriate)

**SE = Sensory**: Animals are given min. 30min TV, TV time or 30 min. R-radio/CD music per week. May also include putting SN- scents in drain, on paper, or on toys. (Record item code as appropriate)

**F = Foraging**: Animals have access to larger area than required by USDA & The Guide (Check box as appropriate)

**SN = Snack**: Animals have access to larger area than required by USDA & The Guide (Check box as appropriate)

**J = Jellies**: Animals have access to larger area than required by USDA & The Guide (Check box as appropriate)

**PB = Popcorn, Sunflower or Other Seeds, Dried Fruit, Macaroni, Fruity Gems, Foraging Crumbles, Veggie Bites, Nuts, CS-Cheewstick or Bamboo**: Animals have access to larger area than required by USDA & The Guide (Check box as appropriate)

**knb 09-17-13**
### Figure 2A

**Behavior Tracking Forms**

<table>
<thead>
<tr>
<th>Animal ID &amp; Name:</th>
<th>Sex (circle one)</th>
<th>Date:</th>
<th>Time Observed:</th>
<th>Length of Time:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CIRCLE APPLICABLE ABNORMAL BEHAVIORS:**

<table>
<thead>
<tr>
<th>Section A</th>
<th>Mating (umbilical)</th>
<th>Har Puling/Pucking</th>
<th>Self-slapping</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Injurious Behaviors:</strong></td>
<td>Head Banging</td>
<td>Sucking (not on genitalia)</td>
<td>Mouthing</td>
</tr>
<tr>
<td><strong>Self-directed Oral Behaviors:</strong></td>
<td>Sucking (not on genitalia)</td>
<td>Penis Suck</td>
<td>Cage Bar Mouthing</td>
</tr>
<tr>
<td><strong>Other Self-directed stereotypies:</strong></td>
<td>Self-clasping</td>
<td>Rocking/Swaying</td>
<td>Huddle</td>
</tr>
<tr>
<td><strong>Stereotypic Locomote:</strong></td>
<td>Flipping/Somersault</td>
<td>Pacing</td>
<td>Circling</td>
</tr>
<tr>
<td><strong>Abnormal Responses to Others:</strong></td>
<td>Fearful Behavior</td>
<td>Aggressive Behavior</td>
<td>(Proceed to Section C or D)</td>
</tr>
<tr>
<td><strong>Other Stereotypies:</strong></td>
<td>Bruxism (teeth grinding)</td>
<td>Floating Limb</td>
<td>Regurgitate/Reingest</td>
</tr>
</tbody>
</table>

**Socialization Information:**

- Partner(s) ID & Name: __________________
- New Pair/Group? Y N
- Comments: ____________________________

**Check Applicable Normal Behaviors:**

- Exploring □
- Sitting □
- Observing □
- Playing □
- Groom self □
- Groom partner □
- Cooing □
- Eating/Drinking □
- Foraging □
- Napping □
- Chasing cage mate (playful, nonaggressive) □

**Check Applicable Submissive Behaviors**

- Fear Grimace □
- Avoid □
- Crouching □
- Cowing □
- Presenting □
- Lip Smacking □
- Hiding Eyes □
- Retreat □

**Check Applicable Aggressive Behaviors**

- Cage Shaking □
- Lunge □
- Open Mouth □
- Stare Threat □
- Head Bob □
- Yawn □
- Barking □
- Attack □
- Chasing (not playful) □
- Other Vocalization/Threat □

- Mild: Rarely, No injuries
- Moderate: Occasionally displayed, Possible mild skin irritation/lesions
- Marked: Displayed frequently, Moderate-Severe skin irritation/lesions

**Abnormal Behavior Comments:**

(Cause? = stress, cage change out, aggressive cage mate, poor human interaction)

**CHECK APPLICABLE ABNORMAL BEHAVIORS:**

- Fear Grimace □
- Avoid □
- Crouching □
- Cowing □
- Presenting □
- Lip Smacking □
- Hiding Eyes □
- Retreat □

**CHECK APPLICABLE AGGRESSIVE BEHAVIORS**

- Cage Shaking □
- Lunge □
- Open Mouth □
- Stare Threat □
- Head Bob □
- Yawn □
- Barking □
- Attack □
- Chasing (not playful) □
- Other Vocalization/Threat □

**Initials:** ____________________________

This form will be completed no less than once per month

rev 02-04-14
<table>
<thead>
<tr>
<th>Abnormal Behavior</th>
<th>Mild</th>
<th>Moderate</th>
<th>Marked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Injurious Behavior</td>
<td>Rarely Displays, No injuries, May observe Bruising, Overgrooming with Alopecia &lt;9%</td>
<td>Occasionally Displays, Causes mild skin irritation or lesions, Alopecia 9-18%</td>
<td>Frequently Displays, Causes moderate to severe skin irritation or lesions, Alopecia &gt;18%</td>
</tr>
<tr>
<td>Self-directed Oral Behaviors</td>
<td>Rarely Displays, May observe sucking/licking cage or self</td>
<td>Occasionally Displays, Mild skin irritation around genitals or around mouth</td>
<td>Frequently Displays, Causes moderate to severe skin irritation or lesions around genitals or mouth</td>
</tr>
<tr>
<td>Response Plan</td>
<td>Initiate weekly toy rotation &amp; weekly destructable enrichment</td>
<td>Initiate 3x/week toy rotation &amp; 2x/wk destructable enrichment</td>
<td>Initiate daily toy rotation &amp; 3x/wk destructable enrichment</td>
</tr>
<tr>
<td>Self-directed Eye Behaviors</td>
<td>Rarely Displays, May be observed covering eyes</td>
<td>Occasionally Displays, Eyes may be irritated, May see poking of eyes</td>
<td>Frequently Displays, Avoidance of onlookers, Eye irritation</td>
</tr>
<tr>
<td>Response Plan</td>
<td>Initiate weekly toy rotation &amp; weekly destructable enrichment</td>
<td>Initiate 3x/week toy rotation &amp; 2x/wk destructable enrichment</td>
<td>Initiate daily toy rotation &amp; 3x/wk destructable enrichment</td>
</tr>
<tr>
<td>Other Self-directed Stereotypies</td>
<td>Rarely Displays, Engages in normal daily activities</td>
<td>Occasionally Displays, Disrupts normal routine, Decreased interactions</td>
<td>Frequently Displays, Disrupts normal routine, No interaction with humans or NHPs,</td>
</tr>
<tr>
<td>Response Plan</td>
<td>Initiate weekly toy rotation &amp; weekly destructable enrichment</td>
<td>Initiate 3x/week toy rotation &amp; 2x/wk destructable enrichment</td>
<td>Initiate daily toy rotation &amp; 3x/wk destructable enrichment</td>
</tr>
<tr>
<td>Stereotypic Locomote</td>
<td>Rarely Displays, Directed toward a particular individual, procedure, or object</td>
<td>Occasionally Displays, Disrupts normal routine, Increase noticeable repetitive movements</td>
<td>Frequently Displays, Avoidance of all individuals, procedures, objects</td>
</tr>
<tr>
<td>Response Plan</td>
<td>Increase cage space if possible, Initiate extra toy rotation</td>
<td>Increase cage space if possible, Initiate extra destructable enrichment, Begin training 1x/week to desensitize to stimulus.</td>
<td>Increase cage space if possible, Initiate extra destructable enrichment, Begin training 3x/week to desensitize to stimulus.</td>
</tr>
<tr>
<td>Abnormal Response to Others</td>
<td>Rarely Displays, Grimace or Avoidance, Lunge</td>
<td>Occasionally Displays, Disrupts normal routine, Grimace, Cage Shaking, Difficult to work with</td>
<td>Frequently Displays, Avoidance, No interaction with others, Attack, Occupational Health Concern</td>
</tr>
<tr>
<td>Response Plan</td>
<td>Begin training 1x/week to desensitize to the individual, procedure, or object,</td>
<td>Begin training 3x/week to desensitize to the individual, object, or procedure. Initiate Extra Enrichment</td>
<td>Begin training 5x/week to desensitize to the individual, object, or procedure. Initiate Extra Enrichment/Special Needs Plan</td>
</tr>
<tr>
<td>Other Stereotypies</td>
<td>Rarely Displays, Directed toward a particular individual, procedure, or object</td>
<td>Occasionally Displays, Grind Teeth, Directed towards several individuals, objects, Difficult to work with, Regurgitate, Plays with Feces</td>
<td>Frequently Displays, Reacts toward all individuals, objects with Regurgitation, Feces Smearing, Teeth Grinding</td>
</tr>
<tr>
<td>Response Plan</td>
<td>Initiate weekly toy rotation &amp; weekly destructable enrichment</td>
<td>Initiate 3x/week toy rotation &amp; 2x/wk destructable enrichment. May also begin training exercises 1-3x per week</td>
<td>Initiate daily toy rotation &amp; 3x/wk destructable enrichment. Also will begin training 1-3x weekly.</td>
</tr>
</tbody>
</table>
APPENDIX B: THE PLAN FOR BABOON SOCIALIZATION AND PAIR HOUSING

Justification

A survey of experts on baboon behavior and housing around the country revealed a wide range of opinions concerning the feasibility of pair housing baboons. No precedent was found where adult male baboons were successfully pair-housed in small indoor enclosures. Baboons need a very large space to deal with territorial issues. Because of the uncertainty of the feasibility of pair housing baboons, and to protect the health and well-being of our baboons, we plan to take a stepwise approach with the goal being pair housing of juvenile animals but having protected social contact for adults or those reaching sexual maturity. Documentation of the effects of measures taken on the behavior of the baboons will occur throughout the process. The documentation will occur on the Nonhuman Primate Socialization Log. This approach is outlined in the three stages below:

Stage 1

Newly acquired baboons will be evaluated for social housing during the quarantine period. Baboons may be paired based on their age, sex, and historical behavior from the place of origin. Baboons will be singly housed in large playpens in the same room. These pens (or cages) allow full visual and olfactory contact between the baboons. After a period of adaptation to the cages (at least three days), braces will be affixed between the cages where the cages will remain at a predetermined distance from each other. The distance from the cages will gradually be decreased over a period of time. This process will slowly acclimate the baboons to close contact and will include an approximate distance of separation starting at six inches, followed by a decrease in distance by approximately two inches until the cages are close enough for the baboons to have the opportunity to finger touch. The time that the cages remain at a set distance will be determined based on the behavior of the baboons, as they react to one another, but not less than three days. If aggressive behavior toward one another is exhibited, the distance will be maintained for a longer period until the aggressive behavior abates. If the aggressive behavior is of the severity or duration that, in the opinion of the veterinary staff, the health and well-being of the baboons is jeopardized, the baboon cages will be rearranged in the room and/or the cages will be kept apart at a further distance still allowing visual and olfactory contact.

Stage 2

After the baboons are close enough to finger touch and have shown they are amenable to this social interaction, they can be left together unsupervised. If after a minimum of one week with the smallest space holding the cages apart via the bracket system; the baboons do not have any injurious incidents; the cages will be pushed flushed together for further social contact. The animals at this stage have more opportunities to present and groom one another.

Stage 3

If the DLAR behavior & enrichment staff, in consultation with the clinical veterinarian, have found juvenile baboons or those showing very positive affiliative behaviors may be given full contact social housing. The proposed socialization will be conducted in five steps. Animals are allowed to advance to subsequent steps in the procedure as long as they exhibit consistent, directional dominant/subordinate behavior towards one another, as measured by approach/retreat interactions and threat/submission gestures. Pairs are considered incompatible if one partner continually attempts to escape from the other, the aggression is severe and does not decrease, or, in later stages, the dominant animal exhibits inadequate food sharing. The timeframe for moving animals to subsequent levels is determined on a case-by-case basis. The procedure for pair housing is defined below:

1) Observation of animal personality and social interactions: Personnel observe animals as they interact with each other through their cage walls. Animals have no physical contact during this time.

2) Limited-contact familiarization: This step can have several increments including visual contact in close proximity, finger touching, and grooming only.
3) Supervised pairing: Animals are allowed physical access to one another while personnel monitor them continuously. At least two, trained individuals will be present during the initial, supervised introduction period. A net, glove, water hose for spraying, air horn, etc. is readily available to separate the animals in case severe aggression occurs. In order for the animals to establish dominance, some aggression is tolerated at the discretion of the person monitoring.

4) Pairing with intermittent supervision: Animals are paired for part of the day and are checked periodically.

5) Continuous pairing: Refers to pairing animals 24 hours a day (minus the time an animal is taken out of its cage for research/medical purposes) or for entire weekends. Animals are checked at least once daily, and compatibility is reevaluated on a regular basis.

All of the above socialization steps will be documented by the behavior & enrichment staff. All social interactions after full-time protected contact or pair-housing will also be documented no less than one time per month.
APPENDIX C: Guidelines for DLC Enrichment

1. As of 12/01/10 it is DLC policy to provide enrichment for all animals under your care on a daily basis.
2. No enrichment category can be used more than twice weekly by the primary technician of an area.
3. Please follow the Food Enrichment guidelines developed by the DLC veterinarian staff. These guidelines can be found posted on the refrigerator in the main kitchen.
4. All enrichment items containing food OR that contained food items are to be removed from animal areas the NEXT day by the technician taking care of that area. NO EXCEPTIONS.
5. If covering an area, you may use any enrichment item of your choice regardless if it has been used that week or not. These are considered Keeper’s Choice days.
6. Record all enrichment given on the Enrichment Tab of your Animal Training records. Records can be accessed from any DLC computer.
7. All staff are required to give one form of enrichment on a daily basis. If you would like to give more, go for it! Please records all daily enrichment on your enrichment sheet.
8. All aye-ayes should receive, at minimum, one piece of enrichment that encourages chewing (i.e, wood feeders, bamboo feeders, PB sandwiches, metal boxes, etc).
9. Daily section logs will be collected and looked over every month by the Enrichment Coordinator.
10. New enrichment items (donated or created by staff) need to be approved by a veterinarian, the Technician Supervisor and the Behavioral Management Coordinator prior to being given to an animal.
11. Please record all approved new items in the enrichment database for future reference by techs (with an accompanying description and photo)
Purpose: To describe safe, acceptable items for use as enrichment with different prosimian species. To ensure animal safety, the veterinarian and the enrichment committee must approve all new forms of enrichment.

Procedure:

Approved non-food items for diurnals and nocturnals except for aye-aye:

<table>
<thead>
<tr>
<th>Substrate:</th>
<th>Structure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mulch</td>
<td>Natural branches</td>
</tr>
<tr>
<td>Sand</td>
<td>Metal poles</td>
</tr>
<tr>
<td>Pea gravel</td>
<td>Sealed 2x4 boards</td>
</tr>
<tr>
<td>Newspaper</td>
<td>PVC pipes</td>
</tr>
<tr>
<td>Shredded Paper</td>
<td>Hammocks (sheets, fleece)</td>
</tr>
<tr>
<td>Bamboo</td>
<td>Ferret bags</td>
</tr>
<tr>
<td>Pine</td>
<td>Playskool or little tyke like play sets</td>
</tr>
<tr>
<td></td>
<td>Ladders (rope, wood or bamboo)</td>
</tr>
<tr>
<td></td>
<td>Fire hose</td>
</tr>
<tr>
<td></td>
<td>Rubber hose</td>
</tr>
<tr>
<td></td>
<td>Swings made from hanging branches</td>
</tr>
<tr>
<td></td>
<td>Plastic chairs</td>
</tr>
<tr>
<td></td>
<td>Bendable rope swings</td>
</tr>
<tr>
<td></td>
<td>Cargo nets (rope, synthetic fiber, cloth - no burlap)</td>
</tr>
</tbody>
</table>

**Manipulada/Foraging**

- Cardboard boxes/tubes
- Milk crates
- Rubber tubes
- Pvc tubes
- Turf mat feeders
- Paper bags
- Phone books
- Stuffed animals
- Fleece
- Plastic baskets/tubs
- Laundry baskets
- Plastic milk jugs/juice bottles
- Raisin boards
- Kongs
- Boomer balls
- Pinecones
- Sheets

**Allowed hanging devices: synthetic ropes (no-fray only), carabiner clips, plastic chain, metal eyebolts, c-clamps.**
SENSORY

Olfactory
- Spices
- Food flavor extracts
- Fresh garlic and ginger
- Cage washing

Auditory:
- Nature CDs

OTHER
- NHEs/Free-ranging
- Painting with Lemurs

SOCIAL
- New cage mate
- New neighbor
- Stuffed animal

RESEARCH
- Select research projects (e.g. locomotion, cognition, sensory, vocalization playbacks)

TRAINING
- Formal training session

APPROVED NON-FOOD ENRICHMENT FOR AYE AYES

Manipulada/Foraging
- Metal box feeders/tubes
- Bamboo tubes for feeding gruel or insects
- Cardboard boxes and tubes
- Paper items (i.e. bags, envelopes, phone books, cups)
- Newspaper or shredded paper

Environmental
- Rotten Logs
- Bamboo for nests
- Fleece
- Pine boughs and needles for making nests

SENSORY

Olfactory
- Spices
- Food flavor extracts
- Fresh garlic and ginger
- Cage washing

Auditory:
- Nature CDs

OTHER
- Painting with Lemurs

SOCIAL
- New cage mate
- New neighbor

RESEARCH
- Select research projects (e.g. locomotion, cognition, sensory, vocalization playbacks)

TRAINING
- Formal training session

***Aye-aye should not receive plastic items or certain cloth items due to ingestion. Exceptions are to be made on a case by case basis by the veterinarian.***
APPROVED ENRICHMENT FOOD ITEMS

*****FOOD ENRICHMENT IS TO BE USED NO MORE THAN 3X WEEKLY*****

Fresh leafy browse can be offered daily if available

DIURNALS (NOT INCLUDING PROPS):

Browse (up to 25g/kg of body weight or 50-75g for an average eulemur 2.0-2.5kg)

Leafy greens and broccoli stems (up to 30g/day per animal)

Approved browse species include the following: *Albizia julibrissin* (mimosa), *Rhus copallina* (winged sumac), *Liquidambar styraciflua* (sweetgum), *Cercis Canadensis* (eastern redbud), *Robinia psuedo-acacia* (black locust – flowers only), *Carpinus caroliniana* (American hornbeam), *Liriodendron tulipifera* (tulip poplar), *Vitis rotundifolia* (muscadine grapes and grape vine), *Rosa multiflora* (wild rose), *Lonicera japonica* (honeysuckle) Bamboo lemurs are provided with immature canes and fronds of *Arundinaria gigantea* (large-leaf bamboo), *Phyllostachys aurea* (small-leaf bamboo), or *Microstegium vimineum* (Japanese stalk grass or “bamboo” grass).

Ice cube treats (2 per kg. of body weight)

4 items below = (max 1/2tsp per 2.0-2.5kg animal, or .5ml/.5kg or .1ml/100g)

- Honey (No group with infants < 6 months of age)
- Jelly
- Syrup
- Fruit Syrup

Peanut butter (1/2 tsp per 2.0-2.5kg animal)

3 items below = 10g maximum

- Raisins
- Craisins
- Dried Fruit

Sugar-free applesauce (2 TBS per animal)

3 items below = ¼ cup pre diluted by ½ unless requested by vet for medical reasons)

- Diluted fruit juice
- Gatorade
- Coconut milk

2 items below=¼ cup per 2-2.5kg animal

- Cereal (corn flakes, rice puffs, non frosted shredded wheat, chex, cheerios, bran flakes)
- Air popped popcorn
- Sugar-Free Jell-o (prepared) = (2 TBS per animal)

PROPS:

Peanut Butter (1/2 tsp per animal maximum 2x weekly)

Raisins (only allowed 10g total of fruit weekly in addition to their prescribed diet)

Craisins (only allowed 10g total of fruit weekly in addition to their prescribed diet)

Ice Treats (2 per kg. of body weight)

Coconut Milk (¼ cup pre diluted by ½ unless requested by vet for medical reasons)
3 items below to be used as part of daily nut allotment for diet or training (10g)
- Mixed nuts
- Sunflower seeds
- Coconut

**SMALL NOCTURNALS:**
- Insects
- Browse
- Hard boiled eggs
- Frozen treats

****dependant on size (.1ml/100g)***
- Honey (No group with infants under 6 months old)
- Jelly
- Syrup
- Fruit Syrup
- Peanut butter
- Raisins
- Craisins
- Sugar-free applesauce
- Diluted fruit juice
- Sugar-Free Jell-o
- Gatorade
- Coconut

**AYE-AYES:**
***See diurnal guidelines for items in common (1/500g body wt. or .5/average 2.5 kg animals)***
- Insects
- Browse
- Sugar Cane (6” piece/ once weekly)
- Tamarind
- Ice cube treats
- Jelly
- Sunflower seeds
- Peanut Butter
- Sugar-free applesauce
- Raisins
- Craisins
- Dried Fruit
- Diluted fruit juice
- Syrup
- Fruit Syrup
- Gatorade
- Fresh garlic
- Fresh ginger
- Sugar-Free jello
SELECTED REFERENCES

Specific Reference
1. University of Chicago; East Virginia Medical School, The Mannheimer Foundation, Chimphaven, NC Zoo, Albany Medical College

General


Non-Human Primates


