

science & TECHNOLOGY

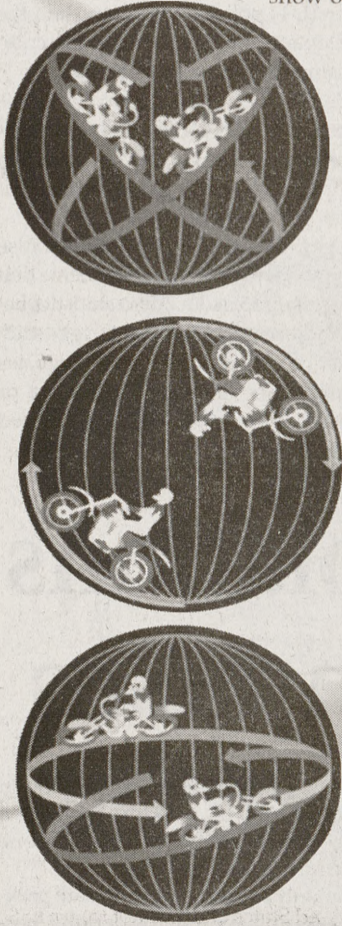
THE BATTALION

THE GREATEST (Physics) SHOW ON EARTH

Physicists explain the science behind the mysteries of the circus

STUART HUTSON
The Battalion

They call it "the greatest show on Earth." The Ringling Bros. and Barnum & Bailey Circus may provide joy for children of all ages, but for lovers of science, it may be the greatest physics show on the planet.



From the Human Comet to the Globe of Death, the circus performances that amaze and entertain audiences across the country are but simple demonstrations of principles physics professors teach every day in the classroom.

"It's mostly pretty simple stuff once you take a look at it, but you know it takes a lot of practice to be able to pull it off ... and that's entertainment," said Texas A&M physics professor Glenn Agnolet.

THE GLOBE OF DEATH

The Globe of Death is a 16-foot-wide, stationary iron sphere in which as many as three performers speed their high-octane motorcycles in circles that not only travel around the side of the globe's gridwork, but along the top as well.

"This basically works on the same principle as a person spinning a bucket of water around their head without spilling any," Agnolet said. "The 'centripetal force,' or the water's mo-

tion outward, keeps it stuck to the bottom of the bucket, even when the bucket is upside-down above your head. It's basically the same."

Agnolet estimates the motorcycles would need to circle the circumference of the globe a minimum of once every two seconds to keep from falling. This equates to a speed of approximately 10 mph.

The circus advertises that the cyclists reach speeds of up to 60 mph.

"This is pretty unlikely," Agnolet said. "At that fast, they would probably be experiencing about 30 G's, or 30 times the force of gravity, pushing them against the walls of the sphere. I think Air Force pilots have been known to black out at 10 G's. At 30, it really would be the globe of death."

THE HIGH WIRE

One of the most common acts associated with a circus may be those daring souls who walk across an inch-thick rope dozens of feet above the audience.

"I think a big secret to that is probably the pole they carry," said A&M physics professor Joseph Ross. "It gives them a big advantage in quite a few ways."

One such advantage is a lowering the tightrope walker's center of gravity.

"If the ends of the pole bend far enough downward, it will lower the person's center of gravity and make it closer to the tightrope," Ross said.

The performer maintains his or her balance on the rope by keeping his center of gravity directly above the rope. The lower the center of gravity, the more stable the performer becomes. For example, it is harder to push over a football player whose center of gravity is kept low to the ground than it is to push over a player who is standing upright.

"The pole in this case would act in a very similar manner to one of those toys where a bird balances on its beak," Ross said. "The body of the bird may be behind the beak, but the wings stretch forward enough to balance it out."

Ross said the pole may also correct any small side-to-side errors the performer makes while walking the rope.

"Well, the most obvious would be to move the pole a little to the left or right to balance you out if you are going to fall in the opposite direction," he said. "But I guess you could also use it to torque (twist) against without shifting the weight."

Ross said the biggest advantage of the pole is its ability to distribute more weight on each side of the rope.

"This basically makes a little mistake to one side or another have less effect on the position and balance of the person," he said. "It's like sticking your arms out when you were a kid trying to balance on something like a curb."

THE HUMAN COMET

The Human Comet is a man who dons a flame-retardant suit and mask, covers himself with flammable liquids, ignites and then dives from 40 feet in the air to a crew waiting to extinguish him.

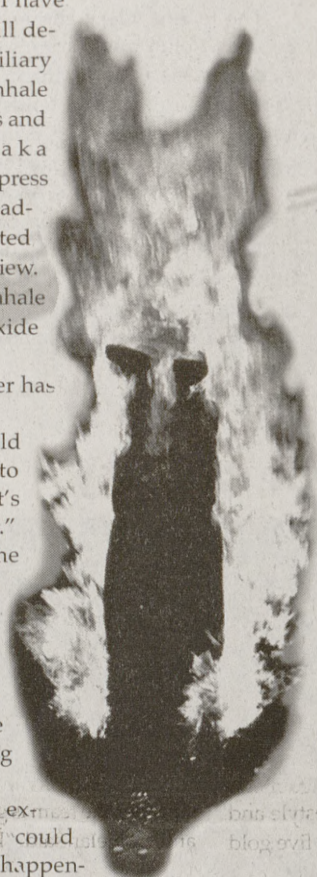
"Once my suit is ignited, I have 15 seconds before the fire will destroy it, and, with no auxiliary breathing apparatus, if I inhale while aflame, I burn my lungs and die," said Jean Pierre Theron, a k a the Human Comet, in a circus press release. "When I jump, my head-first 'suicide dive' is complicated because the fire obscures my view. And when I land, I still can't inhale because of the carbon dioxide from the fire extinguishers."

Agnolet said the performer has more than adequate time.

"From that height, it would take him about two seconds to hit the ground," he said. "That's a pretty good margin of error."

As for Theron taking the heat, Agnolet said much of the residual heat would be left either in the comet's wake or at his feet because the heat tends to rise and the heat is carried away from the performer by the air rushing past him as he falls.

"It still can't be a pleasant experience," Agnolet said. "I could imagine that the worst thing happening is him tripping or losing control somehow."



PHOTOS COURTESY OF RINGLING BROS. AND BARNUM & BAILEY CIRCUS

News in Brief

Mathematician Greek manuscript to be restored

ROCHESTER, N.Y. (AP) — Scientists at Rochester Institute of Technology (RIT) are restoring a 10th century manuscript — the only known copy of the writings of Greek mathematician Archimedes.

The text, which was damaged by a monk who erased it 20 years after it was written, was purchased anonymously at a 1998 auction for \$2 million. Using digital cameras and processing techniques as well as ultraviolet and infrared light, the scientists captured images of the original words and drawings that were washed away and then covered with a new text.

"There is always a residue of traces of what was there," said Robert Johnston, an archaeologist and RIT professor emeritus. "It's amazing what can come out. Soon, nothing will be seen or hidden."

The manuscript is the only copy in the original Greek of Archimedes' theory of flotation of bodies. The text and diagrams also detail his mathematical treatises and mechanical devices and contain the roots of modern calculus and gravitational theory.

The team is working on the pages from the text as part of a competition that will determine who will analyze the entire manuscript, which contains more than 170 pages.

"This book is Archimedes' brain in a book," said William Noel, curator of the Walters Art Gallery in Baltimore, where the manuscript is kept. "What we need to do is X-ray that book."

RIT's scientists plan to finish their work by September. The gallery expects to make a selection by the end of the year.

Sil Aggie
Chris Nelan
If anyone else...
thing he could...
because Nelan...
Texas A&M...
team and has...
United States...
(DWC) held in...
At the June...
Nelan placed...
freestyle, 200-...
the 100-meter

Biochemist fights malnutrition in Mexican villages

PATRICE PAGES
The Battalion

George Bates, a professor of biochemistry at Texas A&M, began his career 31 years ago much like other professors — working in laboratories and teaching in classrooms. But doing laboratory science did not satisfy him. Instead, he sought to use his research to fight the devastating level of malnutrition fighting children in Mexico.

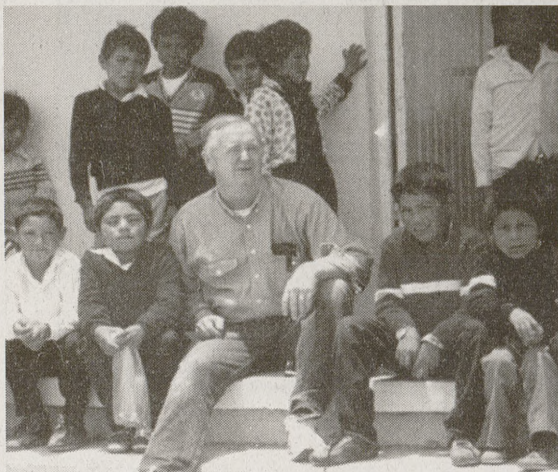
Bates first worked with Otomi Indians in villages in the state of Queretaro, north of Mexico City, where 85 percent of the children were malnourished. As a result, the children suffered from various diseases and diarrhea, most had stunted growth, others were mentally retarded, and others had eye damage, including partial blindness caused by a lack of vitamin A.

"In Mexico, there are many children, espe-

cially Indian children, who may eat only corn tortillas and beans, and maybe a little piece of chicken once a week, but no fruits and vegetables," Bates said. "That is the normal diet. There are also very few milk-based products in their diet."

Bates said that malnutrition is caused by the lack of any one of six types of nutrients: proteins, carbohydrates, fats, water, vitamins or minerals. Bates' research was to determine what the children were lacking, and how those lacking nutrients could be supplied.

David McMurray, an immunologist at A&M and a colleague of Bates', said malnutrition increases susceptibility to infectious diseases. Correcting nutritional imbalances can be as crucial to preventing illness as using conventional treatments such as vaccination or drugs.



Professor Bates sits with Otomi Indian children outside a shelter in the state of Queretaro, north of Mexico City.

Bates supplants the missing nutrients by distributing food, in particular of fortified corn flour, which has minerals, proteins and vitamins. Food distribution is done in collaboration with the National Nutrition Institute, a government-financed hospital and research institution, based in Mexico City.

"This is a paradigm shift," McMurray said. "You think of dealing with infections by vaccination or antibiotic therapy. In fact, you can reduce the infectious disease problem indirectly by improving the nutritional status."

Though the results of existing efforts are visible, expansion of the efforts are slow to come.

"Now Mexico has excellent nutrition surveys, but to provide 30 million meals a day — which would be needed — repre-

sents a tremendous amount of money that the Mexican government just is not able to undertake," Bates said.

The death rate of children in Mexico has declined from 130 per thousand children to 30 per thousand children during the last 20 years.

Severe malnutrition has also decreased, but less severe malnutrition leading to stunted child growth has not changed, Bates said. Bates said he will continue to strive to prove the conditions.

"George has a very humanistic approach to life," McMurray said. "He began to spend more and more of his time taking his students to Mexico, and looking for students whose parents were not working at the bench, but working with people, doing human nutrition."

Bates said he has taken many students

See MEXICO on Page 3

"HOT BLOODED" AGGIE SUMMER BLOOD DRIVES JULY 10 -14, 2000

CARTER BLOODCARE Locations/Dates/Hours:

Bio-Bio Building	July 10 -14
Inside Set-up	9:00 a.m. - 4:00 p.m.
Fish Pond	July 10 -14
Bloodmobile	9:00 a.m. - 4:00 p.m.
Rudder Fountain	July 10 -14
Bloodmobile	9:00 a.m. - 5:00 p.m.

AMERICAN RED CROSS Locations/Dates/Hours:

Recreation Center	July 10 -14
Inside Set-up	3:00 p.m. - 9:00 p.m.
Rudder Fountain	July 10 -14
Bloodmobile	10:00 a.m. - 6:00 p.m.
Spence Street	July 10 -12
Bloodmobile	10:00 a.m. - 6:00 p.m.
Wehner Bus. School	July 13 -14
Bloodmobile	10:00 a.m. - 6:00 p.m.

Ag Students Go Global !!

- Join new Spanish (Ag majors) & Russian (Ag & Vet Med majors) Language Certificate Programs!
- Earn unique degree in Agriculture with international language and cultural dimension!
- Study abroad! Exciting immersion courses in Mexico and Russia in Summer '01. Travel grants available!
- ★ Tap into variety of ongoing TAMU activities in Mexico and all over Russia & Eastern Europe!

• For more information, contact:
International Office of the Agriculture Program
at 845-0706

THE BATTALION

Beverly Mireles, Editor in Chief

Eric Dickens, Opinion Editor
Reece Flood, Sports Editor
Stuart Hutson, Sci/Tech Editor
JP Beato, Photo Editor
Ruben Deluna, Graphics Editor
Brandon Payton, Web Master

STAFF MEMBERS

NIGHT NEWS — Copy Editors: Katie Edwards, Leslie VanDusen, Carrie Jacobs, Susan Wagner, Melissa Maricle; Page Designers: Courtney Bradshaw, Hafiz Memon, Karen Weinberg
CITY — Jenny Gentry, Kim Trifilio, Anna Bishop, Maureen Kane, Joseph Pleasant, Chris Brient, Adrienne Ballare
AGGIE LIFE — Dewey Badaeux, Kyle Whitacre, Kristen Young
SPORTS — Mark Passwaters, Shaun Fitzpatrick, Mike Moran, Matthew Thigpen
SCIENCE & TECHNOLOGY — Patrice Pages

OPINION — Cayla Carr, Jessica Crutchfield, David Leg, Luke McMahon, Brianna Porter, Jill Riley, Sunny Owens, Amber Rasco
RADIO — Catherine McNally, Kelley Scott, Michael Colbert
PHOTO — Stuart Villanueva, Patric Schneider, Elizabeth O'Farrell, Rylie Susan Redding, Bradley Atchinson, Bernice Garza, Andrew Hancock
GRAPHICS — Carson Higgs, Libby Woodward, Adrian Calcano, Matt Roberts, Jeff Smith, Brandon Henderson, Kelsey Roberts, Tamara Cuellar

News: The Battalion news department is managed by students at Texas A&M University in the Division of Student Media, Department of Journalism. News offices are in 014 Reed McDonald Building, Newsroom phone: 845-3313; Fax: 845-3314; E-mail: Thebattalion@hotmail.com; Web site: http://battalion.tamu.edu

Advertising: Publication of advertising does not imply sponsorship or endorsement by The Battalion. For campus, local, and national display advertising, call 845-2696. For classified advertising, call 845-0569. Advertising offices are in 015 Reed McDonald Building, phone: 845-2696; Fax: 845-2678.

Subscriptions: A part of the Student Services Fee entitles each Texas A&M student to pick up a single copy of The Battalion copy free, additional copies 25¢. Mail subscriptions are \$60 per school year, \$30 for the fall or spring semester and \$120 for the year. To charge by credit card, call 845-2611.

The Battalion (ISSN #1055-4726) is published daily Monday through Friday during the fall and spring semesters and on Thursdays during the summer session (except University holidays and exam periods) at Texas A&M University, Postage Paid at College Station, TX 77840. POSTMASTER: Send address changes to The Battalion, Texas A&M University, 1110 College Station, TX 77843-1111.

Gre...
RE...
The Texas...
ended its first...
with a fifth...
finish at nati...
and two ride...
tured three in...
national...
pionships...
without the...
ance of the...
coach.
Even with...
success, Texa...
Wally Groat...
fessor of anim...
the Equine Sc...
it was time f...
reins and sel...
the position...
Buckner s...
being A&M...
coach and sh...
ing new grou...
"There's...
set in stone,"

Net...
Inside the...
Conditioning...
sports worki...
sion of the...
southwest ce...
performance...
The lab, c...
weight room...
ic director ar...
is no better p...
"Not cou...
18,000 squar...
tremendous...
namic move...
are able to d...
Clark ha...
through the...
combines a...
idea of a mo...
ty in a small...
He said...
an immediat...
stations. Af