

AC and OLAW

Perspective on Nonhuman Primate Enrichment and Social Housing



Robert A. Willems, D.V.M.
Assistant Regional Director
Eastern Region, Animal Care
Animal and Plant Health Inspection Service
United States Department of Agriculture



Axel Wolff, M.S., D.V.M.
Director, Division of Compliance Oversight
Office of Laboratory Animal Welfare
Office of Extramural Research
National Institutes of Health

The Animal Welfare Act

1985 Amendment to the AWA

(The Improved Standards For Laboratory Animals Act)

Section 2143(a)

“(1) The Secretary shall promulgate standards to govern the humane handling, care, treatment, and transportation of animals by dealers, research facilities, and exhibitors.

(2) The standards described in paragraph (1) shall include minimum requirements —

*(B) ...for a **physical environment adequate to promote the psychological well-being of primates.**” (Emphasis added)*



AWA Regulations

Section 3.81 Environment enhancement to promote psychological well-being.

The written plan must address the following:

- (a) Social grouping.
- (b) Environmental enrichment.
- (c) Special considerations.
- (d) Restraint devices.
- (e) Exemptions.



AWA Regulations

Section 2.81 (a) Social Grouping.

*“The environment enhancement plan must include specific provisions to address the **social needs** of nonhuman primates of species known to exist in social groups in nature. Such specific provisions must be in accordance with **currently accepted professional standards**, as cited in appropriate professional journals or reference guides, and as directed by the attending veterinarian.”*
(Emphasis added)



Social Grouping: Housing as Enrichment

Group Housing

- Outdoor or indoor
 - Large open areas (outdoor)
 - Large rooms
 - Runs
 - Caging
- Research studies
- Breeding groups or colonies
- Holding
- Family groups
- Age groups, e.g., juveniles
- Compatible social groups

Pair Housing

- Generally indoor
 - Caging
 - Runs
- Compatible pairs
- Research studies



Social Housing is Required

Housing nonhuman primates in social groups is the **requirement** in the regulations. Anything else is an exception.



Exceptions

The written plan may provide for exceptions to social housing for certain animals for the following reasons:

- Vicious or overly aggressive behavior,
- Debilitation as a result of age or other conditions,
- Contagious diseases,
- Incompatibility with other animals.



Exemptions to the Enrichment Plan

Exemptions to the facility's environmental enrichment plan, including the need for social housing, can be granted for individual NHPs by:

The attending veterinarian

- For health reasons.
- In consideration of its well-being.
- Exemptions must be reviewed every 30 days unless condition is permanent.

The IACUC

- For scientific reasons set forth in a research proposal.
- Must be reviewed at appropriate intervals.



Annual Report

Registered research facilities must report all exceptions to the standards and regulations for housing NHPs approved by the IACUC on their Annual Report to USDA. That includes all IACUC-approved single-housing situations.

9CFR 2.36(b)(3)



Single Housing of NHPs

- Allowed for scientific necessity
- Must be justified
- Duration should be specified
- Must be approved by the IACUC



What is Scientific Necessity?

The need to employ or maintain certain conditions, procedures, practices, etc. in such a way that the results of the research study will be deemed to have scientific validity.



OLAW Mission Statement

OLAW provides guidance and interpretation of the PHS Policy, supports educational programs, and monitors compliance with the Policy by Assured institutions and PHS funding components to ensure the humane care and use of animals in PHS-supported research, testing, and training, thereby contributing to the quality of PHS-supported activities.



PHS Policy

PHS Policy is applicable to all PHS-conducted or supported activities involving animals.

All institutions are required to comply, as applicable, with the Animal Welfare Act, and other Federal statutes and regulations relating to animals.



Guide for the Care and Use of Laboratory Animals

- PHS Policy requires that Assured institutions base their programs of animal care and use on the *Guide*.
- In all instances where *Guide* recommendations differ from applicable legal or policy requirements, the higher standard shall apply.
- PHS Policy requires that Assured institutions comply with the applicable regulations (9 CFR, Subchapter A) issued by the USDA under the Animal Welfare Act.
- The *Guide* may differ from USDA regulations in some respects.
- Compliance with the USDA regulations is an absolute requirement of the PHS Policy.

U.S Government Principles for the Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training

- **Principle IV** Proper use of animals, including the avoidance or minimization of discomfort, distress, and pain when consistent with sound scientific practices, is imperative.
- **Principle VII** The living conditions of animals should be appropriate for their species and contribute to their health and comfort.



Guide Language on Social Housing

- Animals should be housed with a goal of maximizing species-specific behaviors and minimizing stress-induced behaviors.
- For social species, this normally requires housing in compatible pairs or groups.
- When it is appropriate and compatible with the protocol, social animals should be housed in physical contact with conspecifics.
- Appropriate social interactions among conspecifics are essential for normal development in many species.
- It is desirable that social animals be housed in groups.
- Single housing of social species should be the exception.



Advantages of Social Housing

- Reduce behavioral abnormalities
- Increase opportunities for exercise
- Expand species-typical behavior
- Increase cognitive stimulation
- Buffer effects of stress
- Essential for normal development



Social Housing Exceptions

- Not all members of a social species can or should be maintained socially.
- Successful social housing may be precluded due to experimental, health, or behavioral reasons.
- Potential risks of social housing are reduced when animals are compatible and in stable social units.



Exemptions

- The institutional veterinarian may exempt a primate from inclusion in the environmental enrichment plan due to health considerations; unless permanent, the exemption must be reviewed every 30 days.
- The IACUC may exempt a primate from enrichment and/or social housing based on scientific justification.
 - Use pilot studies to support the alternative.
 - Take into account current science not historical precedent.
- The default for primates is social housing. Clear medical or scientific justification is needed for exemption.



Enrichment

Singly housed primates should receive other forms of enrichment

- Structural environment: cage furnishings, equipment
- Nutritionally balanced varied diet
- Noncontact communication: visual, auditory, olfactory
- Toys, foraging devices, swings, items to manipulate
- Safe interactions with personnel
- Social housing during times not precluded by study requirements



IACUC Responsibilities

- Provide oversight of the behavioral management of animals
- Approve formal written plans for primate enrichment and conduct periodic reviews
- Evaluate and monitor (i.e., semiannual review) the behavioral management program and outcomes
- Exemptions from environmental enrichment must be:
 - For scientific reasons
 - Documented in the protocol
 - Approved by the IACUC
 - Re-reviewed at least annually
 - Only for the period necessary during the study



Criteria for Protocol Review

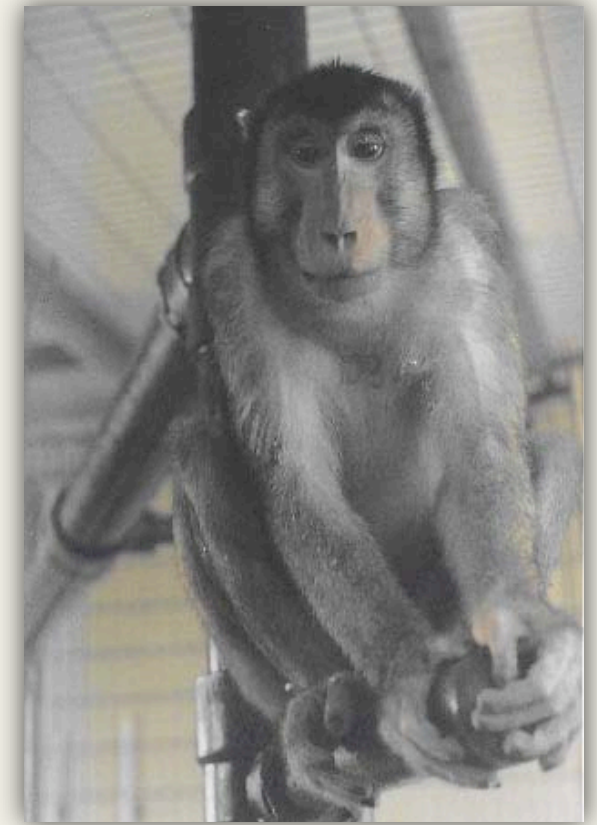
(IV.C.1. of Policy, p 13-14)

- U.S. Government Principles
- Standards of the *Guide*
- Minimization of pain and distress consistent with sound research design
- Appropriate use of anesthesia and analgesia
- Humane endpoints



Criteria for Protocol Review (con't)

- Living conditions and husbandry of animals appropriate for species
- Medical care available and provided by veterinarian
- Qualifications and training of personnel conducting procedures on animals
- Method of euthanasia appropriate and consistent with *AVMA Guidelines on Euthanasia* unless scientific justification provided in writing and approved by IACUC



Applying the Policy to Primate Studies

- IACUC is to ensure that staff caring for animals is appropriately trained - this includes staff providing behavioral management
- Ensure that procedures avoid or minimize discomfort, distress and pain - this includes capture, restraint
- Train animals to adapt to restraint equipment and personnel - positive reinforced training can be used to have primates present limbs or remain immobile for brief procedures



The Bottom Line



Humane care and use of nonhuman primates used in research includes appropriate social grouping and promotion of psychological well-being.

“ With respect to NHPs, the [*Guide*] Committee endorses social housing as the default...”

Addressing these needs is a legal, ethical, and moral requirement and ultimately contributes to the overall quality of the research.



<http://grants.nih.gov/grants/olaw/>
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National Institutes of Health
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Finding Information on Social Housing and Environmental Enrichment for Nonhuman Primates

Presented by
Kristina M. Adams
**Animal Welfare
Information Center
(AWIC)**



What Should I Search?

Terminology Suggestions

- Environmental enrichment
- Environmental enhancement
- Enriched environment
- Enriched housing
- Environmental complexity
- Behavio(u)ral enrichment
- Play or playthings
- Manipulanda
- Foraging boards or puzzle feeder



What Should I Search?

Terminology Suggestions

- Social enrichment
- Pair or group or social housing
- Social environment or social groups
- Pair or group formation
- Social isolation or social deprivation



What Should I Search?

Terminology Suggestions

- Positive reinforcement training
- Operant conditioning
- Animal training or training animals
- Reinforcement (psychology)



Where Should I Look?

- Databases
- Website Resources
- Discussion Groups
- Books and Journals



Databases

- Agricola
<http://awic.nal.usda.gov>
- PubMed
<http://www.ncbi.nlm.nih.gov/PubMed>
- PrimateLit
<http://primatelit.library.wisc.edu/>
- Annotated Database on Environmental Enrichment and Refinement of Husbandry for Nonhuman Primates
<http://labanimals.awionline.org/SearchResultsSite/enrich.aspx>





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environmental enrichment

Definition

Modification of the physical environment of animals, especially those in captivity, for the purpose of meeting behavioral needs and improving well-being.

Definition Source

NAL Thesaurus Staff

Spanish

enriquecimiento ambiental

Used For

enrichment, environmental
environmental enhancement

Broader Term

animal care

Narrower Term

social enrichment

Related Term

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play
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- Author** Niehoff MO ; Bergmann M ; Weinbauer GF
Title Effects of social housing of sexually mature male cynomolgus monkeys during general and reproductive toxicity evaluation.
Source REPRODUCTIVE TOXICOLOGY. 2010. 29(1). Pgs: 57-67
OpenURL [Find It](#)
PMID 19808089 [\[Links to NLM-PubMed Abstract\]](#)
-
- Author** Anonymous
Title Social housing of nonhuman primates with cranial implants: a discussion.
Source LABORATORY PRIMATE NEWSLETTER. 2009. 48(2). Pgs: 1-2
OpenURL [Find It](#)
URL <http://www.brown.edu/Research/Primate/current.html#implants>
-
- Author** Baker KC ; Bloomsmith M ; Neu K ; Griffis C ; Maloney M ; Oettinger B ; Schoof VAM ; Martinez M
Title Positive reinforcement training moderates only high levels of abnormal behavior in singly housed rhesus macaques.
Source JOURNAL OF APPLIED ANIMAL WELFARE SCIENCE. 2009. 12(3). Pgs: 236-252
OpenURL [Find It](#)
PMID 20183477 [\[Links to NLM-PubMed Abstract\]](#)
-
- Author** Branco Pirse J ; Marinan Marin ML ; de la Rica Cambray E ; Loeches Alonso A
Title Changes in the behaviour of a group of capuchin monkeys (Cebus apella) influenced by novel housing. [Abstract]
Source FOLIA PRIMATOLOGICA. 2009. 80(6). Pgs: 415
OpenURL [Find It](#)
-
- Author** Droescher I ; Waite C
Title Social housing of surplus males of captive Javan langurs (Trachypithecus auratus): implication of castration as a management tool. [Abstract]
Source FOLIA PRIMATOLOGICA. 2009. 80(2). Pgs: 156-157
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Environmental Enrichment for Primates

Annotated Database on Environmental Enrichment and Refinement of Husbandry for Nonhuman Primates

Viktor Reinhardt & Annie Reinhardt



Animal Welfare Institute
PO Box 3650, Washington, DC 20007

Environmental enrichment is the provision of stimuli which promote the expression of species-appropriate behavioral and mental activities in an understimulating environment.

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38



Other Databases: [Animals kept in Labs \(excluding primates\)](#) | [All Animals kept in Labs](#)



Animals in Laboratories

Refinement Database

Primate Enrichment Bibliography

Primate Enrichment Photos

Keyword List: Social enrichment & Group formation & Group introduction & Group integration

Appleby, M. C. 1999. *What Should We Do About Animal Welfare?* Blackwell Science, Oxford, UK.

Augustsson, H., Hau, J. 1999. A simple ethological monitoring system to assess social stress in group-housed laboratory rhesus macaques. *Journal of Medical Primatology* 28(2), 84-90.

Baistrocchi, E., Cavicchio, P., Avesani, C. et al. 2000. Introduction of confiscated primates into captive social groups: Experience of some zoos involved. *Folia Primatologica* 71, 294 (Abstract).

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Bloomsmith, M. A., Baker, K. C. 2001. Social management of captive chimpanzees. In: *Special Topics in Primatology Volume 2 - The Care and Management of Captive Chimpanzees*. Brent, L. (ed.), 204-241. The American Society of Primatologists, San Antonio, TX.

Bloomsmith, M. A., Baker, K. C., Ross, S. K. et al. 1998. Enlarging chimpanzee social groups: The behavioral course of introductions. *American Journal of Primatology* 45, 171 (Abstract).

Bocian, D., Carter, A. 1999. Integration of a female Francois langur (*Presbytis francoisi francoisi*) into an existing captive group. *American Journal of Primatology* 49, 37 (Abstract).

Brent, L. 2001. The influence of rearing condition on chimpanzee introductions. In: *The Apes: Challenges for the 21st Century Conference Proceedings*. 103-104 (Abstract). Brookfield Zoo, Brookfield, IL.

Burks, K. D. 2001. Bachelor gorilla introductions: using empirical data in decision-making. *The Apes: Challenges for the 21st Century Conference Proceedings*, 67-70.

Burks, K. D., Bloomsmith, M. A., Forthman, D. L. et al. 2001. Managing the socialization of an adult male gorilla (*Gorilla gorilla gorilla*) with a history of social deprivation. *Zoo Biology* 20, 347-358.



Other Databases

- Scopus
- Biosis Previews
- CAB Abstracts
- Zoological Record
- PsycInfo
- Embase
- Web of Science



Website Resources

- AWIC's Website – see sections on Research Animals, and Zoo, Circus and Marine Animals
<http://awic.nal.usda.gov>
- OLAW's Enrichment for Nonhuman Primates
[http://grants.nih.gov/grants/olaw/Enrichment for Nonhuman Primates.pdf](http://grants.nih.gov/grants/olaw/Enrichment%20for%20Nonhuman%20Primates.pdf)
- UC Center for Animal Alternatives, Readings and Resources on Environmental Enrichment [http://www.vetmed.ucdavis.edu/Animal Alternatives/enrich.htm](http://www.vetmed.ucdavis.edu/Animal_Alternatives/enrich.htm)
- Disney's Animal Enrichment and Training Programs
<http://animalenrichment.org/>
<http://animaltraining.org>





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Environmental Enrichment for Nonhuman Primates, 2009



Camels, Old World: Arabian and Bactrian, 2010



Dogs, 2008



Big Cats, 2009

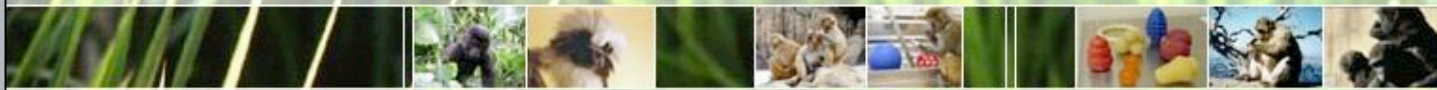


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Publications

Environmental Enrichment for Nonhuman Primates Resource Guide

AWIC Resource Series No. 32
2006 (Updated March 2010)
Updates [Environmental Enrichment For Nonhuman Primates Resource Guide](#), AWIC Resource Series No. 5 - March 1999

Table of Contents

- **About this Document**
- **Introduction**
 - [U.S. Government Agency Information](#)
 - [U.S. Laws, Regulations and Guidelines for Environmental Enhancement of Nonhuman Primates](#)
- **Animal Behavior Research Findings Facilitate Comprehensive Captive Animal Care: The Birth of Behavioral Management** by *J.L. Weed and P.L. O'Neill-Wagner, National Institutes of Health*
- **USDA Final Report on Environmental Enhancement to Promote the Psychological Well-Being of Nonhuman Primates**
- **USDA Draft Policy on Environmental Enrichment For Nonhuman Primates** (PDF|47 KB)
- **Bibliography**
 - [General Environmental Enrichment](#)
 - [General Primate Enrichment](#)
 - [Abnormal Behavior](#)
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A six-booklet series on providing appropriate enrichment for baboons, capuchins, chimpanzees, macaques, marmosets and tamarins, and squirrel monkeys.



enrichment

for nonhuman primates



Readings / Resources on Environmental Enrichment

Alternatives Search Resources

Bibliographies

[AltWeb: Refinement - Enrichment](#)

[Animal Welfare Information Center \(AWIC\) Publications](#)

Primates

[PubMed search on *Environmental Enrichment in Primates*](#)

[Agricola search on *Environmental Enrichment in Primates*](#)

Environmental enrichment for primates: An annotated database.

Reinhardt, V.; Reinhardt, A. Animal Welfare Institute, Washington DC

Refinements in husbandry, care and common procedures for non-human primates

Ninth report of the BVAAWF/FRAME/RSPCA/UFAW Joint Working Group on Refinement, 2009

Articles on environmental enrichment and psychological wellbeing

Laboratory Primate Newsletter 23(1)-45(3), 1984-2006.

Social housing of nonhuman primates with cranial implants: A discussion

LAREF, Laboratory Primate Newsletter 48(2), 2009

Risk factors and remediation of self-injurious and self-abuse behavior in rhesus macaques

J Appl Anim Welf Sci. 2009;12(1):61-72.

Rommeck I, Anderson K, Heagerty A, Cameron A, McCowan B.





Animal Enrichment



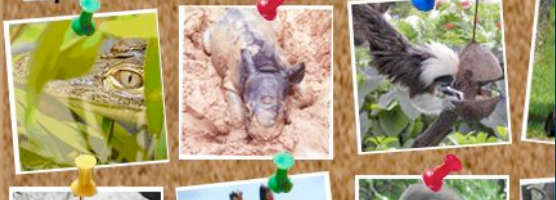
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Disney's Animal Enrichment Program

At Disney's Animal Programs the Mission of the Behavioral Husbandry Team is to:

- Integrate training and enrichment methods into daily care of animals to enhance their welfare.
- Motivate staff by building technical and leadership skills that provide professional development to ensure excellence in animal care.
- Inspire our guests to take action for wildlife and wildlife places through a better understanding of animal enrichment, training and welfare.

Species Specific Enrichment Ideas



Animal Training



- Welcome
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- Creating a Program
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Disney's Animal Programs Training Program

Our quality of work is their quality of life.
Meryle Nelson

Welcome to Disney's Animal Programs' Animal Training website! Disney's Animal Programs training program strives to be consistent, effective, and an integrated part of our excellence in animal care philosophy. Because we believe that an animal training program is essential for the welfare of our animals, we have developed a training framework called S.P.I.D.E.R. which is featured on this website. We invite you to use this site as a tool for developing, or refreshing animal training programs at your institution, and encourage you to check back frequently for new updates and ideas.

Our Mission



Target training of spotted eagle rays.

At Disney's Animal Programs, the Mission of the Behavioral Husbandry Team is to:

46



Website Resources

- NC3R's Information Portal
<http://www.nc3rs.org.uk/landing.asp?id=38>
- The Ft. Worth Zoo's Enrichment Online – find enrichment ideas by animal category or keyword
<http://www.enrichmentonline.org>
- Laboratory Primate Newsletter: Articles on Environmental Enrichment and Psychological Well-being
<http://www.brown.edu/Research/Primate/enrich.html>



Website Resources

- The Shape of Enrichment, Inc.
<http://www.enrichment.org/>
- The Enrichment Record
<http://www.enrichment.org/>



Non-human primates

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Use the links above to access information on the housing, husbandry and care of non-human primates.

Also our pages on [Non-human primate welfare](#).

Basic requirements for good primate housing include the following:

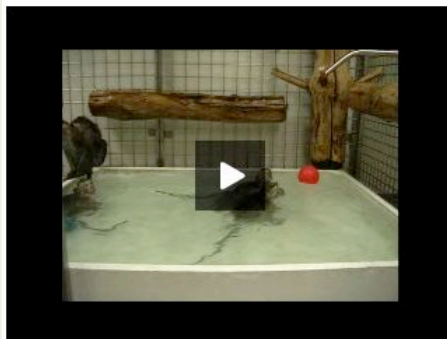
- Housing in stable, compatible groups (pairs at least)
- Enough space for exercise, a range of normal behaviours and suitable enrichment
- Solid floors with substrate
- Sufficient enclosure height to allow vertical flight if alarmed; no double tiers
- Climbing structures to increase useable space (perches, platforms, swings, ropes, ladders); sufficient for all animals to occupy simultaneously
- A varied diet appropriate for the species
- The ability to forage, including appropriate artificial feeding devices and scatter feeding
- Adequate light levels
- Access to outdoors wherever possible
- Nest boxes for species that use them, e.g. marmosets
- Wood for gnawing and scent-marking for species that use it, e.g. marmosets
- Visual barriers for control over social interactions
- Toys, chews, tactile materials, destructible materials to provide a degree of control over the environment
- Novelty - minor changes in furniture, feeding practices, toys
- Adequate socialization and habituation to humans, and training where appropriate



Videos of some enrichment strategies

Anecdotal and empirical observations suggest that provision of a small mobile swimming pool for short periods of time is effective enrichment for macaques in the laboratory. These animals show high motivation to manipulate the water surface, immerse themselves, dive, swim and play (including underwater), even in the absence of submerged food rewards (e.g. raisins, nuts, banana chips). Advantages of this enrichment technique are that it is based on a natural behavioural inclination, encourages play rather than food-orientated enrichment, provides exercise, keeps both animals and their enclosure clean, and can facilitate thermoregulation in hot weather.

The first video shows long-tailed (cynomolgus) macaques using a custom-made polypropylene pool built to fit within their enclosure. Stock and experimental macaques at this laboratory are group-housed and given access to the pools about once per week to maintain some novelty. The macaques can be seen swimming, dive-bombing and wrestling. The second video shows long-tailed macaques diving into a swimming pool at BFC Israel Ltd.



00:00 | 03:53

ient for primates. Responses range from playing with the mirrors in an apparently welfare-luring confrontations with other primates. Rhesus macaques at the Centre for Macaques breeding tier areas, such as an adjacent corridor. The mirrors provide visual stimulation and an element of observation of staff activities.

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AWIC (2006), Environmental Enrichment for Nonhuman Primates Resource Guide
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Reinhardt V, Reinhardt A (2002), Environmental enrichment for primates – annotated database.
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Office of Laboratory Animal Welfare (2005), Enrichment for nonhuman primates, National Institutes of Health
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References

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49



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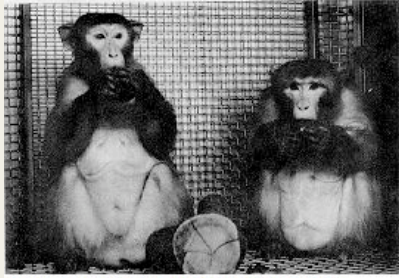
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Articles on Environmental Enrichment and Psychological Well-Being

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Contents

[Social Enrichment](#)

[Pair Housing](#)

[Group Housing](#)

[Environmental Enrichment](#)

[Foraging and Feeding Enrichment](#)

[Toys and Non-Food Related Objects](#)

[Perches and Swings](#)

[Other Environmental Enrichment](#)

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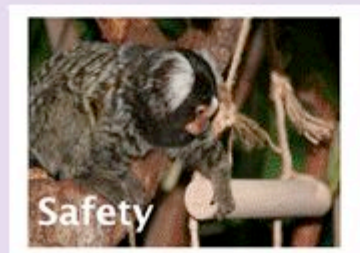
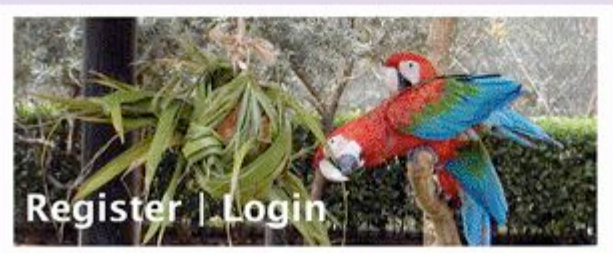
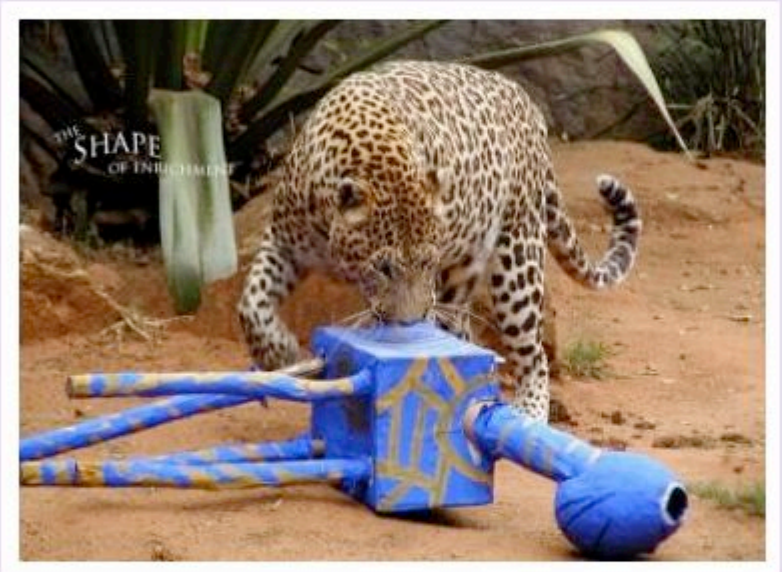
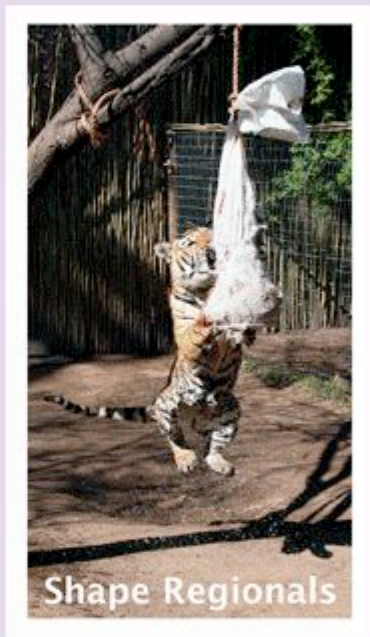
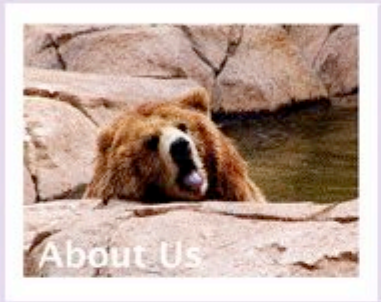


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52



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54



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