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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 <http://enrichmentrecord.com/contribute/>

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.

The Enrichment Record is published in October, January, April and July. If you are interested in advertising in *The Enrichment Record*, please visit: <http://enrichmentrecord.com/advertise/>

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Join the Discussion!

To facilitate informed discussion about environmental enrichment, we have joined the LinkedIn Group called **Laboratory Animal Sciences**. This group allows members of the laboratory animal science community and our readers to interact over a web-based platform to compare ideas and methods. To participate, you will need to create a LinkedIn account and then join the Laboratory Animal Sciences Group.

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New Resource

National Institutes of Health • Office of Extramural Research

Office of Laboratory Animal Welfare (OLAW) has a new online resource for information on nonhuman primate enrichment and social housing. This resource is provided to assist institutions in enhancing the care and well-being of nonhuman primates. You can find new FAQs, a special online seminar, the OLAW report visits to Chimpanzee facilities, a bibliographic guide developed by USDA, NAL, AWIC and more.

Nonhuman Primate Enrichment and Social Housing Resources

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In Other Words



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

At NJABR's recent Strategy Summit entitled **Animal Research: Risks & Reality**, keynote speaker Jerrold Tannenbaum cautioned the audience to be aware of shifts in language that have tremendous power to affect public perceptions and ultimately public policy. His focus on enrichment took me by surprise and got me thinking. He pointed out that when Russell and Burch introduced their now famous 3Rs in 1959, the principles of **Replacement, Reduction and Refinement** were strategies for minimizing pain and/or distress in laboratory animals.

Over the years, the research community has embraced the 3Rs, which are intrinsic to good science methodology. We are always seeking better, faster, more efficient ways to move the process forward, including seeking ways to replace animals, reduce the number of animals used, and refine techniques.

Enrichment is a form of Refinement, which is described in the *New Guide* as "modifications of husbandry or experimental procedures to enhance animal well-being and minimize or eliminate pain and distress." Note the expansion of the concept to animal well-being.

Enrichment itself has more to do with the animal's environment where the emphasis is on promoting species-specific behaviors, which does affect well-being and implies minimizing or eliminating pain and distress. However, the focus on "providing animals with sensory and motor stimulation" and promoting "psychological well-being" represents

quite a shift from the original meaning of the 3Rs and certainly ramps up the role of enrichment in the humane care of laboratory animals.

As a community, we need to think about what we say we are doing and carefully watch our words. We struggle to equate the 3Rs with the term "alternatives" that is commonly understood to stand for efforts to replace animals. For some, replacement has become an end in itself. I think we must be careful not to let enrichment become just another weapon in the war of words to end animal research.

Jayne Mackta

Jayne Mackta, Publisher
President & CEO, Global Research Education
& Training, LLC (GR8)



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DFG Honours Alternatives to Animal Testing

Ursula M. Händel Animal Welfare Prize goes to research teams from Hamburg and Konstanz

“Basic research can lower number of experiments”

The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) has once again honoured scientists who are improving animal welfare in research. The DFG has awarded the 2011 Ursula M. Händel Animal Welfare Prize to Dr. Arne Hansen, Alexander Eder, Sebastian Schaaf und Professor Thomas Eschenhagen from the University Hospital Hamburg-Eppendorf, and to Dr. Maria Moreno-Villanueva and Professor Alexander Bürkle from the University of Konstanz. Both research teams have developed innovative methods that make it possible to significantly decrease the number of animal experiments. Promoting such alternative methods is the purpose of the prize, which is named for its founder Ursula M. Händel and has now been awarded for the fourth time. The prize, endowed with 50,000 euros, will be shared between the two winning teams. It was presented on January 24 in Berlin, at a DFG event that brought together scientists, politicians and the general public for a dialogue on animal testing and animal welfare.

http://www.dfg.de/en/service/press/press_releases/2011/press_release_no_02/index.html



The Laboratory Beagle Adoption Division of Cascade Beagle Rescue-East is NOW the **Lab to Leash Division of Beagle Rescue League!** Beagle Rescue League is an all volunteer non-profit organization committed to providing adoption services to facilities looking to release their adoptable research beagles at the end of a study as an alternative to euthanasia. We maintain the confidentiality of all research facilities and look forward to growing this amazing division!

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Leading UK Scientist Wins NC3Rs Prize for Improving Lab Animal Welfare



A study to reduce stress and anxiety in laboratory mice was awarded the 2010 NC3Rs prize for advances in animal welfare.

Prize winner Professor Jane Hurst's research, published in *Nature Methods*, has shown that a new way of handling laboratory mice can improve their welfare and the quality of the science they are used for.

Laboratory mice are usually picked up by their tails. Professor Hurst's study proves this method of handling causes high levels of anxiety and stress which can influence the outcome of experiments. By simply catching the mice using a plastic tunnel or cupped hands, anxiety can be greatly reduced.

The prize winner receives a £10,000 grant, which is sponsored by GlaxoSmithKline (GSK). Professor Hurst, from the University of Liverpool, plans to use the prize to provide training for scientists and animal care staff on handling methods and also to assess the effects of different handling methods on stress physiology.

<http://www.nc3rs.org.uk/news.asp?id=1457>

To facilitate informed discussion about environmental enrichment, we have joined the LinkedIn Group called **Laboratory Animal Sciences.**

This group allows members of the laboratory animal science community and our readers to interact over a web-based platform to compare ideas and methods. To participate, you will need to create a LinkedIn account and then join the Laboratory Animal Sciences Group.


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Article by

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American Veterinary Medical Association (AVMA) Animal Welfare Division

Happier Animals and Better Data:

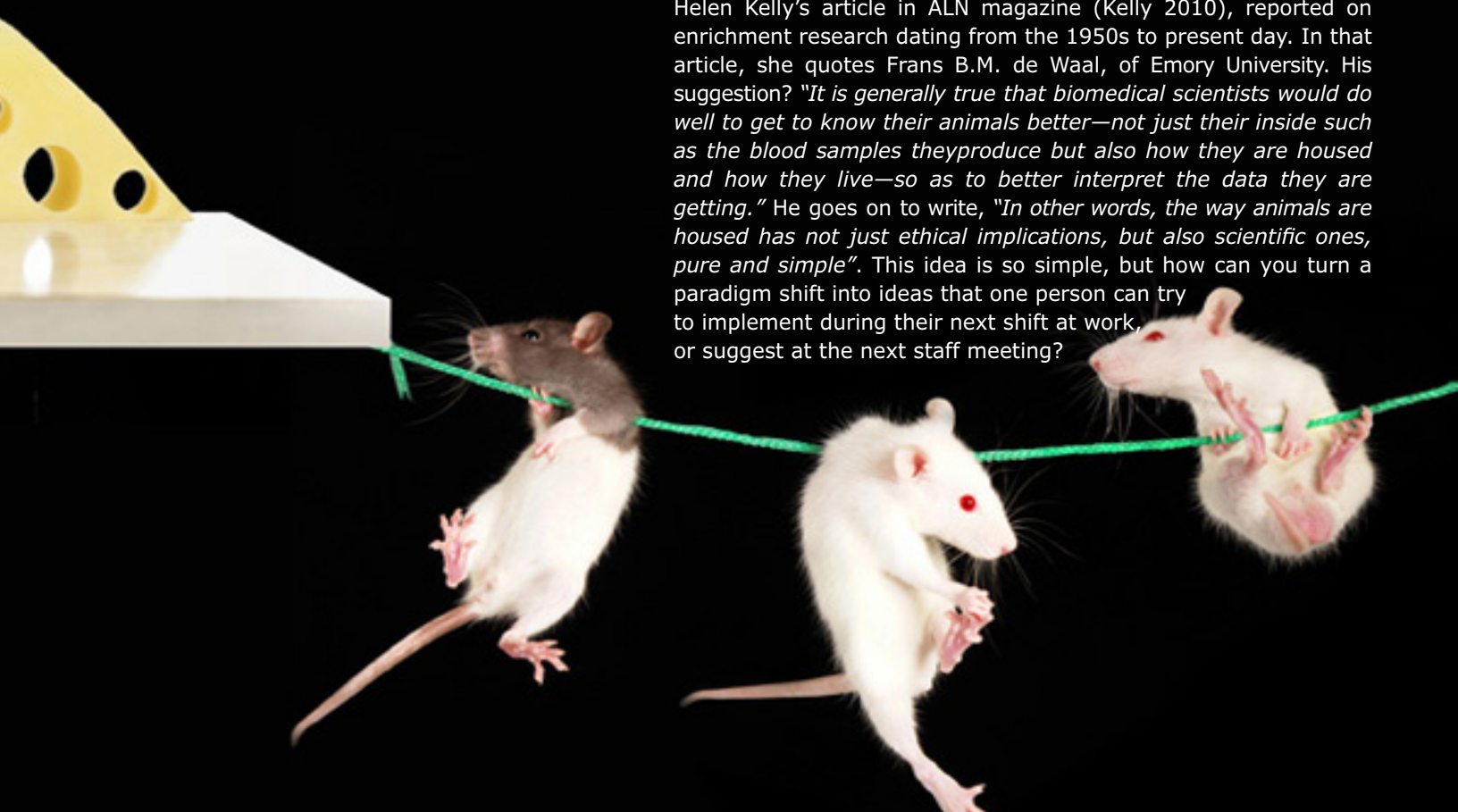
10 Top Tips

More and more publications are making the point that animals have unique species-specific needs and individual sentience—the implication being that sensitivity to animals' needs and subjective experiences may lead to better husbandry and higher quality research. We have reported in previous issues of *The Enrichment Record* about some excellent research that shows the profound beneficial impacts of enriched environments on research results. Some of these efforts involved years of research and painstaking experimentation and data collection. Must we all go through such efforts to get started?

Helen Kelly's article in ALN magazine (Kelly 2010), reported on enrichment research dating from the 1950s to present day. In that article, she quotes Frans B.M. de Waal, of Emory University. His suggestion? *"It is generally true that biomedical scientists would do well to get to know their animals better—not just their inside such as the blood samples they produce but also how they are housed and how they live—so as to better interpret the data they are getting."* He goes on to write, *"In other words, the way animals are housed has not just ethical implications, but also scientific ones, pure and simple"*. This idea is so simple, but how can you turn a paradigm shift into ideas that one person can try to implement during their next shift at work, or suggest at the next staff meeting?

Ten Top Tips offers small but constructive suggestions of things you might be able to do as a part of this effort, and we would encourage our readers to send in their own top tips to info@theenrichmentrecord.com, so that we can share them (anonymously if you prefer). In any specific setting, most or all of these suggestions may not be possible, but hopefully it will help us all to put our thinking hats on and come up with small changes we can make to help make animals happier and research more productive.

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Retirement Options

Many animals are humanely euthanized at the end of an experiment, and the perception may be that other options should be explored only when they can be provided to all animals. However, it may be worth exploring having an adoption or retirement procedure for small animals, even when it will represent an exception rather than a rule. This can allow a retirement cage of animals to be kept as demonstration or teaching animals, and staff will be able to adopt some animals as pets. Increased familiarity with the species as a pet can help staff become better at reading and handling animals in the laboratory setting and so should be encouraged when possible.

1 Getting an Ultrasound Detector

Many species such as rodents vocalize in the ultrasound range. For around a hundred dollars, you can acquire a 'bat detector' that requires no tuning and has an external speaker. This will allow you to hear a range of previously undetectable chatter, social communication, and distress calls... and get to know your animals better. The same equipment can also be used to locate sources of ultrasound in the laboratory or even adjoining rooms that might be distressing to your animals.



3 Acquire a Natural History Book

We get used to seeing animals in the laboratory setting, but the full extent of their abilities is most apparent in a natural setting. To bring this awareness into the laboratory, try and find a classic natural history of the animal's lifestyle in a natural setting for people to browse in the break room or borrow to read at home. Many of the best volumes are now sadly out of print, but might be found online. For example: *The Private Life of the Rabbit* by R. M. Lockley or *Natural History of the House Mouse* by R.J. Berry.



Make Routine Tasks a Treat

Many animals undergo routine procedures such as weighing, feeding, health checks and cage cleaning. Working a simple treat into this procedure may change it from being a source of anxiety for the animal to anticipation. Over time, the animals come to associate the staff more with treats than trouble, and may become more cooperative and easier to handle. This may be as simple as adding a little seed mix into the bedding of a clean cage, or a food treat to occupy an animal and keep it still on the weigh scale. Food treats should be approved by a veterinarian; where they are not possible, a tickle may be just as good.

5 Keep a Lab Book

Sometimes an animal just seems a little off, lethargic or agitated. Nothing you can put your finger on, or worth taking immediate action over. However, if you keep a tech journal, this allows notes to be made on abnormalities or any events that might explain them. Other facilities may use cage notes, an online noticeboard, or a whiteboard. A permanent record is best, as it can be referred to later to see just how long an animal has had

a lingering symptom like poor coat, how often a certain bedding material has contaminants, or how often a piece of equipment in need of replacement has broken down. A record of an event like a power failure or construction noise may help explain a later discovery of abnormal data. These events may not be fully apparent to all hands-on workers or to research and management staff. A lab camera (Polaroid or digital) may also be useful for keeping records of unusual events.



6

Measure Animal Welfare Routinely

Establish some traits of positive and negative behavior for the species under study, and make regular recordings in your lab book. A great idea for some behaviors is to establish a scale (from “min” to “max”), and make recordings over time. Labs might benefit from measuring other parameters—from the concrete (diarrhea) to the complex (agitation or depression). Authors, for example Françoise Wemelsfelder (2007), have developed some species-specific measures that can be used as a great starting point.

8

Ensure Your Data and Samples Are Protected

Research can suddenly be all for nothing if your samples and data are not protected. Does your facility have a generator, or sump pump to protect storage areas? Are these tested regularly? Are pictures and data files labeled according to an agreed protocol and backed up off-site?

Are all major procedures run according to a clear written protocol, preferably with an accompanying checklist? Try and run an experiment so that someone else on the team could take it over seamlessly if they needed to and the whole study could be replicated based on your written procedures.

9

Review Your Disaster Plans: Does your facility have a good protocol to deal with foreseeable disaster, potentially including power outage, fire, severe weather, flooding, break-in and outbreak of zoonosis? These plans protect the animals and the research by preserving their well-being (e.g. use of visual rather than auditory alarms in animal rooms), life (ensuring water, food and temperature control are maintained) and, when necessary, ensuring depopulation is carried out in a timely and humane manner. If plans are already in place, ensure that all staff are familiar with how they are activated and carried out—including coverage outside of working hours.

10

Have Regular Communication Among Researchers, Animal Caregivers and Other Staff

It is often the case that observations of technicians, stock wranglers and caregivers have profound impacts on research. Create a regular opportunity to discuss conditions in the laboratory and behavior of the animals. Other staff who fully appreciate the goals of the research may be more careful and committed to getting a good result rather than just putting in the hours. Regular meetings can also be a great time to take a look at your lab book and learn what uncontrolled factors might be affecting the data. And, don't forget administrative, executive and maintenance staff who may also appreciate being included as an important part of the team.

7

Establish a Behavior Baseline

If one is going to measure changes in behavior due to environment and experimental treatment, it is best to start measuring before experimental treatment or enrichment initiatives begin, and ideal to try to find records of these traits in the natural environment. Having this baseline can help determine how treatments effect animals, which environments are beneficial, and whether the change in behavior is due to environment or due to experimental treatment. If you can't observe these traits directly in the animals' natural environment, at least try to become familiar with their expected behavior from books (see TIP #3).



Kelly, H. (2010). Incorporating an Ethological Perspective to Improve Animal Welfare and Data Quality. ALN.

Wemelsfelder, F. (2007). "How animals communicate quality of life: the qualitative assessment of behaviour" *Animal Welfare* 16(Supplement1): 25-31.

American Veterinary Medical Association (AVMA)
Animal Welfare Division

Horizons of Enrichment

The History, Accomplishments, Obstacles and Aspirations of Environmental Enrichment

History

Environmental enrichment is often seen as arising some time in the 1970s or 80s. However, it has deep roots, and it is important to keep in touch with these—including natural history, specifically the study of animals in their natural environment. Natural history work and publications have become increasingly rare in a scientific environment that tends to prioritize empirical and experimental data. But enrichment continues to rest heavily on an understanding of the animal as a wild type, as a species co-evolved with or domesticated by humans, and deliberately modified both genetically and psychologically. There is always an explicit awareness that an animal's natural history may be modified and distorted, but never erased.

Also, enrichment work has been in the forefront of recognizing caring as a legitimate orientation towards animals used in research, not merely an anthropomorphic confound or unprofessional sentimentality. A discipline or profession is more than a series of skilled tasks; it is a community of peers who share a fundamental ethical code—in this case the belief that research animals must be cared for compassionately and to the best of our abilities.

In addition, enrichment is an area of research and application that has always used science and evidence not just as ammunition, but as a basis for actually changing what we know and feel is right to better meet the real needs of diverse species. As a result, it has laid down an impressive body of research as well as specific protocols and market-ready enclosures and devices.

In the present day, environmental enrichment is a subject that has a strong, multi-dimensional identity that rests squarely on academic and professional traditions. It includes facets relating to data generation and dissemination, professional skill development and recognition, explicit ethical frameworks and a real sense of community.

Accomplishments

If these strong traditions can be seen as the roots of the tree, the last few decades have been growing the trunk, the real tangible advances above the surface. Nowhere is this more evident than in recent experiments into the influence of environmental enrichment on neural development¹ and the development of progressive diseases such as Huntington's². In these studies, the control conditions now often include social housing,

relatively large cages and basic physical features such as bedding material. In effect, conditions that not many years ago would have been considered enriched, are now the normal, standard caging against which enrichments are compared.

Also, the introduction of enrichment has often acted to challenge and improve traditional but poorly understood standardized tests. In terms of behavioral tests, this has helped us begin to move from an old-fashioned understanding of animal motivation to one better approximating the animals' experiences. For example, when researchers studied the aggression of pearl cichlids against an intruder into their territory³, they predicted that a fish with a better, more enriched home would defend it more vigorously. Instead, they found that enrichment reduced aggression, as the fish was more likely to tolerate and share an enriched territory with another fish. It brought home that animal behavior can just as easily be perceived on the basis of tolerance, appeasement and choice as aggression, violence and competition.

Obstacles

Yet it must be recognized that we are not living in a period of extravagant resources and uniform

paradigm shift. Enrichments are still constructed largely within the human sensory realm by caretakers who do not have direct access to information about scent, vibration, ultrasound, free current and other factors known to be relevant to an animal's quality of life. Also enrichment still predominantly relates to changes made within the cage or occasionally minor modifications to it. I hope in the future to see new and remodeled facilities being built from the animals out, rather than from the architectural shape of the building in—and with an awareness of the needs of the human workers. Over and over I see wet rooms where the drain is not in the lowest point of the floor, and rooms into which housing systems are somehow Tetris-ed in, rather than rooms designed or remodeled to accommodate animal habitats and human ergonomics.

Also, budgets are increasingly under pressure. Workers who supplement the enrichment needs of their animals from their own pockets are experiencing shrinking real income, job insecurity, chronic health threats and household members who may be out of work. More than ever, it is important to entrench enrichment in grant applications, budgets, job descriptions, protocols, standards and regulatory guidelines. We are not yet at a place where enrichment is universally seen as being a fundamental aspect of animal care. Enrichment initiatives are easily cut or squeezed out of the daily routine when institutional budgets stray into the red.

We must recognize that there are conspicuous hold-outs who continue not to offer the social housing and basic physical enrichment

that is, or should be, considered standard. There are large and prestigious institutions that draw the line at providing bedding or a nest box to rodents—just as there are still frequent examples of animals not being given appropriate analgesia or timely and humane euthanasia.

Researchers are being allowed to simply opt out, without real and compelling scientific justification. The time is coming when we must no longer tolerate a failure to meet scientifically supported standards that are encoded in guidelines, such as those provided by ILAR and FASS. IACUCs and veterinarians will increasingly find the responsibility



to honor these guidelines falling upon their shoulders, and they should be given every support to use that responsibility appropriately and firmly.

As enrichment options become more variable and more expansive, we must be willing to live in a more complex context of risk and benefit, rather than seeking to categorize enrichment options only as safe or not safe. Barren environments may present a risk of mental suffering, under-developed neurological and immune systems and impaired model validity. On the other hand, highly enriched conditions may present risks of aggressive interaction,

physical injury, exposure to disease vectors and shifts in experimental baselines. The ideal environment for the animal and its application must represent a balance between barren security and enriching risk, not only in the laboratory but in every area where animals are kept in captivity.

Aspirations

That said, environmental enrichment is a successful, vibrant paradigm that has proved itself in the research environment and in zoos. I personally would like to see this model expanded, branching out and providing a sound empirical basis to address the same environmental risk/benefit dilemmas in other areas, reinforcing and feeding back to the research setting.

The flagship example of this need is agriculture. Animals on farms must be sheltered, monitored and protected from the climate, toxins, predation and zoonosis. And yet, when we enclose an animal in a secure, safe area, we find behaviors that go wrong. Pigs bite each other's tails so that the tails are preventatively docked off. Chickens' beaks are trimmed to avoid them mutilating and killing each other in significant numbers—a problem that occurs in both cage, barn and free range systems. Large scale farming is likely to settle somewhere in the area of partial confinement and enriched caging. To do this humanely and avoid these behavioral problems, there absolutely will have to be effective enrichment that directs the animal's natural biting and pecking behaviors into a satisfying and harmless substrate.

This enrichment is not simply going to revolve around toys.

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Different problems arise from thwarting different species-specific needs and expectations. For example, hens can become so frightened that they pile up and smother each other. The presence of the natural flock guardian, a rooster, has been found to significantly reduce this fearfulness⁴. An understanding of natural history is, once again, important.

In the realm of pets, we are increasingly advised to keep pet cats indoors where they live much longer and, in many ways, healthier lives. However, having your cat live its entire life inside an apartment comes with the obligation to make that apartment a suitable habitat for a highly intelligent pocket predator.

I suggest we have very little idea how to do this, and have almost no objective information on the subject. There is not even agreement on the basic features of the natural history of the domestic cat, or indeed, the dog.

Crating of dogs has become increasingly popular. Again, there is a lack of evidence that this practice is to the benefit of the dog. When farmers say that gestation crates are not stressful to sows and are a good management tool, welfare advocates do not just take their word for it. Nor are they convinced by the fact that the sow looks reasonably content most of the time or willingly enters the crate when encouraged to do so. So I do not think dog owners should get a free pass when it comes to shutting an animal in a cage, not only all day while the owner is at work, but all night while asleep.

The default option is to give animals freedom to move and to minimize the time they spend in social isolation. Restrictions on that freedom require not just a convincing story and a sincere good will, but evidence of benefit to the animal and an understanding of how the crate should be designed and used rather than a *carte blanche* assumption that owners know what they are doing.

Humans

Finally, it is worth saying that humans as a species have a very poor understanding of our own natural history. We are effectively adapting our own Stone Age genetics to communities that are often larger, physically denser and psychologically looser and more changeable than what we as a species are programmed to expect. On top of this, we have complex layers of diet, culture, chemicals and technology, which have distorted and adapted but never abolished our unique species-specific needs.

As one example, our office workspaces have become progressively smaller and more open—which is to say, physically barren. This has led to a range of workplace stress responses glibly characterized as “sardine rage”.⁵ We are, in effect, doing to ourselves what we have done to many of the animals in our care and with similar results. We must not be embarrassed to care how people live, and we need to design the spaces in which we live to meet our species-specific needs based on reliable data and a model of constant improvement that establishes new standards for our quality of life.

In addition, we are now grappling with health problems that have complex etiologies that include environmental factors and resist single domain so-

lutions, conditions such as ADHD⁶, Schizophrenia and Alzheimer’s. Enrichment researchers are showing that a good environment can delay onset of cancer and can shape an optimistic mindset⁷. Human researchers are showing that people are most happy when they are occupied most of the time with purposeful activity⁸, and the drastic influence of diet on both humans and animals is gradually becoming clear^{9,10}. We are coming to realize that the environment is always part of a significant problem and so, increasingly, must also be part of the solution.

The enrichment community should not be too modest to address these larger social issues and problems because we have expertise to share in all of these areas. As Woodrow Wilson said: *We are not here merely to make a living. We are here in order to enable the world to live more amply, with greater vision, with a finer spirit of hope and achievement. We are here to enrich the world, and we impoverish ourselves when we forget that errand.*

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From Dog Kennels To Rabbit Housing:

Complete Cage Makeover Encompasses Behavioral Enrichment for Laboratory Rabbits

A major objective of our behavioral management committee was to improve rabbit housing in our large academic research institution. As our dog population decreased, we were left with several rooms of empty stainless steel kennel runs. With minor modifications, we converted fourteen, 4 x 8 feet suspended-floor dog kennels into rabbit group housing units. Our plan was conceived with input from veterinarians, investigative staff, animal facility staff and our behavioral management committee. Our goal was to provide rabbits with a safe and secure environment where they could hop, climb to any of several different levels, stand up on their rear legs ("sentinel" pose), stretch and co-mingle with acceptable conspecifics. We were able to reach the goal with little expense by using parts from old rabbit cages, rodent cages and primate accessories to outfit the new runs. Our presentation described step-by-step instructions on how the conversion took place, introduction and observation of new tenants, use of litter pans and changes in sanitization procedures. After six months of using the new caging, we observed both behavioral and physical changes in the rabbits. They are less timid and easier to handle. Their rear legs are stronger and many have learned to use litter pans. We saw no foot problems associated with the new housing. The plan has been so successful that even rabbits requiring single housing are now kept in the new accommodations whenever possible.



Abstracts of Scientific Sessions—
2010 AALAS National Meeting
Platform Sessions, Page 131

[http://nationalmeeting.aalas.org/
pdf/2010-abstracts.pdf](http://nationalmeeting.aalas.org/pdf/2010-abstracts.pdf)

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Medical College of Wisconsin, Milwaukee, WI

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Environmental enrichment induces optimistic cognitive bias in rats

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Animal Behaviour • Volume 81 • Issue 1 • January 2011, Pages 169-175 • Behavior Brief: <http://www.the-scientist.com/news/display/57966/#ixzz1EW3MMav4>
Cited By in Scopus (0), doi:10.1016/j.anbehav.2010.09.030
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People's affective or emotional state can alter their cognitive processing, biasing interpretation of ambiguous stimuli. Those in a more positive state interpret such stimuli in a more optimistic manner than those in a negative state. Recently this research has extended to animals, and has shown that manipulations associated with negative affect cause animals to interpret ambiguous stimuli more pessimistically. We investigated whether exposure to environmental enrichment engenders optimistic responses to ambiguous stimuli. Rats, *Rattus norvegicus*, were trained on a novel conditional discrimination task whereby they learned the correct response necessary to obtain a food reward given the stimulus present during approach (rough or smooth sandpaper). One stimulus was associated with a higher-value reward than the other. Once the rats were trained, cognitive bias was probed by exploring their responses to an ambiguous stimulus (intermediate grade of sandpaper); a rat was defined as optimistic if it chose the response appropriate to the stimulus associated with the better reward. Animals transferred from unenriched to enriched cages showed more optimistic responses following the change. A control group maintained in unenriched cages showed pessimistic responses throughout. These results demonstrate for the first time that environmental enrichment can induce an optimistic cognitive bias in rats previously housed in standard caging, possibly indicative of a more positive affective state. These results add support to the suggestion that measuring cognitive biases can give an insight into animal emotional states; this has implications for animal welfare and preclinical testing of potential therapeutics for mood disorders.

Understanding behaviour: the relevance of ethological approaches in laboratory animal science

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Applied Animal Behaviour Science • Volume 81 • Issue 3, May 2, (2003)

Pages: 245-264 • International Society for Applied Ethology Special Issue: A selection of papers from the ISAE international congresses, 1999-2001
http://www.unal.edu.co/bioetica/documentos/sem_per/aproximacion_etologica_%20animales_inv.pdf
[http://www.journals.elsevierhealth.com/periodicals/applan/article/S0168-1591\(02\)00285-X/abstract](http://www.journals.elsevierhealth.com/periodicals/applan/article/S0168-1591(02)00285-X/abstract)
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Applied ethology has traditionally focused on farm animal species, whereas there has been much less research directed at understanding the behaviour of laboratory animals in relation to their use as models in research. In this paper, we identify four areas in which ethological approaches could help improve the welfare of laboratory rodents while at the same time enhancing the validity of research based on them. These areas are:

- (1) the effects of selective breeding and gene manipulations on the animals' ability to cope with the laboratory environment;
- (2) the effects of barren housing conditions on behaviour and the mechanisms underlying normal control of behaviour;
- (3) the sensory perception of the laboratory environment by the animals; and (4) the applicability of standard behavioural tests and the potential for improving them by taking animals' species-specific characteristics into account. Given the current increase in the use of rodents in the life sciences, these four areas represent promising areas of future research in applied animal behaviour science.

ENVIRONMENTAL ENRICHMENT IN THE NEW GUIDE

The Guide for the Care and Use of Laboratory Animals (the *Guide*) is an internationally accepted primary reference on animal care and use, and its use is required in the United States of America by the Public Health Service Policy. It was first published in 1963, and has been revised a number of times since then. The most recent edition was published in January, 2011.

The purpose of the *Guide* is to assist institutions and investigators in caring for and using animals in ways judged to be scientifically, technically, and humanely appropriate. Recommendations in the *Guide* are based on scientific principles, published data, expert opinion, and experience with methods and practices shown to be consistent with both high quality research and humane animal care and use. The recommendations are intended to be used as the basis for development of a comprehensive animal care and use program, in the context of applying performance standards to the implementation of the program.

The most recent edition of the *Guide* has additions and changes that institutions have to incorporate into their animal care and use programs. One addition is a specific section on Environmental Enrichment (p.52). The 1996 version discussed the use of environmental enrichment devices in determining appropriate cage size, and provision of an environment that encouraged species-specific behaviors. For social species, environmental enrichment was suggested as a method to compensate for the lack of social interactions with conspecifics when animals must be housed alone. Most references listed were for non-human primates (NHPs).

The 2011 *Guide* expands on the discussion of environmental enrichment, citing many references covering a larger range of species. The *Guide* says:

"The primary aim of environmental enrichment is to enhance animal well-being by providing animals with sensory and motor stimulation through structures and resources that facilitate the expression of species-specific behaviors and promote psychological well-being through physical exercise, manipulative activities, and cognitive challenges according to species-specific characteristics." —p. 52-53.

The main points in this section include:

- Examples given of structural additions include perches and visual barriers for NHPs, elevated shelves for cats and rabbits and shelters for guinea pigs. Manipulable resource examples include novel objects, foraging devices for NHPs, manipulable



toys for NHPs, dogs, cats and swine, wooden chew sticks for some rodents and nesting materials for mice.

- The *Guide* further states: "*Well-conceived enrichment provides animals with choices and a degree of control over their environment, allowing them to better cope with environmental stressors.*"—p. 53. A stated caution is that not every item added to the animal's environment necessarily benefits its well-being, an example being the addition of marbles to a mouse cage where it has been found to be a stressor rather than an enrichment.

- When enrichment items are used, the rotation of the items should be a consideration. However, changing the environment too often may be stressful.
- The IACUC, researchers and veterinarians should regularly review the enrichment programs to ensure they are beneficial to animal well-being and consistent with the goals of animal use. Programs should be updated to reflect new knowledge as needed.
- Animal care personnel should be trained in behavioral biology of the species they work with to appropriately monitor the effects of enrichment.
- Enrichment affects phenotype and may impact experimental outcome (independent variable).
- It is recommended to read and/or conduct research before updating a local Environmental Enrichment Plan.

Application of *Guide* standards in an animal facility should take into consideration the desired outcome—benefiting or enhancing animal welfare. Engineering standards are prescriptive and provide limited flexibility for implementation. However, they can be useful for establishing a baseline and aid in evaluating compliance.

A more advantageous approach is to apply performance and practice standards. Describe a desired outcome and provide flexibility in achieving this outcome by allowing those responsible for managing the animal care and use program, the researcher, and the IACUC, the discretion to apply methodology to achieve the outcome. The intent of the *Guide* is to provide flexibility for institutions to develop and modify practices and procedures when new information becomes available and changes in conditions occur. The new *Guide* places great emphasis on social environment which is intimately tied to enrichment, and must always be considered as part of a comprehensive enrichment program.

Developing an effective Environmental Enrichment program in a toxicology (tox) or GLP environment can be a challenging endeavor due to the stringent confines and documentation required to comply with FDA guidelines. There are some excellent success stories, however, in which laboratory animal care staff and toxicologists have worked together to develop successful enrichment programs improving animal welfare. I will share a story from an Enrichment Coordinator who works for an international pharmaceutical company.

About five years ago, this company began socially housing all their non-human primates (NHPs) into pairs and groups. Initially, there was serious concern from the toxicology technicians who believed their workload would increase, but this did not happen. Along with social housing, the company also employed a positive reward reinforcement and cooperative training program.

The staff trained their NHPs to move into divided caging, present their arms for safe removal from the cage, and take oral medications from syringes, which minimized the need to give injectable medications. The success of this program was immediately realized as the number of animal-related injuries significantly declined and the technicians observed the NHPs engaging in species-typical behaviors. As a result of cooperative training, handling was incredibly safer for both the monkeys and the technicians during treatments.

As part of the Enrichment SOPs, the Enrichment Coordinator developed a list of pre-approved certified (contaminant-screened) enrichment devices and treats from which the caregivers could select and document what was offered. Because they could choose from the list, it was easy for caregivers to provide variety and choice to the monkeys, both of which are keys to successful enrichment.

Training for the monkeys starts by "prepping" them for a tox or GLP environment while the animals are in quarantine. During the training, the monkeys are provided with both treat and non-treat positive reinforcement. Though the training

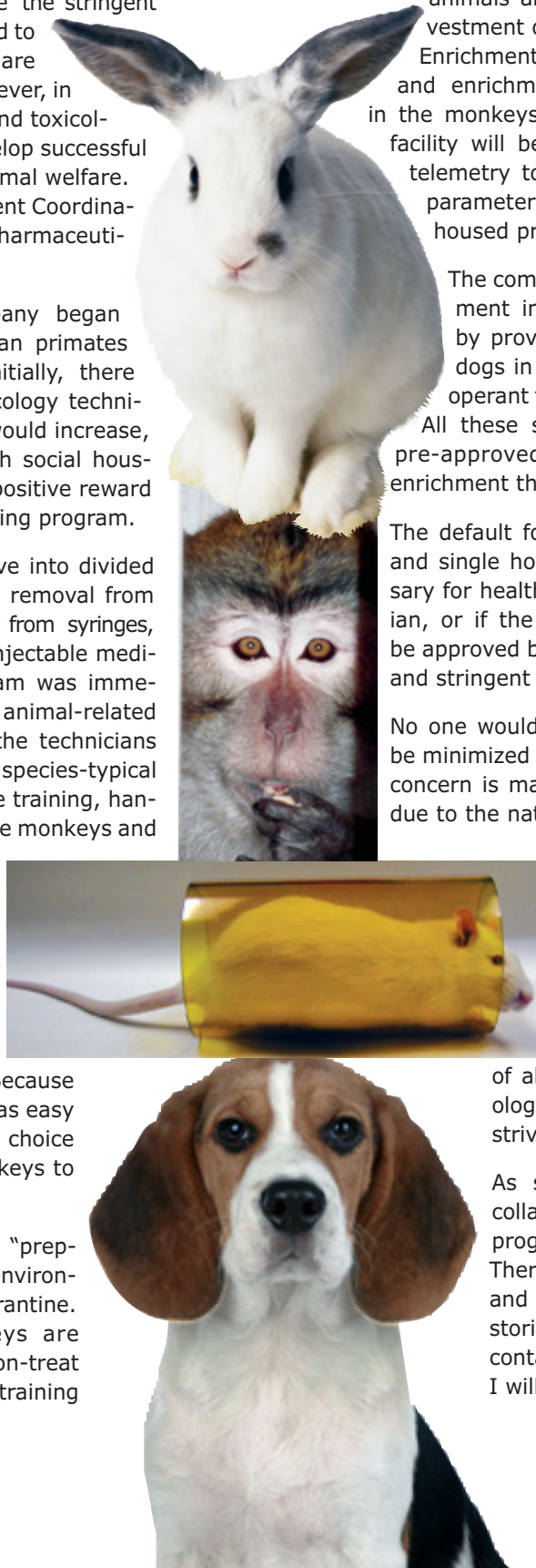
and constant monitoring of compatible conspecifics in social housing takes some time, the benefits to the animals and the lab staff far outweigh the investment of time, as passionately stated by the Enrichment Coordinator. These training methods and enrichment strategies have reduced stress in the monkeys and increased animal welfare. The facility will be validating staff observations using telemetry to monitor for changes in physiologic parameters in single-housed versus socially housed primates.

The company has also employed other enrichment initiatives in other laboratory species by providing sheltering for rodents, housing dogs in runs instead of cages, and providing operant training to rabbits, just to name a few. All these species have enrichment SOPs with pre-approved certified (contaminant-screened) enrichment that the caregivers can provide.

The default for all their species is social housing, and single housing is done only if deemed necessary for health reasons by the attending veterinarian, or if the study requires. However, this must be approved by the IACUC with much consideration and stringent guidelines.

No one would argue that research variables must be minimized in order to collect valid data, and this concern is magnified in a tox or GLP environment due to the nature of this type of research. There is concern in a tox and GLP environment that providing environmental enrichment could potentially affect the outcome of a study. However, not offering the opportunity for animals to express species-specific behavior through enrichment can lead to the most important variable of all, stress. Stress affects every physiologic function of the body and we must strive to minimize it.

As shown in this story, we can work collaboratively to develop enrichment programs in tox and GLP environments. There are several similar success stories, and I invite you to share your success stories in *The Enrichment Record*, or to contact me at kfroberg@bio-serv.com and I will share your story.



Gina Savastano, Ph.D.

Senior Supervisor, Facility Operations
Merck Research Laboratories

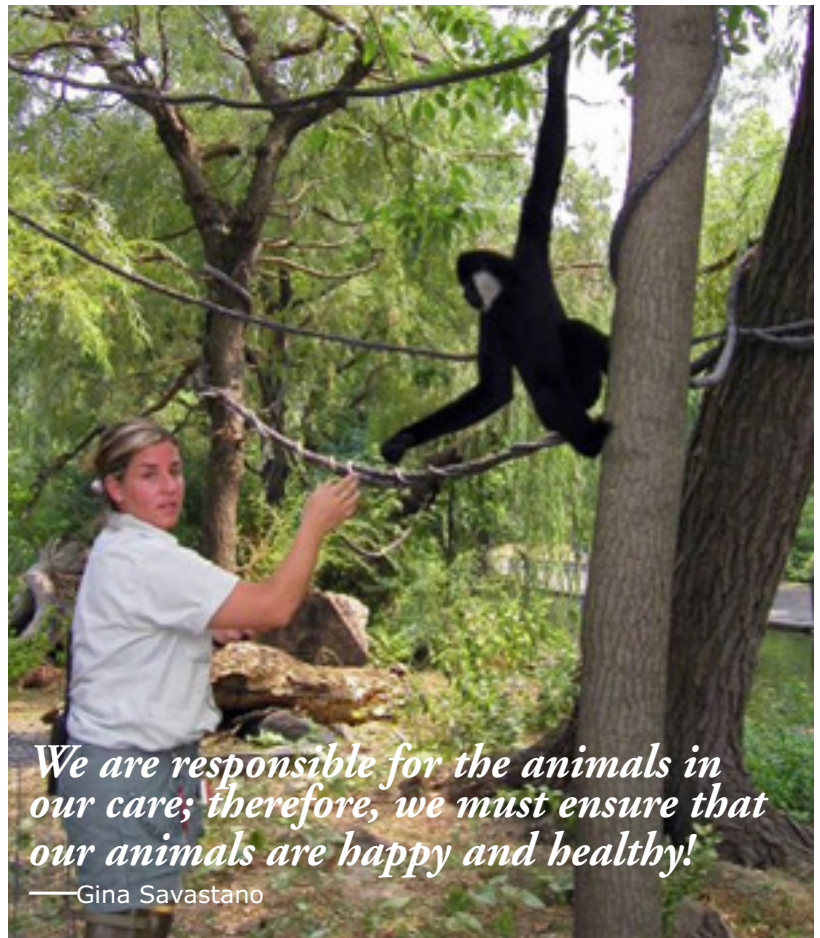
An author, project manager, consultant, life-long lover of animals (ask her about her dogs, rabbits, cats and talking birds!), and dedicated supporter of environmental enrichment, Gina Savastano began her career in 1995 at the Bronx Zoo as a Wild Animal Keeper. During her eleven years at the Zoo, she also served as a Senior Wild Animal Keeper/Monkey House, Primate Specialist, Protected Contact Elephant Handler and Mammal Assistant Supervisor.

In 2006, Gina decided to bring her knowledge of animals to another field...animal research. She joined Merck in Rahway, NJ, as a Laboratory Animal Resources Supervisor and transferred to her current position in Boston in 2008. As Senior Supervisor of Facility Operations, she oversees all animal care and related operational activities in the animal facility.

Gina's responsibilities include maintaining compliance with departmental SOPs and local, state and federal regulations and monitoring and improving animal care and related activities for research. Gina implemented a canine behavioral management program, and oversees enrichment for mice, rats, guinea pigs and dogs.

A Great Idea!

Totally committed to the importance of animals in captivity having an enriched environment, in 2008 Gina co-founded the Enrichment Extravaganza with the help of co-worker Genny Andrews. Together with the New Jersey Association for Biomedical Research (NJABR), they launched the first enrichment program for laboratory animal professionals in the New Jersey area. Now living in Massachusetts, Gina's enrichment program is co-hosted with the Massachusetts Society for Medical Research (MSMR). Her goal is to provide an educational forum in which participants exchange ideas, learn new strategies, and evaluate the impact of various techniques on the animals and... ultimately...the research. She is totally committed to learning about and sharing new methods that provide positive stimulation and positive results for researchers.



We are responsible for the animals in our care; therefore, we must ensure that our animals are happy and healthy!

—Gina Savastano

Gina is most appreciative of her supportive vendors, and of the more than 500 participants who have taken the word about environmental enrichment back to their facilities. She is very much looking forward to the 3rd Annual MSMR Enrichment Symposium, *All Creatures Big & Small...Animal Enrichment in a Laboratory Environment*, scheduled for April 14, 2011 at the Colonnade Hotel in Boston, MA. Sponsored by MSMR, Merck & Co., Inc., the New England Branch of AALAS and Massachusetts General Hospital, the symposium will present current research and collective wisdom about enrichment in a wide range of species including swine, non-human primates, aquatics, canines, and rodents.

Gina holds a Ph.D. in Behavioral Neuroscience from The CUNY Graduate Center, an M.A. in Animal Behavior from Hunter College, and a B.S. in Biology from The University of Massachusetts Dartmouth. She is also a Certified Applied Animal Behaviorist.

Originally from Massachusetts, Gina is delighted to be home. She loves her job, her husband, and her son, joyfully referred to as "the light of my life!"

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: info@theenrichmentrecord.com

Rodent Enrichment 2010 AALAS National Meeting

Christina Winnicker, D.V.M., M.P.H, DACLAM
Director, Enrichment and Behavioral Medicine
Animal Welfare & Training
Charles River

Awareness has grown among both animal care providers and scientists of the importance of providing experimental animals with environments that allow the expression of natural behaviors and reduce or eliminate the expression of abnormal behaviors. This goal reflects both an ethical imperative and a strategy for maintaining the suitability of animals for scientific research. However, if done incorrectly, well-intended efforts to enrich an animal's environment can backfire, with adverse impacts on animal health and well-being or on the use of the animal in research.

Well-conceived enrichment strategies rely on a solid understanding of the natural behaviors of the species in question. Rodents do not respond to environmental stimuli in the same manner as primates, and rats do not respond in the same manner as mice. Furthermore, the enrichment strategy can impact use of animals as research models. A model can be improved by eliminating physiological abnormalities that may be linked to behavioral abnormalities, but enrichment, particularly if used inconsistently, can increase variability in the data, thereby reducing statistical power and necessitating increases in animal numbers.

This seminar addressed all these aspects of environmental enrichment as it pertains to laboratory mice and rats. Participants learned about natural behaviors of both rats and mice, and how to use this understanding to select species-appropriate enrichment strategies. They learned some of the negative impacts that environmental enrichment can have on scientific

data. The target audience included veterinarians and animal care professionals who typically select enrichment for the animals under their care, as well as scientists who use these animals in research.

Dr. Joy Mench of University of California, Davis began the session by discussing the importance of understanding animal behavior. Particular focus was placed upon how the natural behavioral repertoire of a species informs what is enriching to a species.

Dr. Joe Garner of Purdue University spoke on mouse behavior. In particular, he focused on the mouse thermoneutral zone and how the behavioral response of nest building and variations in the quality of the nest as a function of ambient temperature was the natural response of mice to temperature changes. Ambient room temperatures in vivariums are generally below the mouse thermoneutral zone for mice, and the provision of nesting material supplies the substrate to allow for this behavioral response.

Dr. Christina Winnicker of Charles River spoke on rat behavior and enrichment strategies for rats. The main sensory modalities, normal behavioral repertoire, and resource requirements for rats' natural behaviors were reviewed. Taking this behavior into consideration, aspects of a program for rat enrichment were discussed, including options for social housing, shelters & nesting material, and gnawing devices.

Dr. Linda Toth of Southern Illinois University School of Medicine discussed the integration of environmental enrichment into rodent research from a principal investigator's point of view. She reviewed the importance of considering the scientific endpoints of the study and how enrichment may interact with or interfere with research. Two messages were that environmental enrichment, like any other environmental influence, could affect the science being done and that the benefit or type of enrichment being provided should be weighed against its impact on the research questions being asked.

**3rd Annual Enrichment Symposium
All Creatures Big & Small
April 14, 2011
Colonnade Hotel, Boston, MA**

In their third full day Enrichment Symposium, sponsors MSMR, Merck & Co., Inc. and Massachusetts General Hospital will present current research and collective wisdom about enrichment in a wide range of species including swine, non-human primates, aquatics, canines, and rodents.

Presenters:

Emily Patterson-Kane, Ph.D.
Animal Welfare Scientist
American Veterinary Medical Association
Horizons of Enrichment: the History, Accomplishments and Aspirations of Environmental Enrichment

Christian Lawrence
Aquatic Resources Program Manager
Children's Hospital Boston
Environmental Enrichment for Laboratory Zebrafish

Jodi Scholz, D.V.M., DACLAM
Assistant Professor
(Clinical Veterinarian)
Director of the Environmental Enrichment Program at Yale
Providing Mouse Environmental Enrichment at a Large Academic Institution

Amber Alliger, Ph.D.
CUNY Graduate Center
Professor of Biopsychology at Hunter and SUNY New Paltz
*The Effects of Enrichment on Cognition in Rats *Rattus norvegicus**

Christina L. Winnicker, D.V.M., M.P.H., DACLAM
Director,
Enrichment & Behavioral Medicine
Charles River Laboratories
Rabbit Enrichment & Behavioral Management

Gina Savastano, Ph.D.
Senior Supervisor Facility Operations, Daniel Beaudreau Facility Operations Associate
Merck Research Laboratories
Using an Inexpensive Webcam to Validate Dog Enrichment

James L. Weed, Ph.D.
Senior Behaviorist,
Division of Veterinary Resources
Office of Research Services,
Division of Veterinary Resources
National Institutes of Health
SWINE Behavior Management and Environmental Enrichment

Genevieve Andrews-Kelly
Group Leader,
Large Animal Toxicology
Primate Social Housing and PRT in Toxicology Studies

Nirah H Shomer, D.V.M. Ph.D. DACLAM
Director, Laboratory Animal Resources, Merck Research Laboratories
Challenges of Enrichment in a Laboratory Setting

Melissa Dragon, B.S., LATG
Training Coordinator at Pfizer, Groton Enrichment for Mice and Men: *Designing a Program that Works for All Creatures*
<http://events.r20.constantcontact.com/register/event?llr=iwyzvcab&oidk=a07e39avblbf28983dd>



**Animal Behavior Management Alliance Annual Conference
"Miles Above...and Beyond!"
April 17-22, 2011
Denver, CO**

Elevate Behavior Management in the Mile High City!
The 11th Annual ABMA Conference will kick off with keynote speaker, Dr. Jill Mellen from Disney's Animal Kingdom, and will culminate with an Earth Day to remember at Denver Zoo. All of the conference favorites will be included, plus a few new ideas! For information on attending and presenting, please visit the ABMA website www.theabma.org

- **Hosts:** Denver Zoo, Cheyenne Mountain Zoo and Downtown Aquarium, Denver
- **Hotel:** JW Marriott, Cherry Creek
- **Site visits to:** Cheyenne Mountain Zoo, Downtown Aquarium, Denver Zoo
- Pre-conference trip to watch a rescue demonstration by avalanche deployment unit dogs
- CEU credits for CPDT and IAABC certification!
- Possible pre-conference TAG teach opportunity
- Travel scholarship, see website for details

The Enrichment Extravaganza (EE)
Co-sponsored by
The Enrichment Record,
NJABR & NJAALAS
**June 13, 2011
9 AM—4 PM
Atlantic City Convention Center
Atlantic City, NJ**
To register for the EE, go to:
<http://www.njabrevents.org>

For Special Registration Package for EE and Tri-Branch Symposium, go to www.tribranch.org

continued on page 22

Reporters Wanted!



In each issue of *The Enrichment Record* we report on Enrichment meetings and conferences in detail. We are seeking volunteers to write summaries of meetings, workshops, and conferences addressing any aspect of environmental enrichment for lab animals. Meeting organizers are welcome to assign a recorder.

To request "Guidelines for Meeting Up Summaries," send your name, contact and meeting information to info@theenrichmentrecord.com

NAME _____

PHONE _____

EMAIL _____

EVENT _____

DATE _____

TIME _____

LOCATION _____

Meeting Announcement submission Form

Please submit the following information to Rhoda Weiner, Editor rmbw19@verizon.net

ORGANIZATION _____

CONTACT NAME _____

PHONE _____

EMAIL _____

DATE OF EVENT _____

TIME OF EVENT _____

EVENT LOCATION _____

TYPE OF EVENT
 Conference _____ Workshop _____ Lecture _____
 Meeting with featured speaker _____

BRIEF DESCRIPTION OF THE EVENT _____

45th Congress of the International Society for Applied Ethology July 31-August 4, 2011 Hyatt Regency, Indianapolis, IN

The Annual Congress of the International Society for Applied Ethology (ISAE) returns to the United States in 2011 for the 3rd time in its 45-year history. A truly international forum, the Congress attracts researchers, educators, students and policy-makers with diverse yet common interests to disseminate, gather and discuss vital information on the well-being and behavior of companion, farm, laboratory, wildlife and zoo animals and their interface with society.

The meeting is approved for 16 CEUs for members of the American Registry of Professional Animal Scientists.

<http://www.ars.usda.gov/meetings/ISAE2011>

10th International Conference on Environmental Enrichment

August 14-19 2011
 Benson Hotel, Portland, Oregon

Hosted by the Oregon Zoo and the Oregon National Primate Research Center, OHSU Events at the Oregon Zoo and the Oregon National Primate Research Center
"Meeting of the Minds: Working Together to Enrich the Lives of Animals"

The International Conference on Environmental Enrichment is a meeting for the exchange of ideas about both theoretical and applied research on enrichment for animals in captivity. The original conference, held in 1993, was hosted by the Oregon Zoo. For the first time, this conference is being co-hosted by a research facility, the Oregon National Primate Research Center (ONPRC). This combination of the zoo and laboratory communities will bring together caretakers, researchers and veterinarians of differing backgrounds, but with a similar goal; providing for the well being of the animals in their care. Both the zoo and research communities have much to offer each other, and this conference offers a unique "meeting of the minds".

The conference will kick off Sunday evening, August 14 with an Ice Breaker, and will end on Friday afternoon, August 19. Registration for the conference is \$350 (after June 6, 2011, the price will go to \$450), which includes continental breakfasts and coffee breaks for all conference days, as well as admission to the Ice Breaker, Closing Banquet, Zoo Day at the Oregon Zoo (including meals), and a social gathering at the ONPRC. Abstracts will be accepted until April 30, 2011, so get your abstract in early!

The Benson Hotel is offering special room rates of \$149 per night for ICEE participants. To reserve a room, go to Benson Hotel Reservations.

For more information, or to register or submit an abstract, please go the ICEE 2011 home page or contact the ICEE 2011 hosts at icee.2011@hotmail.com



Annual Innovative Environmental Enrichment Symposium

October 2, 2011

San Diego, CA

Marriott Hotel and Marina (Satellite to National AALAS)

The Massachusetts General Hospital, Center for Comparative Medicine hosts an annual Innovative Environmental Enrichment Symposium.

This event is for individuals in the field of animal behavior, enrichment and welfare who are passionate about providing quality laboratory standards that exceed regulations and meet animal welfare needs.

The objective of this symposium is to provide a forum at which participants can compare notes on innovative animal enrichment and conditioning programs and how to best determine the effectiveness of those versus current practices.

The symposium will include a variety of highlights:

- Developing an enrichment program
- Social housing
- Behavioral conditioning
- Human-animal interaction and socialization
- Enrichment in a GLP environment
- Determining economic costs and benefits of enrichment strategies
- Regulatory considerations in enrichment programs

http://www.virtualvivarium.com/about%2Dus/upcoming-events/environmental_Enrichment_Symposium.asp

Please send notification of your Upcoming Meetings to rmbw19@verizon.net

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
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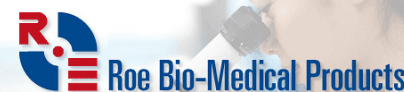
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