

The Journal of the American Association of Zoo Keepers, Inc.

# Animal Keepers Forum



January 2018, Volume 45, No. 1



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Western lowland gorilla courtesy of Dale McDonald

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American Association of Zoo Keepers, Inc.

The American Association of Zoo Keepers, Inc. exists to advance excellence in the animal keeping profession, foster effective communication beneficial to animal care, support deserving conservation projects, and promote the preservation of our natural resources and animal life.

### ABOUT THE COVER

This month's cover photo features a Francois' Langur (*Trachypitecus francoisi*) at the Cleveland Metroparks Zoo by Dale McDonald. Francois' Langurs can be found in the southern Guangxi province of China, northern Vietnam and west-central Laos. Francois' Langurs have black fur with a white stripe stretching from ear-to-ear and a black crest atop the head. Young langurs display bright orange coloring, an adaptation that scientists believe may encourage females in the group to offer care. This primate species occupies dense forests, where they climb through the canopy in search of leaves on which to feed.

Francois Langurs feed primarily on leaves. Because leaves are low in nutrients, the monkeys have a multi-chambered stomach that helps them digest their diet. Special bacteria in the stomach also aid the process. The species lives in groups consisting of 3-10 individuals. The females show allomothering behaviors, with non-mothers cooperating in their care and feeding of young. Males define their territory with hoarse vocalizations.

Francois' Langurs are listed as an Endangered species. They are managed within AZA as a Yellow SSP.

Articles sent to **Animal Keepers' Forum** will be reviewed by the editorial staff for publication. Articles of a research or technical nature will be submitted to one or more of the zoo professionals who serve as referees for **AKF**. No commitment is made to the author, but an effort will be made to publish articles as soon as possible. Lengthy articles may be separated into monthly installments at the discretion of the Editor. The Editor reserves the right to edit material without consultation unless approval is requested in writing by the author. Materials submitted will not be returned unless accompanied by a stamped, self-addressed, appropriately-sized envelope. Telephone, fax or e-mail contributions of late-breaking news or last-minute insertions are accepted as space allows. Phone (330) 483-1104; FAX (330) 483-1444; e-mail is shane.good@aazk.org. If you have questions about submission guidelines, please contact the Editor. Submission guidelines are also found at: [aazk.org/akf-submission-guidelines/](http://aazk.org/akf-submission-guidelines/).

Deadline for each regular issue is the 3<sup>rd</sup> of the preceding month. Dedicated issues may have separate deadline dates and will be noted by the Editor.

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## 2017 by the numbers

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The AAZK Board of Director's swore in four new members and expanded to a 7-person Board.

**\$819K**

AAZK Chapters raised \$819,038.79 during the calendar year 2016 for conservation locally, nationally, and globally. Once the Chapter recharter process is complete for this year we will hopefully see that trend continue in the reflection of 2017 funds raised.

**100**

The AAZK membership grew by approximately 100 members in 2017.

Happy New Year!

As we look forward to what 2018 may bring us, I hope we can all be proud of our accomplishments during the past year.

In 2017, AAZK celebrated its 50<sup>th</sup> anniversary and we were honored to have the annual conference hosted by the National Capital Chapter of AAZK in Washington, DC. Throughout the year we highlighted our golden anniversary by offering a Golden Animal Photo Contest for the cover of the Animal Keeper's Forum, a Golden Keeper Contest, monthly AAZK Golden Trivia and anniversary merchandise in the AAZK shop. I hope you enjoyed celebrating with us.

### AAZK Committees and Programs

#### Recognition

- ▶ The AAZK Grants Committee recognized the efforts of six AAZK professionals and one AAZK Chapter with specialized grant opportunities.
- ▶ The AAZK Awards Committee hosted the first upscale evening Awards ceremony during the National Conference that included some excellent entertainment and rhino statues to accompany awards in honor of our 50<sup>th</sup> anniversary.

#### Education

- ▶ The AAZK Professional Development Committee, in conjunction with the Conference Host Chapter and facility, brought you three new Professional Certificate Courses in Reptile and Amphibian Husbandry, Keeper Excellence in Research, and Zoo Nutrition.
- ▶ The AAZK International Outreach Committee hosted the first recipient of the Latin America Travel Grant during the National Conference.

#### Conservation

- ▶ The AAZK Bowling for Rhinos Program reached a milestone with the all-time total surpassing \$7 million dollars, marking 27 years of contributions toward rhino conservation.
- ▶ The AAZK Trees for You and Me Program had an incredible fundraising year in 2017 and raised \$18,364.45 which will be split between two recipients to plant trees this year for habitat restoration.

#### Communication

- ▶ The AAZK Resource Committee organized the first Committee and Program table during the annual conference so that delegates could have the opportunity to network and learn more about what we are working on and working towards.
- ▶ The AAZK Communication Committee helped to increase our followers on Facebook by more than 2,600 for a total of more than 13,600 followers.

#### Regulation

- ▶ The AAZK Behavioral Husbandry Committee completely reviewed and edited the AAZK Enrichment Notebook publication and created the fourth edition, which will be available for purchase in early 2018.
- ▶ The AAZK Safety Committee presented its second Topical Workshop during the National Conference and authored its first article, on hurricane and flood safety, in the October issue of the Animal Keeper's Forum.

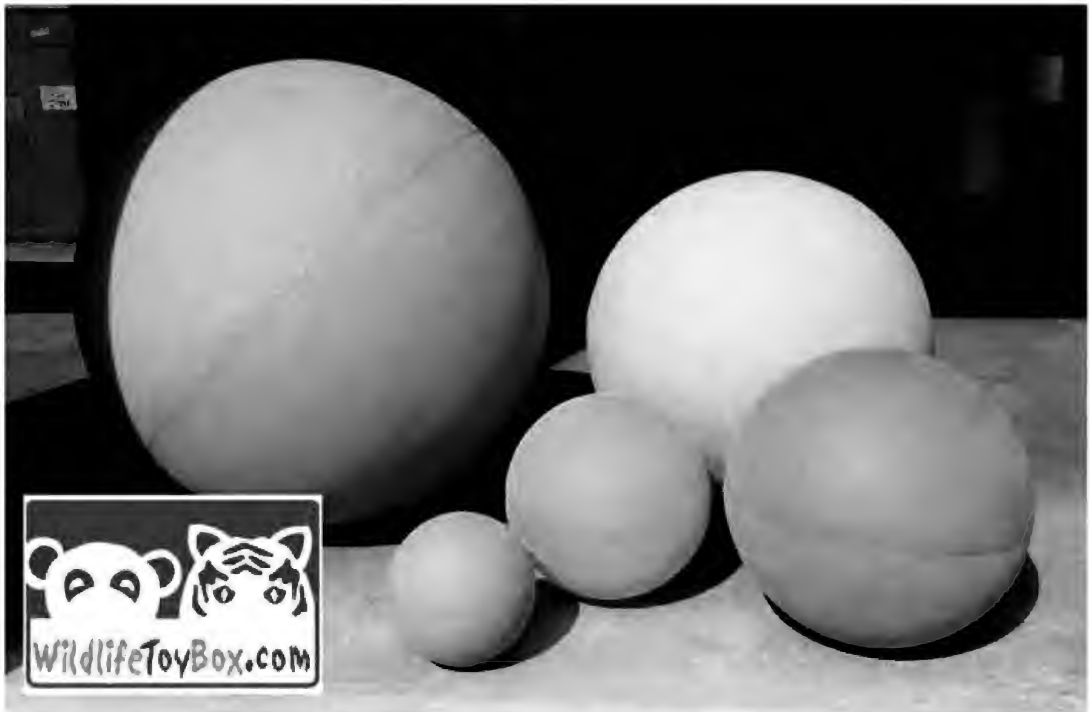
As we welcome in 2018, I hope we all continue to foster our passion for animal care. Share your passion by recruiting new members to the profession, to AAZK and to your Chapters. Continue to network with your peers and seek professional development opportunities to become the very best that you can be in your field. Be champions for conservation through AAZK programs locally and globally. And challenge yourselves to have excellent communication with one another. I believe that communication is interwoven into everything we do as animal care professionals and is the most important tool we have to keep us engaged with our profession, our animals, and our communities.

Be precise. Be relevant. Be accessible. Be credible.

On behalf of the Board, we are always available. I look forward to hearing from you. All the best,

Bethany  
Bethany.Bingham@aazk.org

# Roll into 2018 with us!

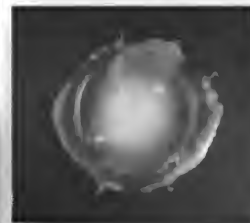


The Wildlife Toy Box animal enrichment balls are offered in 48", 36", 24", 18" and 12" Balls. These are offered in five different wall thicknesses, making these great for ALL animals! All of these balls are supplied with standard with a metal hex plug. If you require a plastic patch instead let us know when you are ordering.



Order the L-Shaped Hex Drive when ordering your enrichment items. This tool is \$12 and works on all our metal hex plugs. Add liquid or sand through this port.

## Metal Hex Plug



## Plastic Patch

The plastic patch is great if you are using the enrichment toy in a water application. This way you do not have to worry about potential rust.

# COMING EVENTS

Post upcoming events here!  
e-mail [shane.good@aazk.org](mailto:shane.good@aazk.org)

**March 24-29, 2018**

**AZA Mid-Year Meeting**

Jacksonville, FL

Hosted by Jacksonville Zoo and Gardens

For more information go to: [aza.org/conferences-meetings#mym](http://aza.org/conferences-meetings#mym)

**April 8-13, 2018**

**Animal Behavior Management Alliance (ABMA) Annual Conference**

San Antonio, TX

Hosted by San Antonio Zoo and Sea World San Antonio  
For more information go to: [theabma.org/abma-annual-conference/](http://theabma.org/abma-annual-conference/)

**April 10 or 11, 2018**

**(\*same workshop held each day)  
Ape Cardio Health Workshop**

Waco, TX

Hosted by Cameron Park Zoo  
For more information contact: [orangutan@wacotx.gov](mailto:orangutan@wacotx.gov)

**May 4-6, 2018**

**Recon: Reconnecting with Elephants in Restricted Contact.**

Colorado Springs, CO

Hosted by

Cheyenne Mountain Zoo

For more information go to: [cmzoo.org/index.php/recon-elephant-workshop/](http://cmzoo.org/index.php/recon-elephant-workshop/)

**May 7-11, 2018**

**Practical Zoo Nutrition Management**

Front Royal, VA

Hosted by Smithsonian-Mason School of Conservation and National Zoological Park. Go to: [smconservation.gmu.edu/programs/graduate-and-professional/professional-training-courses/nutrition/](http://smconservation.gmu.edu/programs/graduate-and-professional/professional-training-courses/nutrition/)

**August 23-25, 2018**

**International Symposium on Pangolin Care and Conservation**

Brookfield, IL

Hosted by Chicago

Zoological Society

For more information contact: [amy.roberts@czs.org](mailto:amy.roberts@czs.org)

**September 23-27, 2018**

**AZA Annual Conference**

Seattle, WA

Hosted by Seattle Aquarium and Woodland Park Zoo

For more information go to: [aza.org/conferences-meetings#mym](http://aza.org/conferences-meetings#mym)

**October 14-18, 2018**

**International Congress on Zookeeping**

Buenos Aires, Argentina

Hosted by Fundacion

Temaiken and the International Congress of Zookeepers

For more information go to: [iczoo.org/congress](http://iczoo.org/congress)

**October 15-20, 2018**

**Otter Keeper Workshop**

Portland, OR

Hosted by Oregon Zoo

For more information go to: [otterkeeperworkshop.org/](http://otterkeeperworkshop.org/)



**October 4-8, 2018**

**AAZK National Conference  
Denver, CO**

*Hosted by the Rocky Mountain  
AAZK Chapter and Denver Zoo*

[rmaazk.org/2018-national-aazk-conference/](http://rmaazk.org/2018-national-aazk-conference/)

**October 25-27, 2018**

**Waterfowl Conservation Workshop**

Greenville, NC

Hosted by International Wild Waterfowl Association and Sylvan Heights Bird Park

For more information go to: [waterfowlconservation.org](http://waterfowlconservation.org)




## 2018 AAZK AWARDS NOMINATIONS OPENED

The American Association of Zoo Keepers (AAZK) Awards Committee is accepting nominations for the following awards:

- ▶ Lifetime Achievement - AAZK Professional Service Award
- ▶ Lifetime Achievement - Meritorious Service Award
- ▶ Lutz Ruhe Meritorious Achievement - AAZK Professional of the Year Award
- ▶ Jean M. Hromadka AAZK Excellence in Animal Care Award
- ▶ Nico van Strien Leadership in Conservation Award
- ▶ Lee Houts Advancement in Enrichment Award
- ▶ Certificate of Merit for Zoo Keeper Education
- ▶ Certificate of Excellence in Exhibit Renovation
- ▶ AAZK Excellence in Animal Nutrition Award

Awards will be presented at the 2018 AAZK Conference in Denver, CO. The deadline for nominations is 1 May 2018. Information concerning the qualifications, nomination procedure, selection procedure and an explanation of the awards may be obtained at [www.aazk.org](http://www.aazk.org), under committees/awards



### Rocky Mountain AAZK invites you to the 46<sup>th</sup> Annual AAZK National Conference

Please join us October 4th-8th, 2018 in Denver, CO  
We are excited to offer three Professional Certification Courses this year:

- ▶ Elevating Your Impact: Leadership, Process-Improvement, & Teambuilding
- ▶ Advanced Behavioral Husbandry
- ▶ Innovations in Small Primate Care

If you are interested in teaching a workshop, Workshop Abstract Submissions are currently being accepted, so be sure to download the application from our website and submit to the Professional Development Committee by January 15th, 2018.

Paper and Poster Abstracts submissions will be accepted later this year- stay tuned!

For the most up to date information visit our website [www.rmaazk.org](http://www.rmaazk.org) Or email us at [aazkdenver2018@gmail.com](mailto:aazkdenver2018@gmail.com).

# The Development of Simulated Termite Mounds for Sanctuary Chimpanzees (*Pan troglodytes*): Construction Methods and Materials

Leilani Case, Behavior Specialist  
Amy Fultz, Director of Behavior and Research  
Chimp Haven  
Keithville, Louisiana

Chimp Haven is a sanctuary for over 200 chimpanzees (*Pan troglodytes*), some of whom are rotated through large forested habitats of 12,140 to 20,234 square meters. Chimp Haven has an extensive enrichment program and, as part of that program, we provide different types of occupational enrichment (Panu, 2006). Environmental enrichment is defined as “the provision of animate, inanimate and nutritional environmental modifications that promote the expression of species-appropriate behaviors (e.g., foraging)” (Reinhardt and Reinhardt, 2008). Chimpanzees in the wild often use tools to “fish” for termites or ants (Goodall, 1986). In captivity, we simulate this type of behavior using a simulated termite mound (Nash, 1982). Since 2006, we have built and installed three termite mounds in three separate forested habitats.

Each time we have manufactured a termite mound, we have learned something new. In this article, we provide the basis for each of our termite mounds, lessons learned, and materials and methods for our most recently constructed termite mound in the hope they will assist others with providing occupational enrichment to the chimpanzees in their care.

Over the last 10 years, we have employed different methods of creating termite mounds. We have based all of our termite mounds off the mound created by the Honolulu Zoo ([www.honolulu zoo.org](http://www.honolulu zoo.org)). One of the first questions that arose during our termite mound building was, how much will this cost? At the time, we could not locate any information on

Figure 1: Termite mound 1 going through the door of habitat with tractor.



Figure 2: Termite mound 2 with multiple chimps.



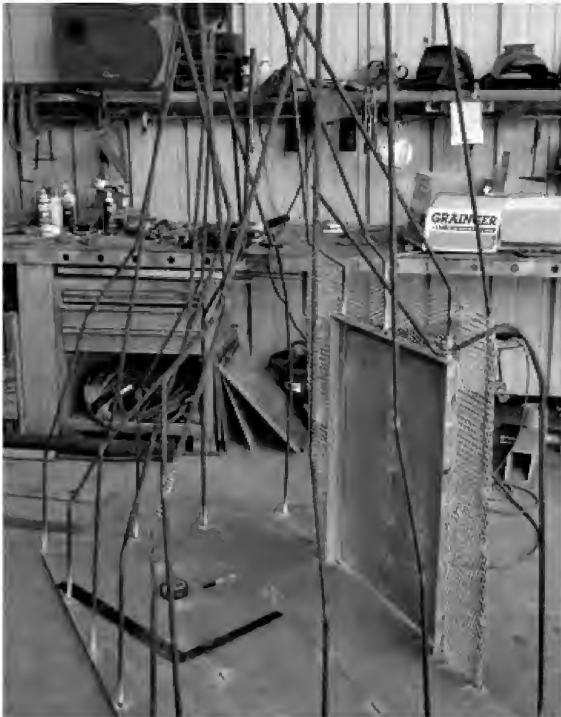


Figure 3: Termite mound 3. View of the first steps beginning with metal sheeting for base and door. Placing diamond mesh around the metal doorframe and welding rebar to the base.

approximate cost to build a termite mound, so we had no way to budget for it. The next question that came up was, who will build it? Maintenance staff? Keepers? Enrichment staff? Interns and volunteers? The third question was, where should we build it? In the enclosure? In another location? If we build it outside the enclosure, how will we get it into the enclosure? The final question was, how long would it take to build it?

#### Termite Mound 1:

This termite mound was our first and construction began at a staff member's home in 2005. It took over a year to build and install in an animal area in 2006. The staff member donated many of the materials, so the overall cost is unknown. Several individuals were involved in the building of the termite mound, including additional staff members and volunteers. Building the overall form of the termite mound onsite required transporting the initial form from this location to the sanctuary. This created difficulties due to the weight and size of the termite mound, which required a tractor to lift it onto the bed of a trailer. Thankfully, it was a short distance from the home to the sanctuary. Because of the weight of the termite mound, we decided to add the last layer of cement within the chimpanzees' habitat. This meant that we had to move it into the habitat first, which required the use of a crane and tractor (Figure 1). We forgot to consider the size of the entrance to the habitat area, which the tractor barely cleared. Finishing the final layer of cement inside of the habitat required locking the chimpanzees in for a few days to allow the cement to dry. Initially, we used wood for the back door access area of the mound (this is where humans access the mound to clean it) and the chimpanzees broke it immediately during a display. We then converted the door to metal sheeting. We learned from this that having our maintenance team involved was key, from the construction of the frame, which required welding and manipulating metal, to placing the termite mound in the habitat. Other staff members or volunteers could

complete attaching the PVC pipes (schedule 40) and adding cement. We built this mound for a group of approximately 17 chimpanzees, but it accommodates six chimpanzees at the most at one time.

#### Termite Mound 2:

After our experiences with the first termite mound, we made a few changes when we decided that to add one to another habitat. We constructed this mound in 2007 over a period of five months. Building began onsite in the maintenance shop by our enrichment technician and our maintenance staff who dedicated many hours to its construction; we then moved the mound into the habitat as before. After observing the chimpanzees at our first termite mound, we decided that we would like to accommodate more chimpanzees at the mound and have multiple places where they could perch while using the mound. To accomplish this, we made the mound larger and added peaks and flat spaces. We improved a few other features as well. First, we made the human door opening to the inside larger as the prior mound required a small caregiver and was a very tight space. Then we attached a metal door with two locking points to close it, rather than one, as was the case in the first termite mound. This gives the door added strength and integrity against the chimpanzees' assaults. We also added more PVC pipes to accommodate more chimpanzees and reduce competition. The PVC tubes are at a vertical orientation in order to aid filling the device with liquids/semi-liquids such as applesauce. We built this mound for a group of 17 chimpanzees, but it typically accommodates 8-10 chimpanzees at a time (Figure 2).

We identified several problems with termite mounds 1 and 2. For both of our initial termite mounds, the schedule 40 PVC pipe has broken over time, and it is difficult to secure with cement and glue both initially and during inevitable repairs. In addition, because the PVC pipes are not removable, they are difficult to clean, as we cannot bring them to a regular sanitizing area. We have to carry water a long distance (with chemical disinfectant and detergent) in order to clean them.

Figure 4: View of the metal nipple welded to rebar and the covering of diamond mesh. Included is the view of the PVC portion of the tube, typically filled with edible items (see Table 1 for PVC items).





Figure 5: Filled PVC portion of tubes. The PVC TOE nipple is glued to the PVC schedule 80 nipple, but the PVC threaded cap remains removable. Note: We fill the termite mound six to ten times each year. Because of the time between fillings, we sometimes froze the PVC portion. When we did so, the chimpanzees in this group did not finish all of the edible material. Therefore, we are unlikely to freeze the PVC in the future. We fill the remaining metal portion of the tube when we attach the PVC in order to entice the group to use the termite mound.

### Termite Mound Number 3:

In 2014, we decided to add a termite mound to a new chimpanzee habitat. We wanted to improve on our two prior termite mounds as well as create a list of materials, costs, and steps to share with other institutions. This model includes a list of supplies and prices, the amount of time it took to construct the mound, and more detailed step-by-step instructions. Our maintenance crew and enrichment technicians built this mound with the assistance of volunteers and interns at various times throughout the process. Implementation of this termite mound took longer due to competing duties and an issue with one chimpanzee: she preferred to remain outdoors, making it difficult to work on the mound after moving it into the habitat area. From beginning welding (by maintenance staff) to installing the finished product in an outdoor

Figure 6: The amount of cement (or mortar mix) that goes through the diamond mesh and then seals to itself. This view includes the metal nipple welded onto the rebar.



area took a year and a half. Our termite mound measures 1.22 m wide, .914 m deep, and approximately 1.83 m tall (for the highest peak) and was built to be used with a group of up to 26 chimpanzees; however, at this time it has only been tested with groups of up to 12 individuals. We constructed the mound in our maintenance area at first and then moved to other areas, still away from animal enclosures. We completed this entire mound before placing it into the habitat to avoid having to lock animals inside for any length of time.

Our list of supplies contains some items that we had onsite, which may be true for others as well. The most expensive items on the list were the metal decking, rebar, and QUIKRETE® (Table 1). Miscellaneous materials include a lock (or two) to weld to the door in order to shut it and lock it (so chimpanzees cannot access it) and metal attachment points welded to the door in order to have a place to put the locks on.

The steps to construct this mound follow with figures to illustrate some steps:

1. Weld all metal components together in a shape roughly resembling a large termite mound in Africa and other termite mounds in captivity (Figure 3).
2. Bind the diamond mesh using hog rings to the rebar, then weld the metal portion of the metal nipple (Table 1), TOE nipple, 1.25" X 6" (item #1XB73) to the rebar (Figure 4).
3. Bend the rebar down to make appropriate peaks and valleys for a simulated termite mound. Then add the metal nipples by welding them to the rebar. The threaded end of the nipple allows you to screw on the PVC portion after filling it with edible substances (Figure 5). The PVC tubes include the female adapter 1.25" (item #22FJ12) (this screws onto the metal nipple); nipple 1.25" X 4", PVC gray (item #3HFT1); and threaded cap, 1.25" (item #22FJ29) (Table 1). The total length of the entire tube including the metal nipple is 10 inches.
4. Add mortar mix to outside of diamond mesh. The cement and mortar mix were added in two phases: first an uncolored layer for a solid base, then a colored later. Try to avoid getting cement on or in the metal tubes as this inhibits the attachment of the PVC and the filling of the tubes. Note: Using regular cement became an issue due to the presence of rocks. The rocks do not allow the cement to go through the mesh, which leads to the material falling off the metal. We switched to mortar mix (without rocks), which pushes through the diamond mesh and attaches to itself on the inside (Figure 6). QUIKRETE® dries very quickly (within a day, in most cases). However, drying times vary due to thickness, humidity, and rain. For this termite mound, the first layer took two days to dry. When applying the mix in batches, if not used within a few hours, the top layer of a batch can dry and become too difficult to apply. Follow instructions on bag.
5. Once the first layer is finished, move the entire mound near the enclosure using a tractor (Figure 7).
6. Mix the remaining mortar mix with cement color (per instructions on bottle) and apply a second layer to the outside for aesthetics and extra structural support. This layer dried within a day because it was thinner. We combined the mortar mix with the coloring in the bucket of a tractor.
7. Glue the female adapter (female adapter 1.25", item #22FJ12) to the schedule 80 PVC nipple (nipple 1.25" X 4", PVC gray, item #3HFT1) using PVC glue. The final portion of the PVC section is a removable threaded cap, which aids in cleaning (threaded cap, 1.25", item #22FJ29). Once the threaded cap is on you can fill with any food item of interest; we typically use no-sugar-added applesauce (Figure 5).

**Table 1.** List of materials and costs to build termite mound 3 at Chimp Haven.

Item	Vendor	Amount of Material	Cost per unit	Total for Item
Rebar	Local construction company	200ft	\$5.25	\$105.00
Metal Decking	Local construction company	8 X 4ft	\$330.00	\$330.00
QUIKRETE (R), 50 lbs, mortar mix	Lowe's	44	\$4.98	\$219.12
27" X 96" diamond mesh	Lowe's	3	\$7.85	\$23.55
Female adapter 1.25", item #22FJ12	Grainger	14	\$0.91	\$12.74
TOE nipple, 1.25" X 6", item #1XBT8	Grainger	14	\$12.80	\$179.20
Nipple 1.25" X 4", PVC gray, item #3HFT1	Grainger	14	\$5.49	\$76.86
Threaded cap, 1.25", item #22FJ29	Grainger	14	\$1.34	\$18.76
QUIKRETE (R), terra cotta cement color	Lowe's	2	\$5.43	\$10.86
Hog rings	Lowe's	40-pack	\$1.57	\$1.57
Boron alloy lock	Philadelphia Security Products, Inc.	2	\$16.35	\$16.35
Oatey 8-fl oz PVC Cement and Primer	Lowe's	1	\$8.78	\$8.78
<b>GRAND TOTAL:</b>				<b>\$1,002.79</b>

Figure 7. Finished view of metal portion of the mound: notice the bottom and back where we began adding the QUIKRETE®.



All termite mounds installed in our outdoor habitats have issues with pests. We encounter skunks, wasps, bees, fire ants, spiders (including the harmful black widow), and other non-hazardous insects.

In conclusion, we created a simulated termite mound for sanctuary chimpanzees in a relatively short period for around \$1000. This provides the chimpanzees with a stimulating and species-typical activity (Figure 8). The latest version of our termite mound is easier to fill, clean, and access than previous models and serves as a template for future termite mounds, both here at Chimp Haven and at other organizations. Having a detailed list of supplies and their costs allows us to budget for additional termite mounds and can even provide a prospective donor with an informed option that will directly affect the lives of Chimp Haven's chimpanzees.

#### Acknowledgements:

The authors thank the many people who contributed to the building of our termite mounds and, in particular, our hard-working maintenance staff who are always willing to go the extra mile to ensure the happiness and welfare of Chimp Haven's resident chimpanzees. We thank Mr. Steve Snodgrass for editing advice. The views and opinions expressed in this publication, presentation, or abstract represent the authors' views alone, and do not express or imply the views, endorsement, or financial support of the federal government or any of its agencies, including the National Institutes of Health, unless otherwise stated by an authorized representative thereof.

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- Lowe's Products in Table 1 <https://www.lowes.com/>
- Philadelphia Security Products, Inc. in Table 1 <http://allpadlocks.com/>

Figure 8. The chimpanzees at Chimp Haven using the completed termite mound 3.



# Describing the Introduction of a Francois Langur (*Trachypithecus francoisi*) and Müller's Gibbon (*Hylobates muelleri*) Pair in a Mixed-species Exhibit.

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## Background

The long-term sustainability of animal populations in zoos is dependent on a variety of factors. One such factor is maintaining sufficient space within zoos to manage ideal population sizes. The natural social structure of a species can further complicate a population's space requirements. For example, although many primates live in one-male, multi-female groups in the wild, most primates maintain an equal birth/sex ratio in zoos. This means that many male primates are not immediately needed, or are ever destined for management in a breeding situation. As a result, these males are often housed in all-male bachelor groups, which has proven to be an effective management strategy for male socialization. However, this puts additional stress on a population's housing requirements, as zoos need to commit to managing non-reproductive groups to sufficiently keep up with breeding requirements.

One method for increasing a population's available space is to house groups as part of a mixed-species exhibit. Mixed-species exhibits are becoming increasingly common in zoos and have been shown to be an effective way

to manage some primate species (Dalton & Buchanan-Smith, 2005; Leonardi et al., 2010; Wojciechowski, 2004). The Francois' langur (*Trachypithecus francoisi*) population, which is currently facing space limitations due to an increased need to manage bachelor groups, could benefit from this type of housing (Species Survival Plan®, Bocian et al., 2016).

At Cleveland Metroparks Zoo, Francois langurs have been managed in the zoo's RainForest exhibit since its opening in 1992. Two males were born into Cleveland's current group in 2011 (Tin Tu) and 2012 (Bronson). In 2014, when a new breeding male was introduced to their family group, the two males (then aged 3 and 2-years-old) were formed into a separate bachelor group due to aggression. Since then, this bachelor group has been periodically housed off-exhibit at Cleveland's Sarah Allison Steffee Center for Zoological Medicine, as well as on exhibit at the Primate, Cat and Aquatics building (PCA). In the fall of 2016, it was decided to try to integrate the bachelor group (now aged 5 and 4 years, respectively) in their current exhibit in the PCA building with a mother-son Müller's gibbon (*Hylobates muelleri*) dyad (0.1, Laisel, 26 yrs;

1.0 (castrated), Pika, 17 yrs). This exhibit was large, and it was thought that the pairing would provide a more enriching experience for both species, as well as provide a more permanent housing option for the bachelor dyad. The purpose of this paper is to describe the behavior of the langurs and gibbons following this introduction and provide a discussion on how mixed-species housing may be a potentially beneficial method for managing bachelor Francois langur groups.

## Behavior Observations

Behavior observations were conducted by AL and LBK using the ZooMonitor app (Ross et al., 2016) on an iPad Mini 2 (Apple Inc.). Over the three week period in which the dyads were together, a total of 20 observations were recorded, each for 30 minutes. This included four observations on the day of the introduction (two back-to-back observations immediately following the introduction, and two additional observations in the afternoon), then, for the following week (week one), observations were conducted twice daily (one AM, one PM) over four days. During weeks two and three, four observations were conducted each week (two AM and PM per week). During observations, the

social proximity of the closest gibbon-langur pair was recorded, along with information on each individual's exhibit space use, and all occurrences of social interactions.

### Species Introduction

The two dyads were introduced on exhibit at PCA. The exhibit was an all-indoor exhibit, approximately 210m<sup>2</sup> in size with 7.6m of vertical space and perched extensively with branches, ropes and other climbing features (Figure 1). The exhibit had two shift areas at the back of the exhibit: one on ground level hidden beneath rockwork, and one mesh howdy cage mounted approximately 3m above the ground on the back of the exhibit. The exhibit had no traditional off-exhibit holding area. Prior to the introduction, all individuals had spent time housed in this exhibit, so both the exhibit itself and the shift cages were familiar to both groups. The langur dyad had been housed alone in this exhibit for approximately three months prior to the introduction and the gibbon dyad, which had been housed on an outdoor island for five months prior to the introduction, had been previously managed in this indoor exhibit as well. The day before the introduction, the mesh howdy was wrapped in a blanket to create a visual barrier, and Pika was transferred from the outdoor island exhibit to the covered mesh howdy. The following morning, Laisel was transferred from the island to the elevated howdy to join Pika. After a short period of time to allow Laisel to settle in, the two dyads were introduced by opening the howdy to allow the gibbons into the exhibit.

### Social Proximity

For the first hour they were together, the two dyads spent an average of 92.3% of their time at a distance of greater than 5m apart. Overall for the first day, they spent an average of 67.7% of their time at this proximity. Over the following three weeks, compared to the first day of the introduction, their time spent at this proximity decreased, while time spent within 1-5m of each other increased. Time spent within 1m of each other was rare throughout the study, and peaked at 3.3% the final week. (Figure 2).

### Social Behavior

Over the course of the study, no affiliative interactions between the gibbon and langur dyads were observed, nor were any instances of contact aggression, defined as aggressive behavior resulting in physical contact. Displacement, defined as the approach of one individual resulting in the approachee relocating, and non-contact aggression, defined as aggressive behavior such as chasing and lunging that did not result in physical contact, were observed throughout the study. Aside from one instance of non-contact aggression that was initiated by a langur in week three, the other 101 displacement and non-contact



Francois langur courtesy of Dale McDonald





Figure 1. The gibbon/langur exhibit as viewed from facing the left side (A) and right side (B) of the exhibit.

aggressive interactions were initiated by the gibbons towards the langurs (typically initiated by Pika). Relatively few interactions were observed on the first day of the introduction, which had an average of 1.5 (SE = 1.3) displacements and 0.75 (SE = 0.6) non-contact aggression interactions per observation. The rate of non-contact aggression increased in weeks 1 and 2, and then began to decrease in week 3 (Figure 3). The rate of displacements increased in week 2, but otherwise stayed relatively constant throughout the study period (Figure 3). Though the rate of non-contact aggression increased following the initial introduction, anecdotally, the intensity of these interactions decreased over time. Initially, these interactions were characterized by fast chasing, but as the introduction proceeded,

they changed to light attempts at grabbing or lunging with little chasing.

#### Group Separation and Discussion of Future

On November 14, 2016 (beginning of week 4), keepers found both langurs to have sustained several injuries overnight; most notably, Tin Tu had a large gash on his inner thigh that required veterinary intervention. The dyads were separated, and given the severity of the wound, it was determined that the two pairs would not be reintroduced. Further, it was noted that the night before the injuries were discovered, the elevated howdy, which was normally closed overnight, had been open. It was hypothesized that the langurs entered the howdy to sleep and were cornered by at least one of the gibbons. While staff generally agreed

that this type of encounter was unlikely to occur again, it was deemed not worth risking the welfare of the langurs to attempt to reintroduce the pairs.

Overall, this three week introduction had proceeded positively, and though it cannot be said for certain, it could possibly have been maintained indefinitely with minor husbandry changes. On two occasions, both at Omaha's Henry Doorly Zoo, a Francois langur group has been successfully housed with a single male Müller's gibbon (Strange, 2013). The first pairing was with a 1.2 breeding group formed in 2005. The gibbon was ultimately removed prior to births in the group over concerns of injuring an infant langur, but it was considered a successful grouping. The second pairing occurred in 2012 with a 3.0 Francois and a 4.0 silvery langur (*Trachypitecus cristatus*) group. Ultimately, the groups were separated, not because of gibbon-langur aggression, but because of fighting within each respective langur group. Though the pairing at Cleveland was not ultimately successful, it does provide further evidence that pairing of bachelor langur groups with other primate species could be feasible, especially in light of other successful gibbon-langur pairings.

One suggested improvement could be to pair groups based on age. In this introduction, the langur group was young (average age 4.5 years) and the gibbon dyad was much older (average age 22 years). It is conceivable that housing the bachelor group with another young primate group would provide for a more cohesive situation, given that the groups may be more behaviorally similar. While not a mixed-species group formation, this age-based strategy has been highly successful in the formation and maintenance of bachelor gorilla groups in zoos (Stoinski et al., 2004), with the hypothesis being that placing young animals together will allow for increased opportunity for affiliative behavior. The resulting social bonds developed in these early years are then thought to successfully carry on into adulthood when affiliative behavior naturally decreases.

A second consideration for a bachelor langur mixed-species exhibit could be to house the langurs with a terrestrial species. Some mixed-species exhibits have focused on combining terrestrial and arboreal species, so that the different groups share the same exhibit but utilize different tiers of the exhibit, though other arboreal-arboreal and terrestrial-terrestrial mixed-species exhibits have been successful (Strange, 2013). This study included two primarily arboreal species, and it was hypothesized that given the vertical complexity of the exhibit, housing these two arboreal species together would not be an issue. It is unclear if the dyads experienced difficulty



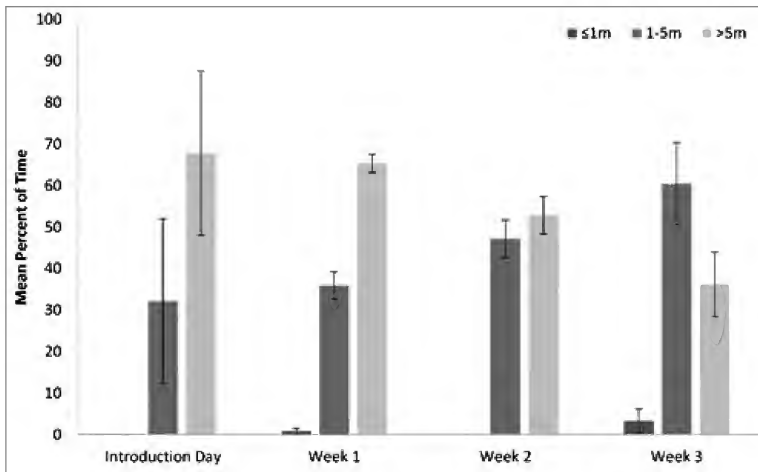


Figure 2. Average proximity of the closest gibbon-langur pair by introduction phase.

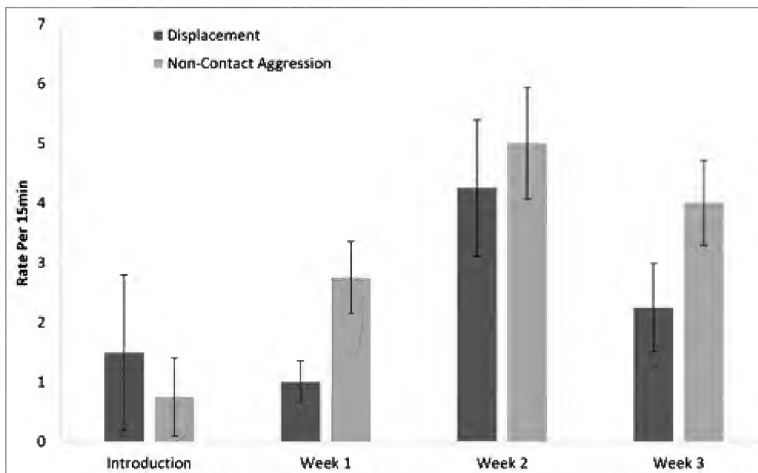


Figure 3. Rate of displacement and non-contact aggressive behavior directed towards the langurs from the gibbons during the introduction period.

sharing vertical space in this introduction, and although both species appeared to have sufficient space to share, it cannot be ruled out.

Finally, another point of improvement could be to provide each species a “time out” from each other. The design of the exhibit in this introduction did not have off-exhibit space to separate the groups for long periods of time, thus, the groups were together on-exhibit for approximately 23 hours a day, only being separated for exhibit maintenance purposes. Such a pairing may do better if the groups can be comfortably housed off-exhibit overnight in separate areas. This is particularly significant to this report, as the incident that ended the introduction occurred overnight when no staff were present. Sufficient holding space

is important to the successful management of most single species exhibits and likely was a contributor to the outcome of this pairing.

This introduction provides evidence that housing a bachelor langur group with another primate species may be an appropriate way to improve the space availability for this species and further ensure the long-term viability of the species within AZA zoos. However, additional attempts and monitoring are needed to better understand this species’ long-term suitability in a mixed-species exhibit. We hope that other zoos can use this information to improve upon the management of bachelor langur groups in mixed-species exhibits.

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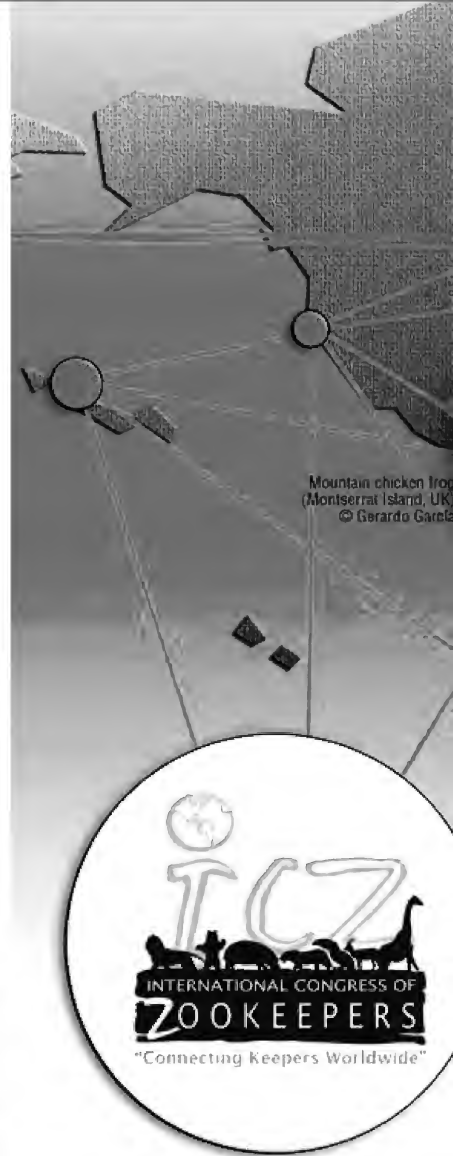


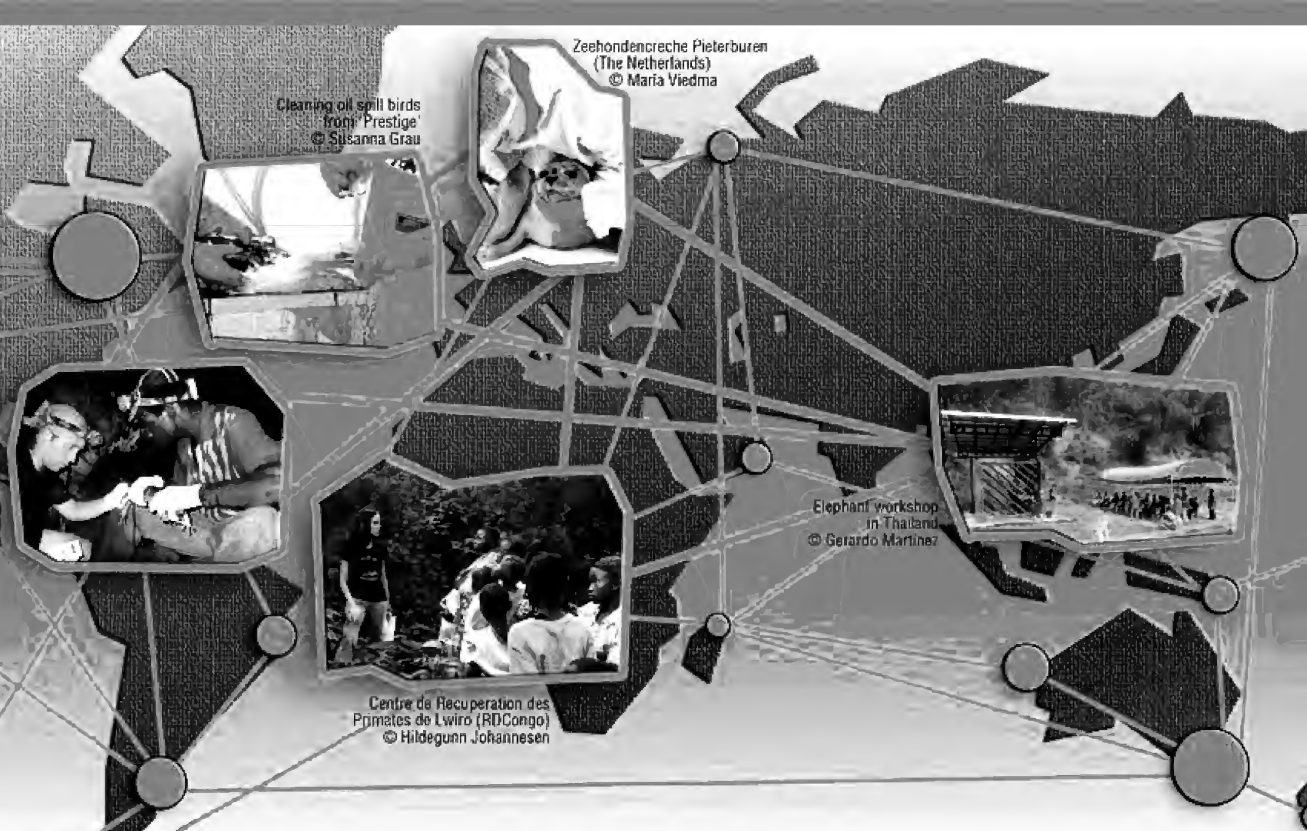
# ICZ CONSERVATION COMMITTEE

The ICZ promotes the value of zookeepers in conserving species and habitats, supporting all activities geared towards establishing links between keepers, educators and conservation organizations. Key outcomes include sustainability, population management, scientifically-based research and education programs that promote awareness, and actions that will contribute to the conservation of wildlife.

ICZ represents a resource of over 7,000 keepers worldwide. Keepers have a large range of specialized skills and knowledge that can be harnessed for conservation work not only involving breeding of threatened species in zoos, safaris, aquariums, rehabilitation centres and sanctuaries but which can extend into work in the field. These talents include good observation and identification skills, knowledge of animal behaviour, animal handling, recording of scientific information and good physical fitness for undertaking strenuous work in the field. All of these must be taken in consideration as a huge potential for conservation.

Keepers are a key in keeping, managing and breeding most animal species in captivity. Many keepers are inspirational in instigating captive components of conservation breeding programs as well as working in the field on recovery programs. Their intricate knowledge of many species from working with them on a daily basis can be invaluable for researchers involved in these programs. The passion of these keepers for the conservation of species is often shown in the way they volunteer in their own time to work on, or run, numerous *in situ* programs.





**The ICZ Conservation Committee would like to create a database for zookeepers involved in any Conservation Project anywhere in the world. As you know, conservation is very important for ICZ and we would like to share information from these conservation projects as widely as possible.**

**Our plan is to compile information on all of these conservation projects and encourage the involvement of other zookeeper, or better still maybe some will start new ones of their own. Many conservation projects are run, managed or helped by animal keepers.**

**Please, send an email to [conservation@iczoo.org](mailto:conservation@iczoo.org) for more information**



# WHAT DOES THE ICZ CONSERVATION COMMITTEE DO?

## 1. Keeper Notes

We publicise conservation projects, where keepers are involved in any manner, in the quarterly ICZ electronic newsletter. The aim of this is to assist spreading the word of the work being done by the project and informs ICZ members how they can assist themselves.

## 2. Conservation Map

We created this Map for encouraging keepers to share their projects with us. The reason is to have a visual picture of where keepers are involved in conservation projects and reinforce the feeling of pride about being a keeper, as in many countries keepers are not very well recognized.

## 3. Database

The ICZ hold a database of projects which are managed by keepers around the world. The objective is to share the information as widely as possible and encourage the involvement of other animal keepers, or even better, inspire them into starting their own project.

At the moment, we have 63 conservation projects from 12 different countries.

## 4. ICZ Website Conservation Section

We aim to display a list of conservation projects in need of volunteers or assistance with other resources or funding.

## 5. One Euro from ICZ Congress Registration

The ICZ donates 1 Euro from each registration at the ICZ congress to a NGO related with reforestation.

In the 2015 Congress in Leipzig this money went for planting trees on Nusa Penida, an island close to Bali, in Indonesia, where the forest is disappearing and the Bali starling is very endangered. The project is run by Friends of National Parks Foundation. Thanks to ICZ they planted 215 saplings through their agro forestry and we have their GPS coordinates.

With this action we:

- ▶ Helped the planet planting trees and sequester carbon while they are growing, helping to eliminate the footprints by our flights to attend the congress.
- ▶ Help the economy of the local people: they take care of the trees and cut them for wood when it is the time.
- ▶ We will give bigger carrying capacity for all birds and other wildlife (seeds, fruit, place...) after about five years post-planting.

## 6. ICZ Keeper Conservation Grant

We are proud to offer an annual grant for conservation projects involving keepers up to the value of \$US1,000.

The grant applications are assessed by the ICZ grants committee based on who is most able to make best use of the funds. We consider the importance of how the project is currently funded, a detailed budget, if the project is part of a recovery project, if there is any keeper involvement either through volunteer work or fundraising, and how the grant may benefit the community through education.

For 2015, and due to the challenge of the ebola crisis in Africa, we had an appeal from Tacugama Chimpanzee Sanctuary, Sierra Leone (when in fact the grant was not officially presented) and they received our first Conservation Grant. Thanks to international help, like the one provided by ICZ, donations allowed Tacugama to keep all their staff during the epidemic, which means they have been able to provide the same standard of care for the chimpanzees, but also none of their staff have been left without a job during the crisis. The ICZ grant has covered the salary of two keepers for two months.

In 2016 the recipient was the project titled "Ecological Monitoring of Drill for Future Release" by the German association "Save the Drill" in cooperation with Limbe Wildlife Center (LWC), Cameroon. LWC has a group of 92 drills living in a stable and cohesive reproductive group, which is intended to be released in a semi-free naturally-forested enclosure. With the Grant they were able to monitor them collecting important behavioural data. The daily observations were made by keepers or educators in association with a Cameroonian researcher. The equipment required was bought with the Grant.

In 2017 we received 11 applications and after scoring all of them the recipient was the project titled "Increasing Reproductive Success of Imperilled Bornean Hornbills Species" and was submitted by keepers from Phoenix Zoo, USA. The project works with other NGO's and the local community and is aimed at creating artificial nests, which will incorporate remote sensing equipment to monitor both the artificial and natural nest cavities.

All the projects submitted were of a very high standards and we had a difficult time in scoring the submissions. We have to thank Fundació Lluís Coromina, in Spain, which sponsored the ICZ Keeper Conservation Grant 2017.

Applications will be called for on the 1st of September each year with a closing date of 31 December. The successful candidate will be announced the first of February. 🐘





For further information about  
the committee please e-mail:  
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# Striving for Evidence-based Animal Welfare Science

Beth Posta

**A note to readers: As you might have already noticed, AKF launched a new column last spring focused on bringing objective animal welfare science to the forefront of zoo and aquarium care and combine it with the subjective “art” of animal welfare. This collaboration of science and art will allow us as a zoological community to make educated decisions that are backed by objective evidence. The goal for this column is to highlight current animal welfare research being completed in zoos by leaders in the field, and provide readers with relevant information regarding how to undertake similar projects, or start a conversation, at your own institutions.**

The AZA defines animal welfare as “Animal Welfare refers to an animal’s collective physical, mental, and emotional states over a period of time, and is measured on a continuum from good to poor.

An animal typically experiences good welfare when healthy, comfortable, well-nourished, safe, able to develop and express species-typical relationships, behaviors, and cognitive abilities, and not suffering from unpleasant states such as pain, fear, or distress. Since physical, mental, and emotional states may be dependent on one another and can vary from day to day, it is important to consider these states in combination with one another over time to provide an assessment of an animal’s overall welfare status.”

As the field of animal welfare has grown, we have learned that simply focusing on negative

indicators of welfare (e.g., stereotypic behavior) or finding new ways to improve animal care cannot ensure that an individual animal is thriving. For example, providing an animal with food, shelter, and social companionship does not tell us anything about animal welfare, as welfare is a characteristic of the animal, not the environment.


So as we look at how those caring for zoo and aquarium animals impact animal welfare, we must consider the relationship between the physical, emotional and behavioral health of the animal at any point in time. Welfare is an effect of a number of input factors, or those that contribute to the animal’s experience. These might include diet, training, enrichment, social housing, natural history, the animal’s environment, and many others. These inputs combined, contribute to measurable outputs, or the measures that can indicate the animal’s welfare state, whether on the positive end of the scale or more toward the negative end of the continuum. Outputs might include physical measures such as body condition, coat, scale or feather condition, fecal condition, and blood values. Emotional states are difficult at best to measure. However, behavioral measures, such as activity budgets and behavioral diversity, especially combined with other physiological measures such as endocrine function (e.g. cortisol levels), can provide insight into an animal’s emotional state.

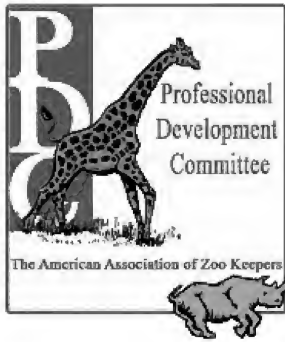
While welfare is the condition of the animal itself, the personality and attitude of the caretaker can have a profound effect on an animal’s wellbeing. Numerous studies within the farming community have highlighted the positive effects of calm, caring, nurturing animal handling and care on animal health and productivity in farm animals and the negative effects of heavy handling and negative attitudes on productivity, animal health

and welfare (e.g. Hemsworth et al., 1992; Waiblinger et al., 2006; Hannah et al., 2009). Similar studies have been conducted in zoos, examining the positive and negative impacts of keeper attitude and personality on the welfare of the animals in their care (e.g. Carlstead, 2009; Claxton, 2001; Hosey and Melfi, 2012).

These examples touch the tip of the iceberg of animal welfare. However, the trend today is for evidence-based evaluation of individual animal welfare focused on measurable outputs. While we recognize that assessing animal welfare should be based on science, we also know that not all measures are feasible at all times. Therefore, we also rely on qualitative, objective assessments when scientific measures have not been validated. Continuously monitoring the collection and using information from a variety of sources to take an evidence-based approach to animal welfare management will help ensure high levels of welfare for the individual animals within a zoological facility.

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## **AAZK Professional Development Committee Final Call for Topical Workshops 2018 AAZK National Conference**

**The 45<sup>th</sup> Annual AAZK National Conference  
Denver, CO October 4-8, 2018  
Conference Theme: “Adjust Your Altitude”**

### **Final Call for Topical Workshops**

The AAZK Professional Development Committee is pleased to announce the FINAL call for Topical Workshops for the 2018 AAZK National Conference hosted by the Rocky Mountain Chapter of AAZK. The Host Chapter has chosen the theme “Adjust Your Altitude”, which will highlight innovative new ideas in the animal care profession.

**Deadline for Submission of Abstracts for Workshops: January 15, 2018.**

**Authors will be notified regarding acceptance no later than February 15, 2018.**

### **Workshops-Format**

Workshop subjects should be in-depth explorations of animal health, animal management, taxa-specific husbandry, and keeper professional development. Workshops should be two hours in length. Subjects that require more than two hours should be submitted as “Part One” and “Part Two”.

### **Open Topical Workshops**

The Open Workshop format will offer unlimited attendance (based on the capacity of the ballroom) and will be best suited for lecture-based workshops with a Q & A session at the end. Limited Topical Workshops – Held in limited capacity breakout rooms, this format is best suited for small group interactive workshops and will have a cap on the number of participants.

### **How to Submit Your Abstract for Consideration:**

- ▶ Go to the 2018 conference website
- ▶ Download the Application for Topical Workshops
- ▶ Fill out completely and submit to [fdc@aazk.org](mailto:fdc@aazk.org) no later than January 15<sup>th</sup>, along with your workshop abstract (see below)

**NOTE:** If you do not use the new application, your abstract will not be reviewed.

### **Guidelines for Abstracts:**

- ▶ Abstracts should be no more than 250 words and should focus on the main theme of the Workshop
- ▶ Abstracts and Applications should be submitted as a Microsoft Word® document via e-mail to: [fdc@aazk.org](mailto:fdc@aazk.org).
- ▶ File should be named WorkshopAbstractAuthorlastname2018

Any questions should be directed to [fdc@aazk.org](mailto:fdc@aazk.org) with ATTN: Topical Workshop as part of the email subject.

## Training of Voluntary Blood Draw on 2.0 Western Lowland Gorillas

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### INTRODUCTION

Cleveland Metroparks Zoo (CMZ) managed 2.0 Western Lowland Gorillas (*Gorilla gorilla gorilla*), Bebac (aged 32 years, deceased January 2017) and Mokolo (aged 29 years). Having lived together for 22 years, they were the longest tenured bachelor group in North America. Both gorillas had been diagnosed with heart disease (hypertrophic cardiomyopathy), which has been the focus of intense monitoring via daily heart rate recordings and biweekly cardiac ultrasound. In addition, they received regular medication (Lisinopril, Carvedilol) to improve cardiac function, were weighed weekly, and provided with a strict, high fiber, biscuit-free diet. Due to the gorillas' heart disease, anesthetic procedures have been avoided whenever possible because of potential stress to their cardiac system. In order to obtain bloodwork diagnostics, another useful measure in managing their heart disease, voluntary blood draws became a necessary aspect of their management. In the fall of 2014, the CMZ team began training Bebac and Mokolo for voluntary blood draw.

### BLOOD SLEEVE DESIGN

A full mesh, rectangular sleeve is used for blood draw access. The sleeve attaches to the holding area mesh (2"x 2" crimped, woven stainless steel) via a port cut through the wire. The port opening has a safety door that can be secured to allow the sleeve to be detached or to block access to the sleeve from the gorillas. The sleeve is also composed of 2"x 2" crimped, woven stainless steel mesh, 9" wide by 9" tall, and slightly over 3 feet long. The sliding door opening in the side of the sleeve for the blood draw is 4" high x 6" wide. The port for the sleeve attachment is at a height that allows both gorillas to sit and slide their arm in at approximately shoulder level.

### TRAINING PROCESS

Training sessions were conducted with each gorilla two to three times per week. Keepers used the bridge "Good", reinforcing primarily with green beans and apple. At the end of a successful session (accepting needle poke and hold), grapes or pineapple were provided as high value reinforcers. The gorillas were together for Mokolo's training sessions, but separated for Bebac's training sessions since he is subordinate to Mokolo. When separated from each other, visual and auditory access between the animals was maintained. The gorillas progressed through nine major training steps before the keepers were able to consistently collect blood samples:

1. Desensitize to sleeve: Gorillas were given access to the sleeve and allowed to investigate it. They were rewarded when they reached their hand and arm inside. They were encouraged to investigate the sleeve by offering a food reward in the sleeve that they had to reach in to retrieve.
2. Ask for "Hand": The gorillas were already conditioned to grab the wire mesh of their holding enclosure. This behavior is often used for ultrasound exam positioning. The trainer asks for "Hand," and the trainer's hand is used as a visual target, mimicking the visual and verbal cues used for "Hand" in ultrasound positioning. The gorillas grasped this concept quickly, but remained on this step for several weeks for the trainers to determine exactly where the gorillas had to have their hand placed in order to place their inner elbow in the window of the sleeve.

3. Move inner elbow toward sliding door: The animals were asked to hold the cue "Hand", and positioning was worked on to have them move their inner elbow toward a PVC target, moving the inside of their elbow closer to the sliding door opening in the sleeve. A dowel rod was placed vertically inside the sleeve to help guide the arm close to the sliding door. The position of the dowel rod was changed until the best position was found.
4. Introduce a safety person: A safety person stands at the end of the sleeve furthest from the port hole and focuses on the hand of the gorilla. If the gorilla releases the mesh and starts to pull out of the sleeve, the safety person immediately communicates this to the trainer and technician. Upon hearing "Break" the technician moves away from the window and the trainer stops rewarding the gorilla. The safety person assists by allowing the technician to focus on getting blood and not worry about the gorilla moving, and allows the keeper to focus on rewarding the animal safely without having to look away from the animal's face to check on the grip of the hand.

Several months after the blood draw behavior was established, the safety person was eliminated since the gorillas exhibited no aggression toward the trainer or technician. When the gorillas released the mesh and pulled out of the sleeve, the movement was slow and gradual. In addition, the sliding door that the technician uses for blood draw is small and at an acute angle, so the gorillas have difficulty reaching out of it.



5. Desensitize gorilla arm to "Touch": Initially, the trainer touched the arm (inner elbow area) at the command "Touch." During the training, the gorilla was expected to maintain its grip on the mesh and allow palpation of the arm. Training step 3 made establishing "Touch" easier. The gorillas learned in step 3 to direct their inner elbow to the sliding door area of the sleeve. As the trainer moved to touch their inner elbow, the gorillas targeted their inner elbow to the keeper's fingers, helping to facilitate contact. Once "Touch" was established with the trainer, the technician was substituted to palpate the arm when the trainer issued the cue. This step allowed desensitization of the gorillas to a technician locating the blood vessel as well as for the eventual insertion of the blood draw needle.



The blood sleeve utilized for voluntary blood draw with gorillas.

6. Desensitize inner elbow to clippers: Mokolo had a low tolerance for the clippers used to shave hair from the blood draw site, sometimes pulling out of the sleeve and going to a corner to brush the shaved area. Bebac seemed more comfortable with the clippers and would hold in the sleeve for long periods of time for shaving. Once keepers could shave the blood draw site on each gorilla, training progressed to the next step since the ultimate goal was blood draw. Bebac was desensitized, but Mokolo was not completely desensitized prior to advancing to step 7.



This photo shows normal positioning of the trainer (standing behind) and technician (kneeling in front) for the blood draw behavior. The trainer is rewarding the gorilla for holding position while the technician works on the blood draw. The burlap is serving as a visual barrier in this picture, and the trainer is utilizing an alternate hand position for the gorilla in this training session. The trainer's hand is gently laying on top of the gorilla's hand. This gorilla tended to fidget less if the trainer had contact with his fingers.

7. Desensitize gorilla arm to alcohol swabs: Alcohol swabs are used to clean the blood draw site prior to sticking with a needle. This step required only one session for each gorilla.

8. Desensitize gorilla arm to blunt sticks: A blunt needle was used initially for training and began with showing the apparatus in the technician's hand. Gradually the needle was moved closer and closer to the arm. The arm was then touched with a blunt needle, sometimes multiple times. When the behavior was established, the gorilla would hold for a long, blunt stick with plenty of pressure, so that it would feel similar to a stick with a real needle.

A routine was developed that would be used for each blood draw attempt. The trainer would ask for "hand" to guide the gorilla's arm in the appropriate position. The trainer then steps back and the technician kneels in front of the sliding door opening of the sleeve. The trainer remains behind the technician and rewards the gorilla by feeding over the technician's head. The safety person (when used in the



The veterinary technician utilizing a blunt needle to illustrate the approximate location on the arm to poke.



The veterinary technician points to the appropriate place to insert the needle.



Normal positioning of the gorilla's hand and inner elbow within the sleeve. The trainer is rubbing numbing cream onto the gorilla's arm.

training phase of the behavior) was in place at the end of the sleeve, watching the gorilla's hand. The trainer gives the command "Touch" and the technician palpates the inner elbow area to find the vessel. The trainer gives the command "Touch" again for the technician to swab the arm with alcohol. The trainer gives the command "Touch" a third time and the technician palpates once more, relocating the vessel immediately prior to utilizing an infusion set needle, blunt or real.

The trainer would run through the entire routine, guiding the gorilla's arm placement and giving the touch commands for the technician. After the second palpation, the trainer would say "Ready" to the technician, signaling preparation for feeding a valuable reward. The technician would respond "Poking" as the gorilla was poked with the blunt needle. The gorilla received high value rewards throughout the poke.

9. Desensitize arm to sharp needle sticks: The same verbal cues are used for sticking with a blunt or sharp infusion set needle. The trainer would communicate to the technician "ready" and the technician would respond "poking". Initially, the gorilla was lightly touched with the needle, allowing them to feel the difference between a sharp needle and a blunt one, then graduating to an actual needle stick.

The CMZ veterinary team considers voluntary blood draw of gorillas to be the most difficult veterinary behavior to train and maintain consistently. A 25 gauge, 3/4" (0.50 x 19mm) winged infusion set with 12" (30cm) tubing and a six (6) ml syringe are routinely used. Blood is drawn from the medial antebrachial vein located 2-3 cm distal to the crease of the elbow on the medial (inner) aspect of the arm. The vessel is not visible, but must be located by manual palpation. After completing the draw, the needle is removed from the vein and

the technician calls out "holding off", applying digital pressure to the venipuncture site. The gorilla is continuously rewarded throughout this routine, receiving high-end reward items during the actual needle stick.

## TRAINING OUTCOMES

Mokolo and Bebac were successfully trained for this behavior in three and four months, respectively, utilizing two-three training sessions per week. The behavior of the gorillas was used as the indicator as to how much to push each session. If they appeared to be nervous or uncomfortable, an easy training session was in order. If they appeared to be unconcerned, or recently trained perfectly during the routine, an advance was made in the training. The trainer and technician would discuss the behavior of the gorillas and make the decision together at the beginning of each session for each animal.

Mokolo continues to maintain the blood draw behavior and holds perfectly, even if he indicates feeling a needle pinch by a vocal grunt. He will hold well for a poke and one or two redirects of the needle, but then jerks his arm in the sleeve for multiple redirects. We made the decision to redirect no more than two times, then stop if blood is not collected. Mokolo has never pulled out of the sleeve for a blood draw attempt.

Bebac initially refused to participate for a sharp needle stick. He would pull his arm out of the sleeve when stuck with a sharp needle, but would hold perfectly still for a blunt needle stick. To alleviate the feel of the needle stick, a skin numbing agent (EMLA Cream, Lidocaine 2.5% and Prilocaine 2.5%, ACTAVIS Pharma, Inc., Parsippany, NJ 07054, 1-800-272-5525) was rubbed on his arm about an hour before an actual attempt. Blood was successfully drawn using this technique.

Bebac exhibited some regression even after successful blood draws with the use of the numbing cream. He would stare at the infusion set during training and appear to try and determine whether the needle was sharp or blunt. He performed the entire routine perfectly if a blunt needle was used. If a sharp needle was substituted, he performed perfectly until the technician moved the sharp needle toward his arm, at which point he would pull out of the sleeve.

Gradually, he again allowed a real needle blood draw. Then, he noticed blood flowing into the syringe and pulled his arm out of the sleeve. A syringe and tube colored with red dye to desensitize him to the look of blood took a couple sessions. By rotating the routine, sometimes using a real needle with just a touch in training, sometimes the blood-colored

Mokolo. Photo by Dale McDonald.



syringe, sometimes a blunt needle with pressure, and sometimes numbing him but not attempting a real draw, the behavior was reestablished and he began holding for blood draws with a sharp needle again.

After performing well and accepting several actual pokes with a real needle, Bebac again showed regression and began to focus on the needle itself intently as it approached his arm during the cue “poking.” Keepers decided to implement a visual barrier in order to redirect his attention to the trainer and food rewards during the poking step. Keepers hung a burlap sack from the mesh of holding using quick clips. The burlap sack blocked the view of the needle, but the trainer could still feed around it. Keepers kept the cues and routine the same so that Bebac would know exactly what was happening at each step of the behavior. The visual barrier did successfully result in Bebac returning his attention to the trainer and food rewards and away from the needle. Bebac allowed several pokes with a real needle with the visual barrier in place.

The biggest challenge is consistently locating the medial antecubital blood vessel on the inside of the elbow for the blood draw. Currently, as we attempt a voluntary blood draw, we tend to be successful within three attempts (which would be performed on separate days). When we first completed the behavior, we often needed more than three sessions before we successfully located the vessel.

**Diet and Motivation:** Both gorillas appear to be motivated to participate in the behavior even though Bebac appeared to fear the actual needle. Training difficult behaviors, such as blood draw, has become easier as the gorillas are motivated to participate in order to receive select food items. CMZ gorillas are provided a strict, heart-healthy diet of greens (usually romaine, endive, and dandelion), browse, resistant starch (Hi-Maize Resistant Starch, Honeyville Inc., 1080 North Main Street, Suite 101, Brigham City, UT 84302, (435) 494-4200) with ground flax seed, alfalfa hay (consuming both stems and leaves), and green beans. They do not receive any type of processed biscuit. To ensure that they are getting necessary vitamins and minerals, they receive a chewable multivitamin/multimineral supplement (Spectravite, CVS Pharmacy, Woonsocket, RI, 02895, 1-800-746-7287 etc.) plus chewable vitamin D3 gummies (Vitafusion, Church & Dwight, Ewing, NJ 08628, 1-888-334-5389) daily.

They receive their heart medication (Lisinopril, Carvedilol) in a small amount of peanut butter. They train primarily for green beans and are given fruit for high priority behaviors.

Since the transition to the restricted diet seven years ago, the gorillas are maintained at more healthy body weights, spend more time foraging, have reduced blood cholesterol and insulin levels, eliminated regurgitation and reingestion behaviors, and advanced markedly in their training. (Less et al., 2014a,b)

### Conclusion

CMZ uses a team-based approach to provide the best care possible for the animals in our collection. Veterinary Services met with animal care staff and the curatorial team to establish the priority of training for the gorillas to allow voluntary blood draw. The Facility Operations team met with the veterinary and animal care teams to design and build the blood draw sleeve for the gorillas. Veterinary Services scheduled technicians to work with keepers each week in order to train the behavior. Keepers in the Primate, Cat, and Aquatics team volunteered to act as the safety person, as did curators and technicians. The Conservation and Science team volunteered a graduate research associate to observe the training sessions and offer feedback throughout the process. Because this training had support from so many staff, the goal was achieved in a relatively short period of time.

### References

- Less, E.H., R. Bergl, R. Ball, P. Dennis, C.W. Kuhar, S. Lavin, M. Raghanti, J. Wensvoort, M.A. Willis, and K.E. Lukas. (2014). Implementing a low-starch biscuit-free diet in zoo gorillas: The impact on behavior. *Zoo Biology* 33(1):63-73.
- Less, E.H., K.E. Lukas, R. Bergl, R. Ball, C.W. Kuhar, S. Lavin, M. Raghanti, J. Wensvoort, M.A. Willis, and P.M. Dennis. (2014). Implementing a low-starch biscuit-free diet in zoo gorillas: The impact on health. *Zoo Biology* 33(1):74-80.

### BHC Comments by Jay Pratte:

As the authors provided so much excellent detail, there is not really a lot of information that needs to be added. I would like to use the examples of Mokolo and Bebac to highlight one point, though. As trainers we can develop shaping plans, and design a program with well thought out steps and goals. Yet the animals will forever be that inconstant variable. Every animal has their own personality, perception of the world, and learns differently, just as humans do. These two gorillas clearly had a different perception of the process, and the team deserves recognition for their creative efforts in keeping Bebac on the same track. The thoughtful use of the burlap, the red dye, but most importantly responding to what Bebac was communicating, all led to improved success in reaching the training goal. One size does NOT fit all. Great work, and thank you for your Tale! 🐒



## We want to hear your Training Tales: the good, the bad and the fabulous!

Did you enjoy the latest Training Tale? Was this information useful or inspiring? Do you have any operant conditioning experiences that others would benefit from reading? Please submit your “Training Tales” and experiences in operant conditioning to share with *Animal Keepers’ Forum* readers. This opportunity provides a convenient outlet for you to exhibit your training challenges, methods and milestones with the AAZK member network. Please submit entries based on the following guidelines:

- a. Submit a brief description of a training project at your facility. These can be 500 words or less, in text or bullet points – it can be longer (up to 1000 words); however, short and simple descriptions with a few images are just as perfect. Details should include the following:
  1. Define the training goal (what did you try to do and for what purpose?)
  2. List important steps (How did you do it – include plans that changed along the way/what worked and what didn’t work)
  3. Timeline used (how long did it take)
  4. Tips you learned along the way
- b. Include 3-5 digital photos that clearly depict the animal in the learning process or performing the desired goal (provide photo caption and photographer of each image). Photos need to be 300 dpi and at least 1200 x 1800 pixels.

Please send submissions or questions to: Kim Kezer at [kkezer@zoonewengland.com](mailto:kkezer@zoonewengland.com) or

Shane Good at [shane.good@aazk.org](mailto:shane.good@aazk.org)  
(use Training Tales Submission as the subject).



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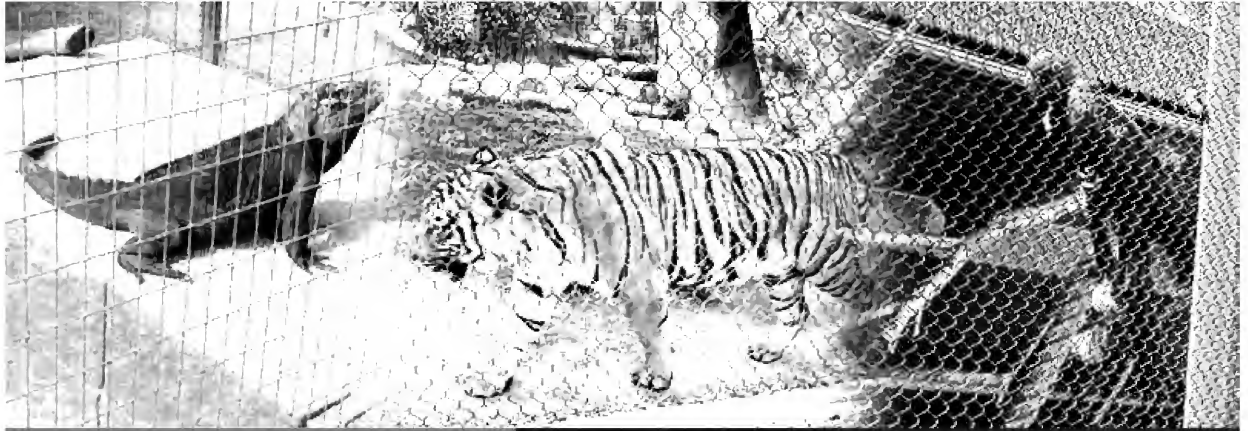


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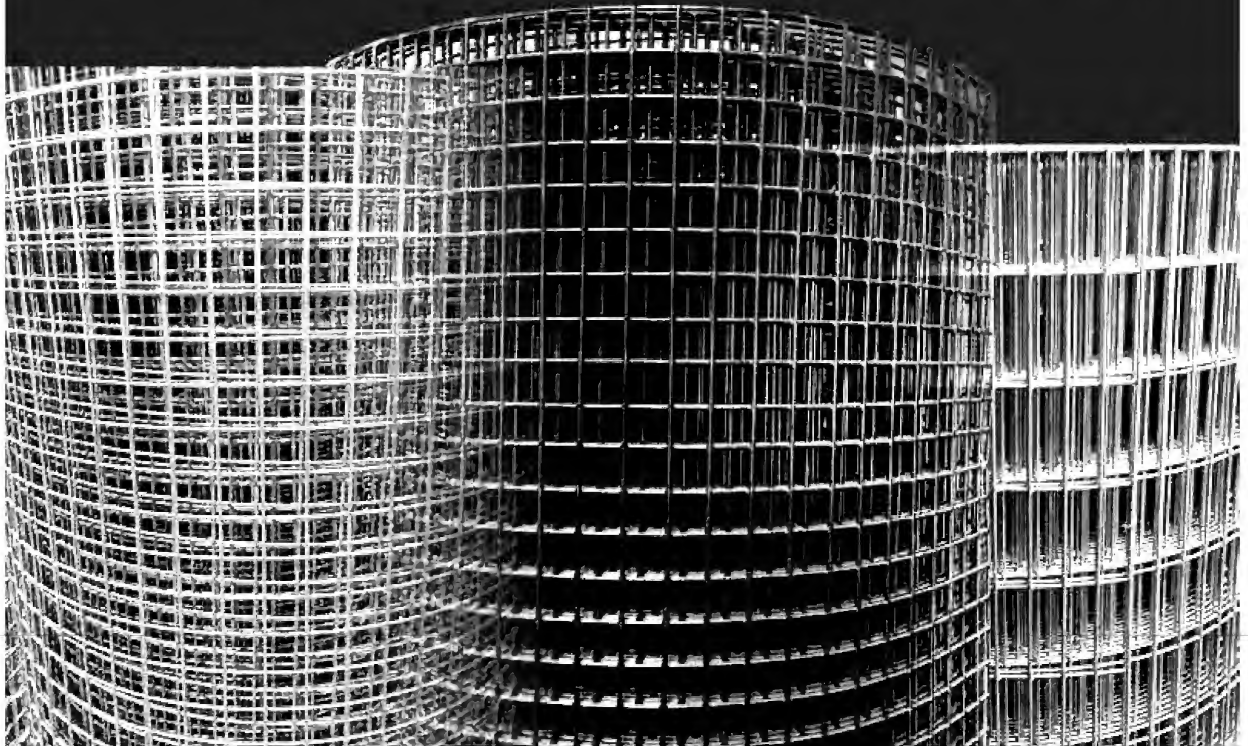
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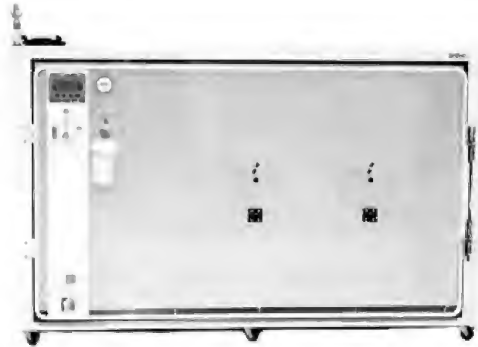
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