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THE SHAPE OF ENRICHMENT is dedicated to sharing ideas, inspirations, and practical knowledge of enrichment strategies among those working in the field of animal care. It is an open forum for keepers, trainers, curators, researchers, exhibit designers, administrators, volunteers, and anyone else interested in approaches to captive enrichment. All of our staff are volunteers.

We are always looking for new submissions, from feature-length articles to short blurbs. We accept submissions in any form, polished or not. Let us, and your colleagues, hear from you!

THE SHAPE OF ENRICHMENT presents enrichment ideas of all kinds from a variety of sources. We urge you to consider, assess, and evaluate any idea carefully before applying it to your own animals and exhibits. If you have concerns or opposing views, we will be happy to accept letters and articles that express them—our purpose is to establish an ongoing dialogue. As the editors, we present these ideas for your consideration only; we do not take responsibility for their effectiveness or feasibility.

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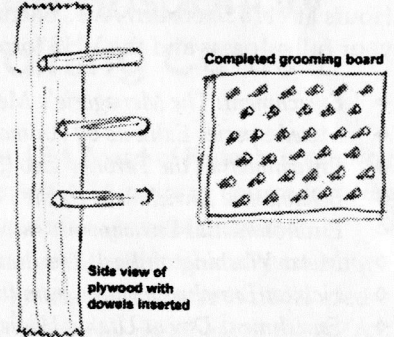
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## A Grooming Board for Hoofed Stock

Animals such as horses, deer, antelope, and goats will rub against branches and rough surfaces to loosen shedding hair and to scratch. A grooming board mounted on an exhibit wall or a structure within the exhibit could provide them with an opportunity for this activity.

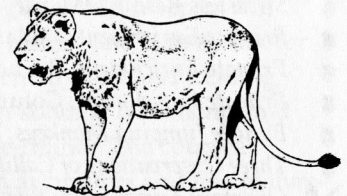
Take a 2-foot by 3-foot section (or whatever size is appropriate) of 3/4-inch plywood, and drill holes into it about 1 to 2 inches apart. The holes should be 1/2-inch deep and 1/4-inch diameter. Cut a 1/4-inch dowel into several 1 1/2-inch-long pieces, enough to fill the holes on the board, and round each peg at one end with a wood file. Put wood glue into the

holes of the plywood board and pound the pegs into the holes, so the rounded ends stick out. Affix the board securely to any suitable vertical surface—make sure that the board cannot injure an animal by swinging or falling, and that animals cannot get caught in any chain or rope that might be used to hang the board.



—Thomas Larimer, *The Living Desert*; reprinted with permission from the AAZK Enrichment Notebook, 2<sup>nd</sup> edition.

## THE SHAPE OF ENRICHMENT



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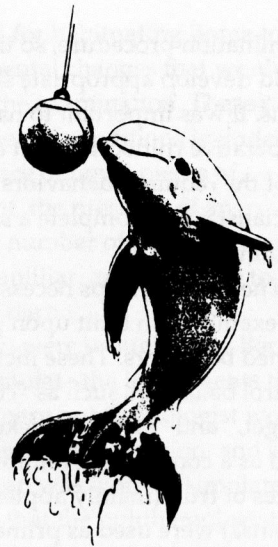
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# IN TRAINING

## Operant Conditioning for an Eye Examination on a Black Rhinoceros

By J. Katka, Philippine Endemic Species Conservation Project, Frankfurt Zoological Society; M. Corcoran, Disney's Animal Kingdom; M.A. Bloomsmith, Zoo Atlanta; E. Garrett, Philippine Endemic Species Conservation Project; R. Sartor, Zoo Atlanta; R. McManamon, Zoo Atlanta; G. Powell-Johnson, Atlanta



Zoo Atlanta houses two black rhinoceroses (*Diceros bicornis*): "Boma," a male born in 1986, and "Rosie," a female born in 1990. Zoo keepers initiated an animal training program in 1994 in response to difficulty shifting the rhinos

eros training has provided an important opportunity for behind-the-scenes tours and "VIP" rhinoceros feedings, and has reduced aggressiveness and hyperactivity in response to novel stimuli (Helmuth, 1995).

Perhaps most importantly, it has allowed veterinary procedures to be performed on calm, cooperative animals without sedation (Gradin et al., 1995; Helmuth, 1995; Laule et al., 1996). Keepers and veterinarians have been able to conduct hands-on examinations, administer topical medications, treat skin problems, treat nail cracks, administer vaccinations, collect blood, collect saliva, treat a serious tail injury, conduct an ultrasound examination on a cheek abscess, clean ears, and check mouth condition without sedation.

tion in which some opacity in the left eye, and a lack of tapetal reflection when a light was shown, were noted. A more thorough and detailed examination by a specialist was needed to determine whether a cataract or some other visual obstruction was present, and whether the retina was normal. A complete eye examination (including indirect, direct, and slit lamp ophthalmoscopy) on an unanesthetized black rhino has not been previously reported. Such an exam commonly requires a narcotic immobilizing agent, which causes extreme miosis and prevents visualizing the posterior segment through the pupil (R.E. Miller, personal communication). Because of this limitation, we decided to train Boma to cooperate with the exam.

### General Plans for the Eye Examination Training

An event such as an eye examination is a complex affair involving many variables and contingencies that we took into account in the training process. Shaping plans—outlines of the steps and strategies proposed to achieve particular goals in the training—were developed for training the entire procedure, as well as for training individual elements involved. The veterinary ophthalmologist provided details of the planned eye

In the summer of 1997, it was decided that the male rhinoceros needed an eye examination. Keepers and zoo veterinarians questioned the quality of Boma's vision after observing changes in his behavior: he seemed to respond differently to stimuli on one side of his field of vision than on the other side. This prompted a preliminary eye examina-



Trainer Robin Pressley-Keough (left) shines a light in Boma's eye while trainer Micki Corcoran uses a clicker to bridge him.

between the exhibit and their holding facility. Operant conditioning has since become an integral part of the husbandry routine for these rhinos and has provided many benefits for their management. It has provided the animals with daily challenges and interactions (Laule, 1992), it has facilitated monitoring the animals' physical condition and behavior, and it has increased the ease with which animals are moved within their enclosure (Helmuth, 1995). Rhinoc-

Disney's Animal Kingdom





examination procedure, so the trainers could develop appropriate shaping plans. It was important to have a calm, cooperative rhinoceros that exhibited all of the required behaviors so the specialist could complete a successful examination.

The training steps necessary for the eye examination built upon previously trained behaviors. These included control behaviors such as "come," "target," and "stay." A clicker was used as a conditioned reinforcer, and pieces of fruit (mainly apples and bananas) were used as primary reinforcers. Six experienced zoo keepers trained the rhinoceros in this project. The training incorporated positive reinforcement and "time-outs"; no aversive stimuli were used. During a time-out the trainer would leave the training interaction for a short time, following an undesirable response from the animal such as aggression or failure to respond to a known cue. Boma was free to choose whether to participate in each training session, and he chose to participate most of the time. Exceptions occurred when the female was in estrous, and on hot days when he was sleeping at the far end of the exhibit when the trainers arrived. Aggression towards the trainers was rare, and only occurred immediately prior to and during the female's estrous. On those occasions, training was postponed until he was more receptive.

### Layout of the Facility and General Training Procedures

The barn where the training and the actual examination took place is made up of two stalls, a connecting hallway, and the keeper service area (see Figure 1). The hallway is T-shaped, with the gate to the corral at the bottom of the stem, gates to the stalls at each end of the horizontal bar, and the keeper service area extending above the horizontal bar. The walls of the hallway are made of vertical iron pipe spaced widely enough to allow a person

to slip between, yet small enough to restrict a rhinoceros. The veterinary ophthalmologist, keeper trainers, and other staff remained in the service area during the procedure. The eye examination was conducted in the hallway between the stalls with the rhinoceros aligned parallel to the wall, demarcating the keeper service area.

From there he could be called into a stall to begin training. The door to his stall was opened and he was given the verbal command to "come over" as a signal to approach the trainer. The door between his stall and the hallway was closed, and the trainer

was stationed in the hallway. Boma was reinforced for approaching the trainer, and the trainer assessed his nervousness and preparedness to cooperate. The trainer would then give some simple cues for well-known behaviors to establish a series of positive interactions prior to any novel or

potentially alarming stimuli.

The trainer would then step back into the keeper area, and the door between Boma's stall and the hallway was opened. He was cued to "target," (i.e., touch his upper lip to the trainer's hand) at a place just inside the hallway. He was put in a "stay" position with his eye centered between two of the vertical bars. A

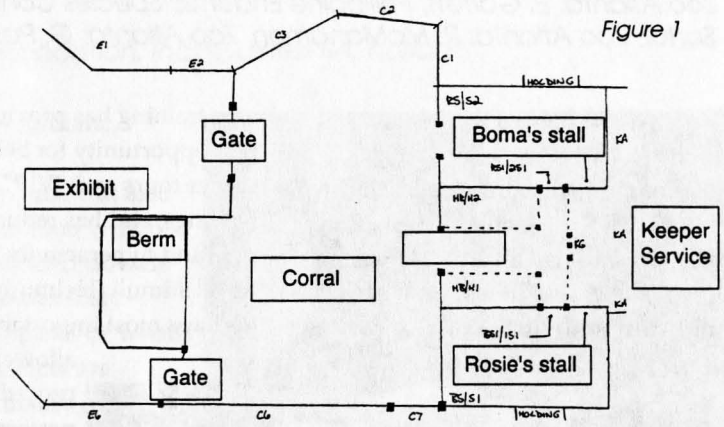
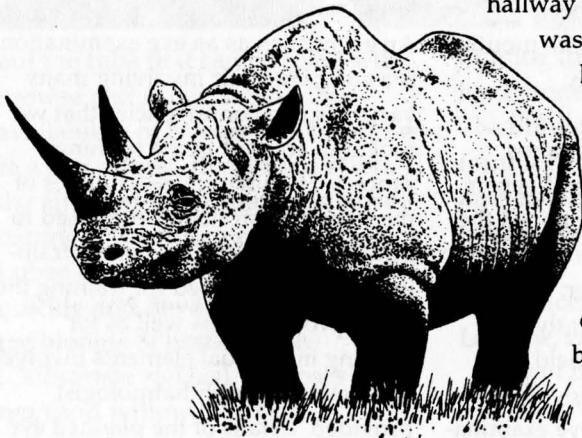


Figure 1

second trainer then manipulated his eye in various ways including holding it open, placing drops in it, waving objects in front of it, and waving a flashlight beam past it. He was periodically reinforced throughout the procedure. Twice more he was then moved forward about three feet and the eye manipulations were repeated. Boma was then targeted into the other stall, the door between that stall and the hallway was closed, and the entire procedure was repeated for his other eye. The duration of time that he was required to "stay" was gradually increased until he remained still for the estimated duration of the procedure, about five minutes per eye, with a few additional minutes to photograph each retina.

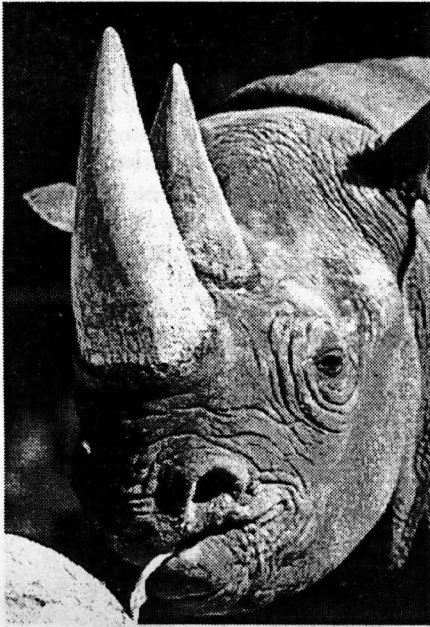
The majority of the eye examination training focused on acclimating Boma to the physical sensations he would experience during the examination, and the changed environment under which the examination would be conducted. The majority of





training sessions intended to acclimate Boma to the changes he would experience during the examination were conducted in the 10 weeks immediately prior to the examination. Twenty-five training sessions were

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held, averaging 20 minutes each, for a total of about 8 hours and 20 minutes of training time. It is important to emphasize that these hours of specialized training were preceded by a solid foundation of years of training experience for both the animal and the staff.

### **Training to Tolerate Physical Sensations**

Systematic desensitization was used to prepare Boma for as many elements of the examination as could be predicted. Systematic desensitization involves presenting stimuli that may evoke fear or aggression in such a way that they elicit minimal response, and then reinforcing that calm response while gradually working towards a complete presentation of the stimuli without manifestation of fear or aggression. For example, shining a bright light directly in a rhinoceros' eye could result in

snorting, charging, head tossing, or running away. Introducing a penlight beam indirectly into the eye for a brief time allowed us to reinforce the desired, calm response. The light was gradually brought closer until the beam could be waved across his eye without any reaction. We felt that this prepared Boma for the light used during the examination and for photographing his eyes.

A critical element of the eye examination involved manipulating Boma's eyes and holding the lids back to view as much of the pupil as possible. Boma had already been trained to "stay," and in training for the eye examination this behavior was embellished. He had to "stay," keep his eyes wide open, and not roll back his eyeballs. Only those instances in which these criteria were met were reinforced. Once this behavior was accomplished, its duration was increased to match the expected duration of the examination. Boma was allowed to blink, so that with his eyelid held up, he would periodically roll his eye back for a second or two. Boma was also conditioned to accept sterile saline drops or sterile ophthalmic lubricating ointment in his eyes. This simulated the medications (1% mydriacil or "Tropicamide" drops, and atropine ointment) needed to dilate his eyes for the examination, and for the possibility of daily drops if a surgical procedure became necessary. Through repeated training sessions, Boma was able to cooperate with two or three of these approximately five-minute-long periods of mock eye examination and manipulation, and in between these periods he was asked to walk a few steps and reposition himself.

### **Habituation Procedures for Environmental Changes**

Systematic desensitization was also

employed for habituating Boma to environmental changes that would be a part of the examination. These novel environmental conditions included the presence of novel pieces of equipment, the presence of an increased number of people, some of them unfamiliar, and exposure to a darkened barn.

Objects were brought near Boma's eyes to simulate the instruments that the veterinary ophthalmologist would use during the examination, and a baseball cap was worn to simulate the headgear that the ophthalmologist would wear. A variety of accessories, such as carts and tables, were brought in during training sessions to approximate the atmosphere of the actual examination. Training also involved having more people present during training sessions and reinforcing a calm response by Boma. When he was calm and comfortable with these procedures, zoo personnel with whom he was unfamiliar were brought in to practice the role of the ophthalmologist.

Since the eye examination would be conducted in a darkened barn, Boma was accustomed to coming into a darker barn. The barn has one skylight over each stall, and two windows on the two keeper doors into the keeper area. He was first desensitized to coming in the barn with one skylight covered, then with both covered. Over a series of sessions, the remaining sources of daylight were covered until he reliably and calmly entered a barn with minimal light. One window was left partially uncovered so that the rhinoceros and trainer could see each other well enough to interact.

### **Examination Day**

On examination day the procedure was performed smoothly and calmly. The eye examination involved administering atropine ointment and





1% mydriacil ("Tropicamide") drops into Boma's eyes about two hours prior to the examination. The veterinary ophthalmologist (GPJ), had extensive experience working with fractious horses and other large animals. She was advised regarding safety measures, and on using calm and deliberate movement and speech during the examination. The ophthalmologist held each of Boma's eyelids open while she looked into them, first with a lens, then with a bright light called a "slitlamp," and finally with a camera that photographed the retinas. At one point in this process, after Dr. Powell-Johnson had completed a portion of the examination of his first eye, Boma broke his "stay" and calmly lumbered forward a few steps. He was cued again to "stay," and cooperated with the remainder of the examination. The entire procedure required about 20 minutes of cooperation from Boma. It was determined that the opacity in his eye was due to nuclear sclerosis, a normal aging process. No visual loss

or ocular abnormality was present, and no additional veterinary procedures were deemed necessary for his optical health.

### Conclusions

The importance of this examination lies in the fact that it was performed on a calm, relaxed rhinoceros, without apparent stress, and that it allowed a specialized examination procedure that was not possible with common anesthetic protocols for this species. Although other, non-narcotic anesthetic protocols might have been attempted, this training procedure was clearly preferable. Any chemical immobilization carries some attendant risk, and the moderate behavioral changes observed here prior to his exam would not have warranted a full anesthetic procedure. Instead, we were able to get an accurate assessment of his optical health and good baseline information, including photographs, for any future problems that may occur regarding the health of his eyes. Successful procedures

such as this one exemplify the benefits of positive reinforcement training in managing captive exotic animals. Training is a valuable tool requiring coordinated effort, but provides many benefits for keepers, veterinarians, and animals.

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## Update on Conference Proceedings

*First the bad news: There are no more copies of the Proceedings of the Third International Conference on Environmental Enrichment available for sale. They're all gone! We're glad they all went to good homes.*

*But the good news is that the obstacles that have been hindering the publication of the Proceedings of the 4<sup>th</sup> conference have now been resolved! It is in final production and will be printed in November (after Val and Karen get back from Sydney!). Copies will be mailed by the end of the year. All conference delegates who attended the conference in Edinburgh, Scotland, will be receiving a free copy. Everyone who pre-ordered copies for sale will also receive the number that they purchased. Some extras will be printed for sale, so if you or your facility would still like to buy a copy, please send your name, facility name, complete address, phone number, e-mail address, and a check for \$35 if you live in the U.S. or \$45 if you live elsewhere to The Shape of Enrichment/4th Proceedings, 1650 Minden Drive, San Diego, CA 92111. Please enclose a note stating exactly what you are ordering, and please be specific about a person and address to which it should be directed. We've had trouble with orders being "lost" because the delivery information was too general. We will fill orders until the supply runs out.*

*It's been a difficult year in so many respects, but we are glad to finally be getting the 4<sup>th</sup> Proceedings out to you. Thanks for your patience and understanding!*