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THE Enrichment RECORD

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BUILDING A BETTER ENVIRONMENT



Animal Enrichment Influence on Facility Planning and Design • Targeted Approaches for Enrichment: Nutrition Offers Many Benefits for Laboratory Animals • Inspiring Future Enrichment Technicians: Huntingdon Life Science's Bring Your Child to Work Day • The Johns Hopkins Center for Alternatives to Animal Testing (CAAT) 2013 Animal Welfare Enhancement Awards

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WE'D LOVE TO HEAR FROM YOU!

We welcome your comments, observations and contributions to *The Enrichment Record*. Contributors include lab animal veterinarians, principal investigators, animal care staff, animal behaviorists, animal technologists and members of the bioscience community who promote the 4 Rs: reduction, replacement, refinement and respect.

Share your story ideas with Rhoda Weiner, Editor at
rmbw19@verizon.net

Guidelines for authors can be accessed at
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Please give credit where credit is due.

Outstanding animal care is truly a team effort, and we ask you to credit colleagues, published reports, articles, and other reference materials that have contributed to your enrichment article. Great ideas don't happen in a vacuum, and we encourage you to list all sources of inspiration.

**The Enrichment Record is not a peer-reviewed journal.
However, the Editorial Board of this E-Zine is composed of dedicated volunteers who have extensive experience and expertise in the care of laboratory animals. Members of the Board are involved with all aspects of this publication.**

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In Other Words

The Enrichment Record

is a quarterly E-Zine/Forum for:

- Discussing environmental enrichment in the optimal care of laboratory animals
- Documenting best practices and approaches for addressing challenges of implementation & assessment at every level
- Sharing data on the impact of environmental enrichment on the science
- Building the case for integrating enrichment into research design

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is an 8.5" x 11" format.

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A lot of people are talking about environmental enrichment these days. And I am pleased to report that the conversations are moving beyond definitions and talk about toys and treats. The level of discussion is getting higher and deeper with presenters focusing on evidence-based strategies backed up by sound science.

CAAT held a two-day Symposium on Social Housing at the NIH that drew over 150 people to Bethesda in late August. VBI hosted the "Enrichment Leadership Exchange" in North Carolina and online

in early September and is offering a 3-part webinar series featuring Sabrina Brando, AnimalConcepts. Also enriching the fall schedule is our own 4-part webinar series that brings a global perspective to the community with high-level presentations by Penny Hawkins (9/12), Vera Baumans (10/17), Mike Noonan (11/13), and the always provocative Bernie Rollin (12/10).

Massachusetts General Hospital's Center for Comparative Medicine will host its annual "Innovative Enrichment Symposium" on Sunday, October 27 as a satellite to National AALAS in Baltimore. They've been offering this national symposium since 2007. It is illuminating to review the program content as it has evolved over the years:

http://www.virtualvivarium.com/about-us/upcoming-events/environmental_Enrichment_Symposium.asp

The questions we need to be asking include:

- Are we competing among ourselves for the same audience?
- What is the actual impact of the growing number of enrichment conferences and webinars on the welfare of lab animals?
- To whom should we be talking, and what should we be talking about?
- What can we do to broaden the audience?
- Are people actually doing more or are they content to keep talking about enrichment?

In other words, "How are we doing?"

What do you think we should be doing next?

Jayne Mackta

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Laboratory Animal Science Specialist, Dept. of Animals,
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Utrecht University, Netherlands

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OBJECTS AND BEDDING CONDITIONS

Presenter: **Michael Noonan, PhD**

Professor, Biology, Chair, Animal Behavior, Ecology, and
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December 10, 2013 • 11AM EST

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Abstract

Play Caging Benefits the Behavior of Singly Housed Laboratory Rhesus Macaques (*Macaca mulatta*)

Griffis, Caroline M¹; Martin, Allison L²; Perlman, Jaine E¹; Bloomsmith, Mollie A¹

Source: *Journal of the American Association for Laboratory Animal Science*, Volume 52, Number 5, September 2013, pp. 534-540(7)

<http://tinyurl.com/k94lxoa>

This study addresses a recommendation in *The Guide for the Care and Use of Laboratory Animals* to provide singly housed nonhuman primates with intermittent access to large, enriched (play) caging. Research on the potential benefits of this type of caging is limited. The present study examines the effects of play caging on behavior, activity, and enrichment use. Singly housed, adult male, rhesus macaques ($n = 10$) underwent a baseline phase in their home cages, a 2-wk treatment phase with housing in play cages, and a posttreatment phase after returning to their home cages. Each subject underwent focal behavioral observations ($n = 10$;

duration 30 min each) during each study phase, for a total of 150 h of data collection. Results showed increases in locomotion and enrichment use and a trend toward decreased abnormal behavior while subjects were in the play cage, with the durations of these behaviors returning to baseline levels after treatment. Anxiety-related behaviors decreased between the treatment and posttreatment phases but not between baseline and treatment, suggesting that outside factors may have influenced the decline. During the treatment phase, subjects spent more time in the upper quadrants of the play caging and preferred a mirror and forage boards as forms of enrichment. The greatest behavioral improvement occurred during the first week in the play cage. This study provides evidence to support the benefits of play caging for singly housed rhesus macaques.

Affiliations:

1: Yerkes National Primate Research Center, Atlanta, Georgia, USA

2: Yerkes National Primate Research Center, Atlanta, Georgia, USA; School of Psychology, Georgia Institute of Technology, Atlanta, Georgia, USA



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Idea Exchange



Please provide a photo of your favorite foraging device, manipulanda, puzzle feeder, etc., along with a brief narrative.

List the species that it is intended for, describe how the device is used, and include a short statement on the durability, cost, pros and cons.

How much time is invested in preparation, and how does that compare with the time invested by the animals? If you have performed any behavioral evaluations and a cost analysis, include that as well.

Please send your ideas to: Genevieve Andrews-Kelly at genandr@aol.com

Thank you!

Stainless Steel Puzzle Feeder

Anthony Ferraro, Boehringer Ingelheim

Introduction

This NHP puzzle feeder was designed and manufactured with the assistance of a local metal fabricating company. The need for a custom feeder arose following the use of several types of commercially available NHP puzzle feeders, all of which had shortcomings including: lack of complexity, difficulty in filling, difficulty attaching and securing, and difficulty in proper sanitization. We wanted a feeder that could be easily and securely attached to the front of our cages and that would be sanitizable and able to be run through our cage washer with the entire cage.

Description

This puzzle feeder is used with Cynomolgus Macaques, but could be used with similar primates whose food biscuits are the same size. Made from 100% stainless steel, it is attached to the front of our standard primate housing units by hooking the top of the feeder

to a horizontal bar and securing with a J-hook, and a nut at the bottom of the feeder to another bar. It was designed so that water could drain from the bottom to help facilitate daily sanitization. The opening on the outside near the top of the feeder allows for easy placement of the animals' daily biscuits; the opening on the inside of the feeder makes it necessary for the animal to manipulate his/her biscuits all the way to the bottom in order to retrieve them. These feeders



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are primarily used as a "prescribed" form of enrichment for those animals that are on a formal enrichment plan. But, since they are semi-permanent, and can be run through the cage washer with the cages, some feeders may be randomly or specifically rotated throughout the colony as part of the overall enrichment plan.

Pros

These puzzle feeders meet all of the needs that they were designed to address. They are easy to fill with biscuits, only taking a few seconds per animal and requiring most animals to take 20 minutes to successfully retrieve their biscuits. They are a great form of occupational enrichment, making the animals "work" for their food. They stimulate the animals' natural desire to forage while utilizing their standard food portions. We have been using these feeders continually for the past three years; so far there have not been any issues with durability.

Cons

One of the cons with this device was the initial investment; each feeder cost \$380. This may seem excessive, but, due to their durability, we don't foresee any need for replacements in the near future. Another issue is the weight of the feeder; each one is close to 10 pounds, making them somewhat difficult to move around the facility and attach to the cages. Also, although they do a good job of making the animals work for their food, the maze design is identical on all the feeders, and we have noticed that, after several months, some animals learn how to retrieve their biscuits much more quickly, therefore reducing the feeder's value as an enrichment strategy for long-term animal holding. If we were to order more feeders, we could minimize these few issues by using a thinner gauge of steel to help reduce weight as well as cost, and design multiple maze types to increase variability for our animals.

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Animal Enrichment Influence on Facility Planning and Design

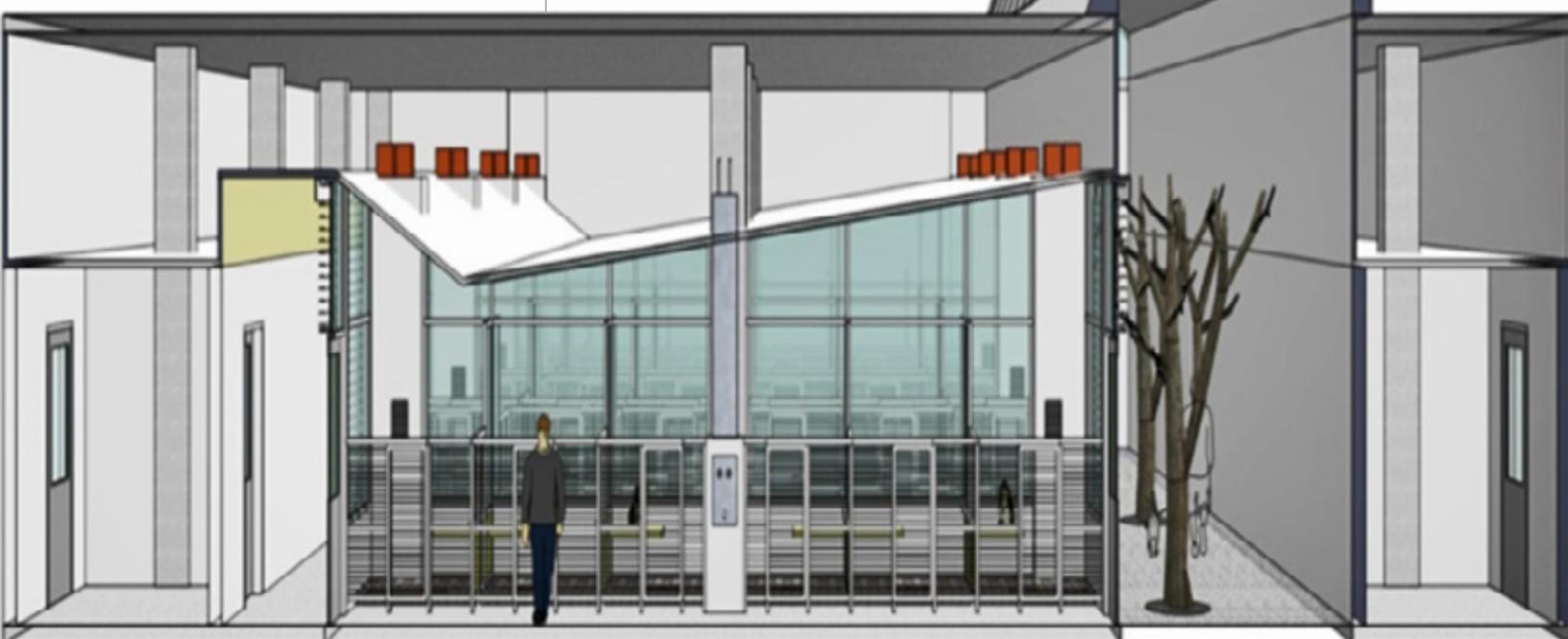
There has been growing interest within the lab animal industry, as well as the governing bodies and agencies that provide oversight and guidance to both public and private research organizations regarding the value and importance of "enrichment" for a variety of species, especially nonhuman primates (NHP's) and canines. The current trends have extended beyond the basic use of toys, foraging boards and nesting materials to a holistic building design approach. This approach incorporates programmatic elements for playrooms, natural light and views to the outside environment. It also includes open

group housing and animal runs that support a healthy social environment that mimics the animal's natural, social, and physical environment.

In the United States, the *Guide for the Care and Use of Laboratory Animals* as well as the USDA—ARS *Facility Design Standards 242.1* offer minimal prescriptive guidance on facility design requirements or suggestions that would create opportunities for improved species enrichment. Research organizations have had to turn to other sources such as the EU's *Appendix A: Guidelines for Accommodation and Care*

of Animals (Article 5 of the Convention) or internally developed guidelines which outline facility features that champion enrichment housing solutions. It is alternative guidelines that have driven design solutions to open pens with greater areas and volume per animal as well as emphasize the value and importance of daylight and views to the natural environment as critical to the physical and psychological well-being of the animal.

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CANINE HOLDING ROOMS—LONGITUDINAL SECTIONAL

The importance of facility designs that incorporate animal enrichment has become evident during recent tours of academic institutions and through personal involvement in the planning and design of a drug safety assessment facility. Increasingly, facility design is influenced by the species used and research activities and functions that support the scientific mission. However, the use of less dense, open social pens with increased area and room volume to allow for free climbing and animal movement, as well as the incorporation of natural light into the animal holding rooms, is a constant.

When embarking on a facility design, planners should examine a number of physical and operational factors when migrating from a traditional vivarium design that utilizes one-over-one or two-over-two caging paradigms to an open penning arrangement. The characteristics of each species and the impacts to animal handling and husbandry practices must be considered when deciding how to design an open, healthy and enriching environment. The facility design concepts should account for the animals' locomotion patterns. Designs should allow for ropes, bars, platforms and perches to permit a variety of physical activities as well as the incorporation of nesting and isolation boxes for refuge, solitude

and safe haven. Operational protocols need to be developed in conjunction with the facility design to address issues such as how to isolate and control an aggressive animal within an open pen design. A focus on positive reinforcement and clicker training to aid the animal care staff with effectively moving and isolating animals during either cleaning activities or research procedures needs to be investigated. When animals are allowed to run freely, materials for walls and floors surfaces need to be fully evaluated because of the heavy wear and tear caused by the direct contact of animals and the cleaning process. Because of the direct contact, final finishes need to be evaluated to ensure that the materials are not detrimental to the health of the animals.

Key Design Drivers

The experience of designing a safety assessment facility for a confidential corporate client offers important insights into key factors that drive the process. The first was the corporate mandate to design an animal facility that would incorporate open social pen environments for the housing of both canines and nonhuman primates. The corporate push to integrate the requirements of both the EU Appendix A and internal guidelines set a foundation for the design team as well as the animal care and

research staff to develop an animal facility that would place enrichment and the social interaction of the animals at the forefront of the design effort. This foundation set the tone for the early forums and collaborative design charrettes where the design team, along with the animal care



NHP HOLDING ROOMS—CROSS SECTIONAL VIEW

and research staff, focused on the macro level criteria for pen volume and area per animal in addition to the spatial adjacencies and plan configurations that would support safe and effective research and animal care protocols.

The second was the time and attention spent on evaluating

and developing construction details that would not adversely affect the built environment and the day-to-day research and animal care operations. During the later stages of the design process, the team spent significant time interfacing with animal care staff and caging manufacturers to evaluate pen fronts and designs for the orientation and arrangement of

not develop interdigital cysts. A great amount of attention was placed on the design of full glass walls in the canine holding areas and skylights in the NHP holding rooms to allow the animals to see the outside environment. The construction and sealing of glass partitions for the canines, along with the place-

building design approach that provides for a more natural social and physical environment for the animal is growing. There are a number of issues to evaluate and balance with regard to staff and animal safety as well as standard operational protocols within traditional facility designs that simply cage animals. It is critical that the animal facility management champion and drive the change to an open and enriching animal holding paradigm. Also, the full engagement of the animal care and research staff to review protocols, flows, plan configurations and pen and room design details is key to the successful integration of a holistic design approach for the animal holding environment.



the bar and mesh materials to ensure there were no pinch points or areas where NHPs could get fingers or limbs caught. Time was spent evaluating with the animal care staff the effective height of resting boards for canines, along with the appropriate mix of flat and raised flooring and the profile of the grating material to ensure that the canines would

ment of skylights in NHP holding rooms and coordination with the MEP distribution, consumed a significant portion of time to ensure the ability of staff to effectively clean and maintain the facility.

Conclusion

The trend to integrate animal enrichment within a holistic

Erik Terry has 17 years of experience focused on a variety of vivarium planning and design projects for a diverse base of clients including Higher Education, Government, Institutional, Pharmaceutical and Biotech companies. With a broad range of experiences with developing strategic/master planning initiatives as well as providing programming and planning services for vivarium design projects, Mr. Terry works with scientific users, designers and engineers to develop innovative solutions for the changing research environment.

Targeted Approaches for Enrichment: Nutrition Offers Many Benefits for Laboratory Animals

The field of laboratory animal enrichment is continually evolving. New enrichment products, methodologies, and protocols are being developed, revised and updated daily, and for good reason: enrichment is a critical component to improving and maintaining the health and well-being of laboratory animals. With research budgets tightening, there is increasing emphasis on streamlining operational efficiencies and standardizing best practices. Organizations are being asked to do more with less. Faced with these fiscal constraints, the research community is rising to the challenge, demonstrating creative and innovative ways to maximize enrichment, implementing and adopting new enrichment programs, and leading the way as models of efficiency. With limited resources, it's important that the enrichment tools that animals do receive are of high quality and nutritional value and can be used in multiple ways. Nutritional enrichment is one area that can accomplish those needs in a cost effective format.

Nutritional enrichment or nutri-enrichment is the act of using nutrition, such as dietary supplements, to enrich an animal's environment and improve its well-being. Nutri-enrichment can be a powerful and effective



tool to reduce stress, prevent boredom, improve colony performance and provide additional nutritional support for animals. It overlaps well with other enrichment areas and can be used as a launching point to evaluate how enrichment methods can be combined and used in an effective and efficient manner.

Foraging is one example of how nutri-enrichment can be used in such a way. In the wild, rodents spend most of their time foraging for food. Foraging takes a physical toll on the animal, and their reward is the fruit, seed or other energy source that gives them adequate nutritional support for survival. The animal's physiology and behavior has adapted to these nutritional sources over time. In contrast, laboratory animals are usually provided food ad libitum, requiring very little physical expenditure to obtain their required daily energy requirements.

It has been shown that using an inadequate source of nutrition for foraging has an adverse impact on the reproductive performance

of female mice. Further, lactating rats can eat up to three times more at peak lactation compared to non-lactating rodents. Therefore, chose nutri-enrichment sources wisely. Ensure that there is enough foraging reward (energy).

Sunflower seeds are recommended for female mice and, in many cases, improve breeding performance. Using nutritionally devoid enrichment treats puts unnecessary stress on the animal and may impact overall breeding performance and experimental results.

Facilities can employ simple enrichment techniques that will provide natural foraging conditions and opportunities for the animals. These techniques promote species-specific behaviors and improve the physical, psychological and social conditions of the animal. There are many examples of nutritional sources that can act as enrichment and offer a high nutritional value. By scattering sunflower seeds, apple and orange pieces and other approved nutritional foraging mixes in the bedding, animals such as mice, rats, guinea pigs and chinchillas will forage as they would in their natural environment. Fruit and vegetables, either fresh or frozen and used in creative ways, work very well for NHPs. Timothy hay

in different forms such as cubed, pelleted or bales are ideal for rabbits, guinea pigs and chinchillas. Institutions that are developing enrichment programs or making improvements to existing ones, should consider the many nutritional enrichment options and products available for laboratory animals.

Selecting the type of nutritional foraging reward must be carefully considered. There are clear distinctions between providing "treats" such as yogurt drops versus carefully selected nutri-enrichment sources that are nutritionally balanced. Treats, which are usually comprised of processed ingredients and have high sugar content, are recommended in very limited amounts and should be used sparingly. A balanced approach, which weighs the specific nutritional needs of the animal with the type of application, is preferred. Gel based products, such as DietGel 31M and Criticare are alternatively good sources of nutrition that have the added benefits of embedded sunflower seeds to promote foraging for rodents and timothy hay for rabbits and guinea pigs. With a proper balance of vitamins, minerals, fats, carbohydrates and protein, gel-based products offer a powerful nutritional and enrichment option for animals. Further, since they combine both nutrition and enrichment, they are ideal for those institutions looking for an efficient way to implement an enrichment program.

Before implementing nutrition and enrichment products, take some time and effort to better understand how the products are made, and to ensure that their ingredients are acceptable for the animal species. In other words, know what the animals are eating and why they are eating it. Study design and nutritional implications must be reviewed prior to the start of the experiment and factored into study scope and aim. It's recommended that researchers be given enrichment questionnaires before the study to ensure that they understand the benefits of nutri-enrichment and its study implications.

It's equally important that facilities develop enrichment guidelines that are clearly communicated and adopted by all staff members and then are harmonized throughout the institution. Once implemented, it's critical to assess outcomes to ensure that the enrichment implementation is effectively meeting the intended goals. Observations of animal behavior, health, performance characteristics and use of the enrichments are important components of such an assessment. These efforts should be continuous and revisited on a regular basis.

Researchers and staff must also monitor the reactions of the animals to the enrichment sources compared with baseline behavior. This is especially true as the introduction of nutritional variables could impact study results and animal health. Physiological variables can be monitored to assess responses to changes in

laboratory environments, e.g., body-weight, heart rate, hormonal levels, immune status and reproductive function. Guinea pigs, for example, are used as a model of human cholesterol and lipoprotein metabolism. Using improper nutri-enrichment sources for guinea pigs could alter blood cholesterol levels and lipid profiles and may not represent accurate data.

Conclusion

Having a well-thought-out enrichment strategy, factoring in study design and enrichment methods, is critical for successful study outcomes. Unbalanced nutritional rewards (e.g., products with high sugar and salt content) may produce unwanted health consequences and experimental results. It is always recommended to use products that are nutritionally well-defined, have purified ingredients (if possible) and are nutritionally balanced.

Implemented properly and in combination with other enrichment areas, nutri-enrichment is a powerful tool that offers the laboratory animal community many opportunities to improve enrichment programs, achieve cost-efficiencies and support institutional animal health initiatives.

Jay Palmer has 18 years biomedical research experience. He can be reached at [jpalmer@clearH₂O.com](mailto:jpalmer@clearH2O.com). ClearH₂O Inc. develops innovative hydration, nutrition and medication solutions for laboratory animal research: www.clearH2O.com

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Inspiring Future Enrichment Technicians: Huntingdon Life Sciences Bring Your Child to Work Day



Every year, Huntingdon Life Sciences hosts a “Bring Your Child to Work Day”.

This event typically includes an opportunity for the children to visit with some of our dogs, tours of the facility and presentations by individuals from both our in-life and post-life departments. It is an introduction to the basics of the discovery process from start to finish.

This year, we added a new event to the program—an enrichment session! We included a small presentation on enrichment, primate behavior and why it is important for the well-being of our animals. After the presentation, 30 children helped to enrich our monkeys' day by making foraging

devices for enrichment. This activity included assembling brightly colored boxes for use as a destructible foraging item. Once assembled, the children added shredded paper and various foraging treats. The boxes were then folded up and ready to distribute to the monkey colony.

The idea for the enrichment boxes, or, as we call them, “Primate Presents”, was developed by our veterinary technician, Tanya Callan. These foraging boxes are simple to make; boxes are ordered in bright colors, then paper and treats are added. The “Primate Presents” keep the monkeys engaged for quite

some time and allow them an opportunity to express species-typical foraging behavior. Next year, we plan to expand upon the success of this event. Future enrichment activities on “Bring Your Child to Work Day” will allow the children to create and design their own novel devices.

The project was a success for both the children and the monkeys. The children had fun assembling the enrichment, and the new supply of foraging items benefitted the monkeys. It is our hope that we inspired some future enrichment professionals!

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2013 Grant Recipients

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Using in-cage ultrasonic vocalizations to assess the well-being of laboratory rats and assessing the effectiveness of playful handling in reducing blood collection associated stress in laboratory rats**Sylvie Cloutier, PhD**

*Center for the Study of Animal Well-Being
Washington State University*

Housing conditions, handling, and procedures such as blood collection can be stressful, and thus impact laboratory rat welfare. Since animal welfare is defined as the physical and psychological state of non-human animals, its assessment should include affective measurements. In rats, changes in positive and negative affective

states can be easily assessed by quantifying the production of ultrasonic vocalizations (USVs). Rat 22-kHz USVs have been associated with anticipation of aversive situations, and inform about the rat's anxiety and negative state whereas the 50-kHz USVs have been validated as indicators of positive affective states. The goals of this research are to assess the effects of: (1) home cage environments differing in their complexity, and (2) exposure to playful handling immediately prior to blood collection on the affective state and thus, welfare of rats. Rat vocalizations, behaviors and physiological measures will be compared to determine if animals provided with an environment that allows them to express their five important

groups of natural behaviors (social interaction; rest/hiding; locomotion including climbing, exploring and playing; chewing/gnawing; manipulating, carrying and hoarding food and objects) are in a more positive affective state than rats kept in less complex environments. These measurements will also be used to determine if rats exposed to playful handling immediately prior to being restrained for blood collection will show a more positive affective state and less fear of humans than rats exposed only to restraint. This study will improve our understanding of the impact of cage environment and procedures on laboratory rat welfare.

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Effects of environmental enrichment on anxiety and place preference in adult zebrafish**Chereen Collymore, DVM***Laboratory Animal Medicine
Rockefeller University*

Currently, the standard of housing for zebrafish is bare tanks with fish maintained in groups of conspecifics. In this study, we aim to determine if the presence of environmental enrichment will alter anxiety-like behavior in adult zebrafish. We hypothesize that zebrafish exposed to environmental enrichment will display fewer anxiety-like behaviors than conspecifics housed in standard conditions. Adult zebrafish will be housed in groups with and without enrichment, as well as individually with and without enrichment. We will utilize the novel tank/open tank diving test, the light/dark preference test, the in-tank place preference and latency to feed test as well as the novel tank place preference test to evaluate the behaviors displayed by the fish. The findings from this study may provide evidence that environmental enrichment can be used to help reduce anxiety-like behaviors in laboratory reared zebrafish.

Development of a maze test to assess emotional affinity in mice and rats**Debrah Hickman, DVM, MS,
DACLAM***Laboratory Animal Resource
Center, Indiana University*

Happy and healthy animals are necessary to ensure that the results of studies using animal models are as reliable as possible. Evaluating health and preventing pathogen exposure is well characterized, but the effect of our husbandry practices on animal well-being is less understood. Behavioral tests that measure emotional affinity 'optimism' or 'pessimism' allow us to change something in the animal's environment and 'ask' them what they think of this change. Although these tests have been developed for multiple agricultural and laboratory animal species, the behavioral tests are labor intensive and require that the animal learn a discrimination task. If the animal fails to learn the task, they are removed from the study, potentially biasing the results of the study. This study will evaluate an alternative maze test of emotional affinity for rats and mice. This test was first used to measure the emotional affinity of lambs. In this test,

the latency time to complete a brightly lit maze and obtain shelter, including time spent in two 'dead ends,' is used as a measure of emotional affinity. The results of this study will allow us to provide the scientific community with a novel means to assess the emotional affinity of rats and mice that will require less labor, improve throughput, and remove potential individual performance bias from studies of well-being in these species.

Can the mouse grimace scale be applied to mouse pups?**Joelle Ingrao, DVM***Department of Pathobiology
University of Guelph*

In Canada alone, approximately 1.5 million mice are used every year for biomedical research. Little to no data exists for commonly used analgesics, and dose ranges and methods of administration are deduced from other species. Administration of carprofen through the drinking water is an attractive method of administration as it does not require the time, training, or skill that is required with other routes

of administration. This method would also greatly diminish handling-associated stress, which has been shown to occur with other methods of administration. In addition, there are currently no proven methods by which to assess pain in pre-weaned mice, which makes providing appropriate pain-management difficult if not impossible. Our study has two aims: the first is to assess the pain-reducing effects of carprofen given through the drinking water to pre-weaned mice, and the second is to evaluate the Mouse Grimace Scale (MGS) in pre-weaned mice. Mice will be recorded up to 24hrs post-procedure (ear notching) and recordings analyzed using the MGS and behaviour scoring. Should administration of carprofen through drinking water prove to be successful, this may be used as a scientifically proven method to reduce pain in laboratory mice. Proof that the MGS could be used in pre-weaned mice could provide us with a practical method by which to identify pain, allowing researchers to minimize pain and suffering in these animals wherever possible.

The influence of emotion on judgment and decision making in rhesus monkeys with self-injurious behavior

Pete Otovic, MA, DVM

*Laboratory Animal Medicine
Johns Hopkins University*

The welfare of animals in a laboratory setting is an issue of increasing importance. In order to improve the well-being of these animals, we first need to develop reliable methods to assess it. An ideal way to study welfare is to examine an animal's underlying emotional or affective state. In humans we study emotions by combining information obtained from physiological recording devices, such as heart rate, with that from directly asking the subjects how they feel. It is this latter part that is difficult to do with animals since they cannot speak with us like humans can. Although we cannot directly study animal emotions, we can evaluate other phenomena that are directly impacted by emotions. For example, cognitive functioning in humans is profoundly affected by emotional state. Human beings that are depressed or anxious are more likely to make pessimistic

judgments than healthy controls. Thus, we surmise that animals with similar emotional disturbances would also be more likely to make cynical judgments. Self-injurious behavior is a condition found in as many as 20% of rhesus monkeys within a population. It is characterized by repeated and progressive self-inflicted wounding and is thought to be mediated by anxiety. Studying the judgments that rhesus monkeys with self-injurious behavior make and comparing them to behaviorally normal monkeys will help us validate the approach of using cognitive performance to assess emotion and well-being as well as help us understand the nature and treatment of self-injurious behavior.

Evelyn K. Skoumbourdis, MS, RLATg

Laboratory Animal Veterinary Technician, Thomas Jefferson University, Philadelphia PA
Department of Laboratory Animal Services



Evelyn and Zeb, a baby baboon.

"He was one of the greatest folks I met during my volunteer trip to Africa."

Full Circle

In reflecting on her passionate dedication to environmental enrichment, Evelyn Skoumbourdis, author, presenter, instructor, researcher, volunteer and adoptive mom to two six-month old kittens, (former foster littermates Gavin and Marley), says, "Eons ago, it was baptism by fire!"

After receiving an MS degree, Evelyn decided to pursue her interest in neurodegenerative diseases and neuroscience by accepting a position as a Research Technician in the Department of Anatomy, Pathology and Cell Biology at Thomas Jefferson University (TJU), working with nonhuman primates to research Parkinson's disease. Dr. Judy Daviau, a clinical veterinarian and current Director of Jefferson's Lab Animal Services, was Evelyn's mentor, and together they designed an animal specific plan for the NHPs with Parkinson's disease.

"Dr. Daviau," Evelyn says, "was my inspiration. She cared so much for the animals."

Now Evelyn has come full circle! In 2006, she accepted a multi-faceted position in TJU's Department of Laboratory Animal Services, a department dedicated to implementing the university's policy of conducting animal research in accordance with high ethical standards, providing quality animal care and use programs which meet these standards, supporting the animals used in research and supporting husbandry and veterinary staff.

As a Veterinary Technician, Evelyn performs veterinary-based animal care, including general monitoring, treatments, anesthesia, surgical procedures, post-operative care, and physical examination of all experimental animals including NHPs, swine, canines, rabbits,

chinchillas and rodent colonies. She also assists investigative staff with obtaining appropriate supplies and ensures that proper procedures are followed in regard to the humane handling, care, and euthanasia of experimental animals.

As Enrichment Coordinator, Evelyn is responsible for monitoring the psychological well-being of all experimental animals and providing both basic and enhanced enrichment for all species. She trains species to cooperate with facility and research procedures, works with IACUC, investigative and facility staff to ensure their program is in compliance with regulatory guidelines, and educates staff in regard to abnormal behavior patterns.

And, in her capacity as a Technical Trainer, she applies, evaluates and interprets standard scientific techniques used within animal research protocols, supervises research projects with plans specified by investigators, records data, trains new staff on scientific and clinical techniques as required by approved animal research protocols, and accompanies members of inspection teams (IACUC, USDA, AAALAC) during reviews of the facility.

"Environmental Enrichment provides the closest setting to a naturalistic environment, and, the more naturalistic the environment, the more "normal" animal models will be. As a result, the better the data!"

A graduate of Lock Haven University with a BA in Psychology and Shippensburg University with an MS in Psychology, Evelyn has also completed undergraduate and graduate studies at TJU and Oklahoma State University. Prior to her current position, she served as Contract Manager for the Behavior and Environmental Enrichment Program for the National Institutes of Health and Research Specialist for the Department of Psychology at the Harlow Primate Laboratory, Wisconsin National Primate Research Center.

Evelyn is also a dedicated volunteer, currently active with *Primates Incorporated*, a non-profit organization that aims to provide lifetime enriched care for nonhuman primates who come from the entertainment industry, research facilities, zoos, refuges, and private ownerships. Evelyn is also involved with the *Philadelphia Animal Welfare Society* (P.A.W.S.), an organization dedicated to saving Philadelphia's homeless, abandoned, and unwanted animals by creating behavioral profiles and utilizing this information to write bios for those animals awaiting adoption. Evelyn is particularly focused on photographing dogs, cats and kittens for internet adoption sites.

In addition, one of Evelyn's greatest experiences was serving as a volunteer for the Centre for Animal Education and Rehabilitation (C.A.R.E. South Africa). As a volunteer veterinary technician for a sanctuary specializing in the care and rehabilitation of chacma baboons, she assisted a veterinarian with physical examinations, fitting of contraceptive implants, blood collection, deworming and emergency care. She also performed TB tests, distributed treatments, created and distributed enrichment, performed husbandry and health duties for animals housed in the clinic area, and assisted in the care of baby and young baboons on site.

Evelyn's goal is to insure that animals have the best possible lives and that those working with animals are totally committed to treating the animals with respect. She looks forward to the day when EE is commonplace—no arguments, not a "defined" program. "It would be wonderful," she says, "if EE is just what we do, just an integral part of our biomedical research programs."

Outside the laboratory, Evelyn is a classically trained musician—piano and flute—and loves spending time and enjoying music with her niece Avery, 3. She is also a runner and dedicated baseball fan, with a particular interest in the Yankees, Brewers, and Phillies. Her ultimate baseball dream is to see a game in every single park in North America!

There's an old saying that "You can't dance at two weddings at once." You also can't attend all the meetings and conferences taking place that offer the latest information in the field of laboratory animal science. Meeting Up will provide summaries of panels, workshops and symposia covering topics relevant to Environmental Enrichment. If you want more information about any of the presentations described or want to contact the presenters, let us know and we will be happy to connect you: *rmbw19@verizon.net*

Symposium on Social Housing of Laboratory Animals

Jayne Mackta
The Enrichment Record

Over 150 attendees from around the globe attended the "Symposium on Social Housing of Laboratory Animals" on August 22-23, 2013 at the National Institutes of Health in Bethesda, Maryland. Co-hosted by CAAT, NIH, USDA, OLAW and *The Enrichment Record*, this conference brought together leaders in lab animal care from industry, academia, and government for two days of intensive discussions. The agenda was a combination of lectures, species-specific talks and breakout sessions led by conference speakers including Mollie Bloomsmith (Emory); Kristine Coleman (ORPRC); Steve Schapiro (MD Anderson); Keely Harding (Charles River); Kathryn Bayne (AAALAC); Carol Clarke (USDA); Brent Morse (OLAW); LaVonne Meunier (GSK); Candace Croney (Purdue); Karen Froberg (Bio-Serv); and Brianna Gaskill (Charles River).

Participants were treated to data-supported talks that moved quickly from "what to do" to "how to do it." During afternoon break-out

sessions on the first day, pairs of speakers rotated to each group, which greatly facilitated discussion, problem-solving and sharing.

Below are summaries of just three of the talks. Abstracts of many of the other presentations will be published in future editions of *The Enrichment Record*, including Kathryn Bayne's "Historical Perspective on Social Housing."

Dr. Kristine Coleman, Oregon National Primate Research Center, discussed the importance of socialization to the behavioral health of nonhuman primates.

Key points:

- Appropriate socialization can help prevent the development of abnormal behaviors
- Socialization can be an effective intervention for behavioral problems
- Social partners can mitigate effects of stress
- Social housing is not a panacea—does not always reduce occurrence of abnormal behavior
- Social housing can cause abnormal behavior if the partners are not compatible
- Temperament can help guide choices about potential partners for captive monkeys

Dr. Karen Froberg-Fejko,

President of Bio-Serv and founding member of *The Enrichment Record* Editorial Advisory Board, explored how changes regarding rodent care and enrichment in the new *Guide* might affect an institution's bottom-line. She gave an overview of normal rodent behavior and signs of maladaptive behavior that must be understood in order to provide effective rodent enrichment. Acknowledging the concern that providing appropriate rodent enrichment may stretch already lean budgets, she offered a cost/benefit analysis of EE options that compliment a comprehensive rodent care program without breaking the bank.

Keely Harding, CVT, LATG,

Behavior Management Specialist at Charles River in Houston, talked about the importance of data collection in social housing of NHPs. She challenged the audience to identify and break through barriers to social housing at their own facility using purposeful data collection in order to improve animal welfare. Her talk focused on the specifics of data collection as it related to a nonhuman primate facility's progression to 97% social housing. She presented some ideas on how to collect meaningful data

and addressed the decrease in abnormal behavior as a result of social housing at this facility. As a result of increasing social housing, abnormal behavior rates in animals in the colony decreased to nearly zero incidents. Alopecia rates decreased by 75%.

The Gottingen Minipig Symposium

*Nicole Navratil, MS
Business Development Manager,
Gottingen Minipigs
Marshall BioResources*

Marshall BioResources hosted the first Gottingen Minipig Symposium, which took place September 10-12, 2013. The symposium included a full day of presentations in Rochester, NY covering a wide range of topics. Justin Metheny from Wil Research provided a model of hand rearing piglets used in juvenile safety assessment studies, and concluded that pan feeding is actually a better option than bottle feeding when raising young piglets by hand. Dr. Kristie Mozzachio, owner of Mozzachio Mobile Veterinary Services, presented common pathological conditions in minipigs based on her experience with both minipigs used in research and pet minipigs. Dr. Mozzachio emphasized that while there is not a lot of overlap between the research and pet industries for minipigs, minipigs in general can show similar reactions to stress in their environment, and an understanding of these reactions and what stressors can cause them can be very beneficial to all people who care for the health and well-being of minipigs, whether as pets or in a laboratory setting. Other presenters included Dr. Jeff Richig, CEO of Anilab, who provided a summary of electrocardiography in minipigs and Dr. Prashasnika

Gehlot of MD Anderson Cancer Center who discussed the minipig as a model of human hepatocellular carcinoma.

The afternoon sessions included presentations and discussion by Dr. Jamie Lovaglio of the Pacific Northwest National Laboratory, and Adrian Zeltner of Ellegaard Gottingen Minipigs on clicker training with minipigs. Adrian Zeltner emphasized the importance of motivation for a successful clicker training program; this includes a motivated minipig, a motivated trainer, and a motivated institution to put the initial investment into the training. Dr. Lovaglio repeatedly emphasized how much the minipigs enjoy training and how beneficial it is to give the minipigs the opportunity to learn and problem solve, as minipigs are very intelligent animals. Dr. Lovaglio also participated in a series of presentations on blood collection in the minipig along with Michelle Salerno from Marshall BioResources and Robyn McCain from Purdue University. The goal of the discussion was to evaluate various alternatives to the common method of collecting blood from the jugular or cranial vena cava while the minipig is restrained. This included a presentation by Robyn McCain regarding her experiences with the BASi Culex-L System for automated blood collection in pigs which allows the minipigs to move freely and unrestrained while blood is collected automatically.

The second day of the symposium included two hands-on workshops led by Adrian Zeltner and Michelle Salerno. The first workshop covered housing, enrichment, and socialization, along with basic handling

and sampling methods. The second workshop included percutaneous catheter placement, as well as other techniques in the minipig. Further information on these techniques provided by Ellegaard Gottingen Minipigs is also available at www.minipigs.dk. The event concluded with tours of the animal facilities at Marshall BioResources.

Enrichment Leadership Exchange

Karen Froberg-Fejko, LATG, VMD

The Enrichment Leadership Exchange was held on September 10, 2013 at Wake Forest Innovation Quarter in Winston-Salem, North Carolina. Hosted by Veterinary Bioscience Institute in partnership with *The Enrichment Record*, the Enrichment Leadership Exchange was a hybrid conference focused on evidence-based strategies for improving animal welfare while controlling cost and maintaining data integrity. In addition to the live event being held onsite, additional participants and speakers joined online, forming an international forum focused on animal enrichment. Several posters were presented to round out the program.

The featured keynote speaker was Jan Lund Ottesen, DMV, PhD, DipECLAM, Vice President, Head of Laboratory Animal Science, Novo Nordisk A/S Denmark; he presented housing systems used at their facility which are in accordance with EU Standards. Dr. Ottesen discussed how they developed their current housing conditions. They started by collaborating with others in the industry to develop the following criteria: 1. improved housing and care, 2. ethical

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review, 3. removal of unnecessary tests, and 4. training of animals and staff. They went on to develop global standards for CRO monitoring, demands on suppliers and 3 R's collaboration.

Based on the above criteria, Novo Nordisk conducted a workshop in 2000; the main conclusions for mice, rats, rabbits, guinea pigs, and dogs were that they should all have social contact and sufficient freedom of movement. Dr. Ottesen showed the audience Novo Nordisk's innovative housing environments for their research species. Dogs have routine access to outdoor exercise with conspecifics. Mice are provided aspen bedding, paper nesting material, gnaw sticks, shelter, have corn treats two times per week and feed placed in the bedding two times per week for foraging opportunity. Rats are housed similarly to mice, except they have an elevated shelf in their cage and their cage height is high enough so they can stand on their hind legs. Guinea pigs and female rabbits are housed similarly to each other in pens on aspen shavings, provided gnaw sticks, a shelter, hay, nesting material and apples and carrots offered two times per week for treats. Male rabbits can fight, so they are housed individually in pens, but still maintain visual and scent contact with each other.

A panel discussion moderated by D. Kemp Covington, DVM, GlaxoSmithKline was opened in the morning session to discuss the challenges and strategic approaches to implementing enrichment. The Panelists were Matthew Jorgenson, PhD, from Wake Forest University, Lara Metrione, PhD, from the Southeast

Zoo Alliance for Reproduction and Conservation and Evelyn Skoumbourdis, MS, RLATg, from Thomas Jefferson University.

Dr. Ron Banks from Duke University ended the morning session by updating the audience on the nation's newest veterinary specialty organization: the American College of Animal Welfare.

The afternoon sessions were presentations around practical data-driven solutions. Sabrina Brando, BSc, from Animal Concepts, discussed considerations of implementing enrichment with nonhuman primates and brought out a unique consideration of night enrichment—i.e., more bedding options for marmosets and increased seed release for rhesus macaques. Dr. Matthew Jorgenson discussed his research demonstrating the influence of nutrition on maternal behavior in African greens. Interestingly, there were changes in maternal behavior and infant survival based on the caloric and fiber content of the diet fed the dams; higher fiber and lower calorie diets resulted in more maternal rejection in African greens and African greens fed a typical American diet resulted in increased neonatal deaths. Guerra Benberry, Account Manager from Purina Mills, discussed how quality enrichment could equal happy animals, leading to better science.

Late afternoon sessions included three more presenters discussing data driven results when providing environmental enrichment to research animals. Dr. Karen Froberg-Fejko from Bio-Serv presented growing evidence that the simple gesture of providing research animals with an enriched

environment can have a great impact on well-being, quality of life and improved validity of scientific data. In fact, some enrichments can save money on husbandry costs and can bring about profitable gains: for example, improved breeding success with more viable pups weaned per dam. Dr. Conrad Julius from Merz, a German-based pharmaceutical company, discussed his work with Stauffacher et.al. that led to the development of an innovative system for socially housing female research rabbits in Europe. The Hohenheimer group housing system is a clever design, which allows 16 dams to be housed socially and opens the doors for one hour in the morning providing the dams adequate time to visit and nurse their babies. As the babies become weanlings, they leave the nest box to join the social group. The last speaker of the day was Kelsey Neeb, Enrichment Coordinator for Wake Forest University. Kelsey presented behavioral training on laboratory animals for sample collection. She discussed the positive effects cooperative training has upon the animals and the staff. The animals are trained to cooperate with protocol procedures and are not stressed, since they know what to expect and are rewarded for their participation. When polling her staff to ask if they felt the time investment to train these animals to cooperate was worth it, their response was overwhelmingly positive.

All the presentations and posters from the Enrichment Leadership Exchange will be available on demand for registrants through the Veterinary Bioscience Institute website. For more information visit <http://www.vetbiotech.com>.

Resources

Primates in Medical Research



Free eBook: *Primates in Medical Research* Now Available

How do researchers work with primates? Which species do they use? What has research with primates revealed? How are the primates looked after?

These are the questions answered in the new eBook, *Primates in Medical Research*. This eBook features recent video clips recorded in primate research and breeding facilities in the UK, US and Israel. Its galleries include over 80 images of primates that illustrate the eBook's 71 pages, along with archive material and a time line showing medical advances with primates stretching back a century.

Primates in Medical Research is free to download from iTunes and can be viewed on iPads. A PDF version can be downloaded from the website.

Free download from iTunes: <https://itunes.apple.com/us/book/primates-in-medical-research/id676974662?mt=11>

Free PDF download: <http://www.understanding-animalresearch.org.uk/news/2013/08/free-ebook-primates-in-medical-research-now-available/>

Primates in Medical Research was produced by Understanding Animal Research in collaboration with primate specialist and vet Dr. Moshe Bushmitz. This is the first version of *Primates in Medical Research*. Please email comments for later versions to Richard at rscrase@uar.org.uk. Moshe Mark Bushmitz also welcomes your thoughts and comments. Please send them to moshe@bushmitz.com



[DOWNLOAD](#)

AAALAC recently produced its inaugural podcast on social housing. The podcast features discussion between Dr. John Bradfield, AAALAC Senior Director, and Dr. Jeff Wyatt, Executive Director for Animal Resources at the University of Rochester, which provides the Council on Accreditation's perspective on this timely topic. AAALAC podcasts are intended to augment understanding and training on a number of accreditation-related topics.

To download the first episode on social housing <http://aaalac.org/education/index.cfm>

Upcoming Meetings

WEBINAR: STANDARDIZATION OF ENVIRONMENTAL ENRICHMENT FOR LAB MICE & RATS

Oct. 17, 2013 • 10AM EST

Presenter: Vera Baumans, DVM, PhD, DipECLAM, Laboratory Animal Science Specialist, Dept. of Animals, Science and Society, Div Laboratory Animal Science, Utrecht University, Netherlands

Register online-For more information or questions, contact: Annette at annettermccabe@gmail.com

INNOVATIVE ENVIRONMENTAL ENRICHMENT SYMPOSIUM Sunday, Oct. 27, 2013 Satellite to National AALAS

Baltimore, MD

http://www.virtualvivarium.com/about-us/upcoming-events/environmental_Enrichment_Symposium.asp

7TH TRAINING AND ENRICHMENT WORKSHOP FOR ZOO AND AQUARIUM ANIMALS (TEWZA)

November 11-15, 2013

**Moody Gardens
Galveston, TX**

<http://www.enrichment.org/MiniWebs/International/tewzaa.pdf>

WEBINAR: RAT CHOICE REVEALS PREFERENCES FOR ENRICHMENT OBJECTS AND BEDDING CONDITIONS

Nov. 13, 2013, 10AM EST

Presenter: Michael Noonan, PhD, Professor, Biology, Chair, Animal Behavior, Ecology, and Conservation Program Director, Anthrozoology, Canisius College

Register online-For more information or questions, contact: Annette at annettermccabe@gmail.com

PRIMADAPTION Nov. 17-21, 2013 Panther Tracks Learning Center Southwestern Florida

Contact Dr. William Singleton, Animal Care Training Services (ACTS) 484-574-7455

<http://actstraining.com/workshops/>

WEBINAR: ACCOMMODATING TELOS-AN ETHICAL BASIS FOR ENRICHMENT

Dec. 10, 2013

Presenter: Bernard Rollin, PhD, University Distinguished Professor, Professor of Philosophy, Professor of Animal Sciences, Professor of Biomedical Sciences, University Bioethicist, Colorado State University

Register online-For more information or questions, contact: Annette at annettermccabe@gmail.com

PRIMATE TRAINING & ENRICHMENT WORKSHOP

Feb. 24-28, 2014

**MD Anderson Cancer Center
Bastrop, Texas**

Completed pre-registration form for each participant due on or before Dec. 1, 2013

<http://www.mdanderson.org/education-and-research/departments-programs-and-labs/programs-centers-institutes/michale-e-keeling-center-for-comparative-medicine-and-research/educational-programs/primate-training-enrichment-workshop.html>

Please send notification of your Upcoming Meetings to Rhoda Weiner at rbmw19@verizon.net

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to open discussion about environmental
enrichment for laboratory animals,
The Enrichment Record
can greatly expand its reach and ability
to increase community engagement
at every level.

THE Enrichment RECORD

The Enrichment Record is a quarterly E-Zine created by the Laboratory Animal Research Community as an online forum for: Discussing environmental enrichment in the optimal care of laboratory animals • Documenting best practices • Sharing data on the impact of environmental enrichment on the science • Building the case for integrating enrichment into research design