

**Martha Fischer**

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**From:** elephant@lists.aza.org [azalistserver@lists.aza.org]  
**Sent:** Wednesday, March 23, 2005 12:04 PM  
**To:** Martha Fischer  
**Subject:** Nature Article



EleTraumaNature05  
.pdf

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**From:** "Mike Keele" <keelem@metro.dst.or.us> 1c998f  
**To:** "Martha Fischer" <fischer@stlzoo.org>

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"Mike Keele" <keelem@metro.dst.or.us>

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[attachment below: eletraumanature05.pdf]

Thought you all would be interested in the attached.  
Mike

# Elephant breakdown

Social trauma: early disruption of attachment can affect the physiology, behaviour and culture of animals and humans over generations.

G.A. Bradshaw, Allan N. Schore, Janine L. Brown, Joyce H. Poole and Cynthia J. Moss

The air explodes with the sound of high-powered rifles and the startled infant watches his family fall to the ground, the image seared into his memory. He and other orphans are then transported to distant locales to start new lives. Ten years later, the teenaged orphans begin a killing rampage, leaving more than a hundred victims.

This scene is strikingly similar to post-traumatic stress disorder (PTSD) observed in Kosovo and Rwanda, but here, the teenagers are young elephants and the victims, rhinoceroses. In the past, animal studies have been used to make inferences about human behaviour. Now, studies of human PTSD can be instructive in understanding how violence also affects elephant culture.

Psychobiological trauma in humans is increasingly encountered as a legacy of war and socio-ecological disruptions. Trauma affects society directly through an individual's experience, and indirectly through social transmission and the collapse of traditional social structures. Long-term studies show that although many individuals survive, they may face a lifelong struggle with depression, suicide or other behavioural dysfunctions. In addition, their children and families can exhibit similar symptoms, including domestic violence. Trauma can define a culture.

How PTSD manifests has long been a puzzle, but researchers today have a better idea as to why effects of violence persist so long after the event. Studies on animals and human genocide survivors indicate that trauma early in life has lasting psychophysiological effects on brain and behaviour.

Under normal conditions, early mother–infant interactions facilitate the development of self-regulatory structures located in the corticolimbic region of the brain's right hemisphere. But with trauma, an enduring right brain dysfunction can develop, creating a vulnerability to PTSD and a predisposition to violence in adulthood. Profound disruptions to the attachment bonding process, such as maternal separation, deprivation, or trauma, can produce psychobiological and neurochemical dysregulation in the developing brain, leading to abnormal neurogenesis, synaptogenesis, and neurochemical differentiation. The absence of compensatory social structures, such as older generations, can also impede recovery.

African elephant society has been



Social bonds guide an elephant's development.

decimated by mass deaths and social breakdown from poaching, culls (systematic killing to control populations), and habitat loss. With an estimated ten million elephants in the early 1900s, there are only half a million left today. Wild elephants are displaying symptoms associated with human PTSD — abnormal startle response, depression, unpredictable asocial behaviour, and hyper-aggression.

Elephants are renowned for their close relationships. Young elephants are reared in a matriarchal society embedded in complex layers of extended family. Culls and illegal poaching have fragmented these patterns of social attachment by eliminating the supportive stratum of the matriarch and older female caretakers (allomothers).

Calves witnessing culls and those raised by young, inexperienced mothers are high-risk candidates for later disorders, including an inability to regulate stress-reactive aggressive states. Even the foetuses of young pregnant females can be affected by pre-natal stress during culls. The rhinoceros-killing males may have been particularly vulnerable to the effects of pre- and postnatal stress for two reasons: studies on a variety of species indicate that male mammalian brains develop at a slower rate relative to females, and also that elephant males require a second distinct phase of socialization. Like females, male socialization begins during infancy with the mother and a tight constellation of allomothers. But in adolescence, males leave the natal family to participate in older all-male groups, a period coincident with a second major stage of brain reorganization identified in humans. Cull orphans sustain a series of traumas, such as premature weaning, shock and the lack of older male socialization. The critical role of older males in normal social development was clearly

demonstrated when researchers re-introduced older bulls to quell the young males' violence. Hyperaggression and abnormally early musth cycles (periods of sexual activity and hormonal shifts) both ceased.

Elephant hyperaggression is not an isolated event. At another heavily impacted African park, intraspecific mortality among male elephants accounts for nearly 90% of all male deaths, compared with 6% in relatively unstressed communities. Elsewhere, including Asia, there are reports of poor mothering skills, infant rejection, increased 'problem animals', and elevated stress-hormone levels.

Elephant sociality is both a strength and weakness. As with humans, an intact functioning social order helps buffer trauma. But as human populations increase, more elephants are likely to live in environments characterized by severe anthropogenic disturbance. Current methods for conserving both wild and captive elephant populations fail to preserve elephant social systems. Even successful rehabilitation centres, such as The David Sheldrick Wildlife Trust, can only partially restore social processes because there are too few older herd members. There is an added danger to social breakdown, namely that selection for asocial heritable traits in the absence of normal socialization may increase under adverse conditions. All these factors bring into question what kinds of behaviour are being promulgated in both *ex situ* and *in situ* conservation programmes and compel new conservation strategies that promote normal social patterns.

Neuroscience has demonstrated that all mammals share a ubiquitous developmental attachment mechanism and a common stress-regulating neurophysiology. Now, a wealth of human–animal studies and the experiences of human victims of violence are available to help elephants and other species survive. ■

G. A. Bradshaw is at the Environmental Sciences Graduate Programme and Department of Forest Sciences, Oregon State University, Oregon, USA.

Allan N. Schore is at the Department of Psychiatry, University of California at Los Angeles, California, USA.

Janine L. Brown is at the Smithsonian National Zoological Park, Washington DC, USA.

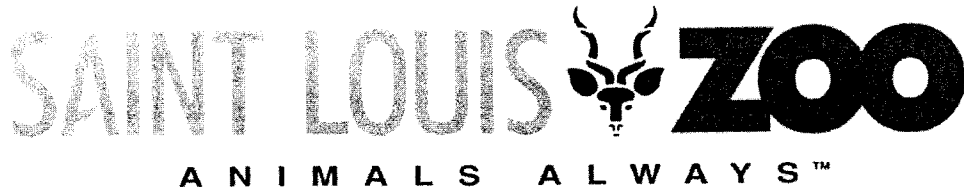
Joyce H. Poole and Cynthia J. Moss are at Amboseli Elephant Research Project (AERP), Nairobi, Kenya.

## FURTHER READING

Clubb, R. & Mason, G. *A Review of the Welfare of Elephants in European Zoos* (RSPCA, Horsham, 2002).

Schore, A. N. *Affect Dysregulation and Disorders of the Self* (W. W. Norton, New York, 2003).

Slotow, R. *et al.* *Nature* **408**, 425–426 (2000).



29 June 2005

Mike Keele, Chair, AZA Elephant TAG/SSP  
Oregon Zoo  
4001 SW Canyon Road  
Portland, OR 97221-2705

Mark C. Reed, Chair, AZA Elephant Taskforce  
Sedgwick County Zoo  
5555 Zoo Boulevard  
Wichita, KS 67212

Dear Mike and Mark,

The Saint Louis Zoo is committed to full participation in the AZA Elephant TAG/SSP, as follows:

- The Saint Louis Zoo is committed to participating in the AZA Elephant TAG/SSP as a breeding institution. Our facilities are capable of holding 1-3 adult bulls and 6-8 adult cows with some calves. Our space is flexible and we are open to using this space for breeding and/or holding elephants as needed and recommended by the TAG/SSP.
- The Saint Louis Zoo is currently participating in and contributing to both *in situ* and *ex situ* Asian elephant research and conservation activities. We are committed to continuing this participation and contribution into the future.
- The Saint Louis Zoo has historically and is currently participating in and supporting AZA Elephant TAG/SSP research projects. We are committed to continuing this participation and support into the future.
- The Saint Louis Zoo is committed to abiding by AZA SSP breeding recommendations for all species, including those of the AZA Elephant SSP/TAG.
- The Saint Louis Zoo is committed to promoting the AZA Elephant TAG/SSP education messages.
- The Saint Louis Zoo is committed to contributing resources and expertise to developing conservation centers.
- The Saint Louis Zoo is committed to contributing resources to hiring a full-time position for program oversight.

- The Saint Louis Zoo is committed to publicly speaking and acting with a unified voice.
- The Saint Louis Zoo will participate in a proactive public relations campaign.
- The Saint Louis Zoo historically has provided and currently continues to provide a significant level of support for elephant staff to participate in AZA Elephant TAG/SSP activities. We are committed to continuing this support into the future.
- The Saint Louis Zoo will abide by the AZA Standards for Elephant Management and Care.

The above-described commitment is understood and fully supported by the Saint Louis Zoo Commissioners and the Saint Louis Zoo staff. We look forward to our future participation with the AZA Elephant SSP/TAG.

Sincerely,

A handwritten signature in black ink, appearing to read 'JPB', with a stylized flourish at the end.

Jeffrey P. Bonner, Ph. D.  
Saint Louis Zoo  
President and CEO

**Martha Fischer**

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**From:** elephant  
**Sent:** Friday, March 08, 2002 10:41 AM  
**To:** Fischer  
**Subject:** Elephant microsattelites

From: "Debbie Olson" <dolson@indyzoo.com> 5f643  
To: "Martha Fischer" <fischer@stlzoo.org>

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"Mike Keele" <keelem@metro.dst.or.us>

[attachment below: dna 1.pdf]

The ElephantSSP/TAG has endorsed the following project for member institutions holding African elephants. This study will ascertain the genetic variability of the captive african elephant population in North America something that is desperately needed. The Elephant SSP/TAG strongly encourages your participation in this project. The request is simple. Stephanie needs one teaspoon of fecal material from each african elephant. She is on a tight time frame though, and needs the samples within the next two weeks.

Since I did not want to tie up all of your computers with this email, I am sending the project proposal in two emails. If you do not have african elephants, then delete the next email from me. Attached to this email is the proposal itself. The next email has a letter of support from Stephanie Coster's advisor and the first page of Dr. David Ribble's curriculum vitae. If you need the rest of his vitae to approve this biological sample collection, contact Stephanie.

For clarification of the proposal, I requested the following information from Stephanie. Please read her email below.

Please participate in this study. Please contact Stephanie as soon as possible with the number of elephants you hold and she will send you the supplies.

Deborah Olson  
Director of Conservation and Science Programs  
Indianapolis Zoo  
Program Officer

7/17/2005

International Elephant Foundation  
P.O. Box 366  
Azle, Texas 76098  
Phone: 8174447381  
Fax: 8174445101

Original Message

From: Clydemnest@aol.com [mailto:Clydemnest@aol.com]  
Sent: Friday, March 08, 2002 10:14 AM  
To: dolson@indyzo.com  
Subject: Elephant microsattellites

Ms. Olson

This is Stephanie Coster from Trinity University I just received your email, and I wanted to thank you for your help and support and answer your questions. For the dung samples, they should be relatively fresh, but can be up to three days old (three hours would be fine). The samples will be packed with dessicant so they do not need to be shipped on ice. What I have been doing is sending out tubes with dessicant and instructions in them, and then the samples are packed in the tubes and sent back via a stamped envelope that I provide. I just need a list of institutions that I should send out these dessicant samples to, and the number of African Elephants that these institutions house. As far as a limit to the number of elephants that I can use, I would like to get as many samples as I can for the most accurate data collection, but I am in a bit of a time crunch so I would need the samples within the next few weeks. I appreciate all of your help, and I will keep you updated on the results!

Sincerely,  
Stephanie Coster  
2109998363  
fax 2109997229  
scoster@trinity.edu

*Outline of Research Proposal and Fecal Sample Request Form*

**Principal Investigator:** Stephanie Coster under supervision of Dr. David Ribble  
Trinity University  
715 Stadium Dr.  
San Antonio, TX 78212

**Title:** Genetic Variability of *Loxodonta africana* as revealed by microsatellites.

**Objective:** To ascertain the genetic variability of *Loxodonta africana* by assessing the heterozygosity of microsatellite alleles.

**Project Summary:** Recent improvements in DNA extraction techniques have made it possible to extract DNA non-invasively through fecal samples. This study is an exercise in perfecting this technique while determining the genetic variability of African elephants in captivity. The data collected will be compared to recent literature, which has published an account of the genetic variability of native populations.

**Experimental design:** DNA extracted from fecal samples using Qiagen extraction kit, Polymerase Chain Reaction to amplify the DNA and microsatellites sized to ascertain genetic variability.

**Type of Samples Required:** Fecal Samples of captive African elephants are requested.

**Collection Method and Frequency:** One teaspoon of fecal matter placed in a collection tube. The frequency of the sample is one time.

**Funding:** Department of Biology Trinity University

**Samples Requested By:** As soon as possible

**Proposed Use of Data:** Undergraduate Thesis

## Martha Fischer

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**From:** elephant@lists.aza.org [azalistserver@lists.aza.org]  
**Sent:** Wednesday, August 13, 2003 6:47 AM  
**To:** Martha Fischer  
**Subject:** Elephant TAG/SSP Institutional Liaison Assignments



Excel 97

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From: "Mike Keele" <keelem@metro.dst.or.us> 115750  
To: "Martha Fischer" <fischer@stlzoo.org>  
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[attachment below: excel 97]

Institutional Liaisons are a resource for Institutional Representatives. They are all members of the Elephant TAG/SSP Steering Committee and they help share the work load of the TAG/SSP. This work load can be considerable at times and I appreciate the time they commit to further our goals. In many cases they can quickly provide IRs with information they may need or answer questions regarding elephant management, etc. At other times, they can coordinate facility concerns and questions to the Steering Committee for action. This process has helped to facilitate the TAG/SSP business in a more expeditious manner. I urge all of you to work elephant related matters through your assigned Institutional Liaison. A list of the Institutional Liaisons and their assignments are attached.

Thank You,  
Mike

**David Blasko**

Six Flags Marine World  
Wildlife Safari  
Cleveland Metroparks Zoo  
San Francisco Zoological Gardens  
Chaffee Zoological Gardens of Fresno  
Honolulu Zoo

**Martha Fischer**

St. Louis Zoological Park  
Tulsa Zoo and Living Museum  
Dickerson Park Zoo  
Santa Barbara Zoological Gardens  
Audubon Zoo  
Oklahoma City Zoological Park

**John Lehnhardt**

Disney's Animal Kingdom  
Lowry Park Zoo  
Miami Metrozoo  
Lion Country Safari  
Montgomery Zoo  
Jacksonville Zoological Gardens

**Harry Peachy**

Columbus Zoo and Aquarium  
Cincinnati Zoo and Botanical Garden  
Busch Gardens Tampa Bay  
Los Angeles Zoo  
Detroit Zoological Park

Central Florida Zoological Park

**Guy Lichty**

North Carolina Zoo  
Oakland  
Topeka Zoological Park  
Louisville Zoological Garden  
Birmingham Zoo  
Virginia Zoological Park

**Bruce Bohmke**

Woodland Park Zoo  
Oregon Zoo  
Reid Park Zoo  
Point Defiance Zoo and Aquarium  
Houston Zoo  
Phoenix Zoo

**Charlie Gray**

African Lion Safari  
Calgary Zoo  
Have Trunk Will Travel  
Albuquerque Biological Park  
Fort Worth Zoo  
Toronto Zoo  
Granby Zoo

**Steve McCusker**

San Antonio Zoological Gardens and  
Aquarium  
El Paso Zoo  
Dallas Zoo  
Little Rock Zoo  
Brookfield Zoo

**Mike Quick**

Sedgwick County Zoo  
Kansas City Zoo  
Omaha's Henry Doorly Zoo  
Lee Richardson Zoo  
Memphis Zoo

Milwaukee County Zoological Gardens

**Steve Wing**

Riverbanks Zoo and Garden  
Pittsburgh Zoo and Aquarium  
Greenville Zoo  
Jackson Zoological Park  
The Toledo Zoological Gardens  
The Baltimore Zoo

**Chuck Doyle**

Rosamond Gifford Zoo at Burnet Park  
Buffalo Zoological Gardens  
Smithsonian National Zoological Park  
Bronx Zoo  
Buttonwood Park Zoo

**Dale Leeds**

Denver Zoological Gardens  
Zoo Atlanta  
BREC's Baton Rouge Zoo  
Abilene Zoological Gardens  
Utah's Hogle Zoo  
Cheyenne Mountain Zoo  
Chehaw Wild Animal Park

**Debbie Olson**

Indianapolis Zoological Society, Inc.  
Knoxville Zoological Gardens  
Roger Williams Park Zoo  
Zoological Society of Philadelphia  
Caldwell Zoo  
Cameron Park Zoo

**Randy Rieches**

San Diego Zoo  
San Diego Wild Animal Park  
Lincoln Park Zoo  
Gladys Porter Zoo  
Seneca Park Zoo