



ULTRASOUND IMAGING: Ouma Hannie Koerant, a speaker of Njuu, an endangered click language spoken by fewer than 10 people in South Africa, has her mouth and tongue imaged as she pronounces Njuu words. JOHANNA BRUGMAN, CORNELL UNIVERSITY, AND BONNY SANDS, NORTHERN ARIZONA UNIVERSITY.

## Classifying 'Clicks'

New language technology clears up 100-year-old mystery

National Science Foundation

A new way to classify sounds in some human languages may solve a problem that has plagued linguists for nearly 100 years—how to accurately describe click sounds distinct to certain African languages.

Cornell University professor Amanda Miller and her colleagues recently used new high-speed, ultrasound imaging of the human tongue to precisely categorize sounds produced by the Njuu language speakers of southern Africa's Kalahari Desert. The research potentially could change how linguists describe "click languages" and help speech scientists understand the physics of speech production.

She explains her findings in the online version of the Journal of the International Phonetic Association posted on July 10. The National Science Foundation supports the research.

The African languages studied by Miller use a series of consonants called "clicks" which are unlike most consonants in that they are produced with air going into the mouth rather than out. The Njuu clicks, produced using both the front and back of the tongue, are difficult to characterize.

"When we say 'k' or 't,' the sound is produced by air breathing out of our lungs," said Miller. "But click sounds are produced by breathing in and creating suction within a cavity formed between the front and back parts of the tongue. While linguists knew this, most didn't want to accept it was something people controlled." So

they loosely classified these click consonants using imprecise groupings.

"For nearly a century, some of these sounds fell into an imprecise catch-all category that included every type of modification ever reported in a click language," said Miller. "The movements of the tongue at the front of the mouth were quite accurately classified. But tongue movements at the back part of the mouth were not classified properly."

The reason was that prior tools were either too large to carry to fieldwork situations in Southern Africa, or too unsafe. Ultrasound imaging changed that by allowing Miller's research team to use safer, faster, non-invasive technology in the field to view the back part of the tongue.

Early ultrasound tools captured images only at about 30 frames per second, and thus are not able to keep up with the tongue's speed in fast sounds like clicks. The new ultrasound imaging tool is capable of capturing more than 125 frames per second, producing clearer images.

Miller and her colleagues used the high-speed ultrasound imaging to group the clicks more accurately. Her colleagues included Johanna Brugman, Cornell University; Bonny Sands, Northern Arizona University; Levi Namaseb, the University of Namibia; Mats Exter, University of Cologne; and Chris Collins, New York University.

"We wanted to classify clicks in the same way we classify other consonants," said Miller, who was a visiting faculty member at the University of British Columbia during the 2008-2009 academic year. "We think we've been pretty successful in doing that."

Njuu is severely endangered with fewer than 10 remaining speakers, all of whom are more than 60 years of age. Linguists are working diligently to document the unique aspects of this language before it disappears.

## Americans value science, but not all of it

CHICAGO (Reuters)—Many Americans still value the nation's scientific achievements, but unlike most scientists, they often pick and choose which scientific findings they agree with, especially in the areas of climate change and evolution, according to a recently released survey.

The survey found nearly 9 in 10 scientists accept the idea of evolution by natural selection, but just a third of the public does. And while 84 percent of scientists say the Earth is getting warmer because of human activity, less than half of the public agrees with that.

"The public and the scientists have very different views on many different issues, including the science of evolution and climate change," Scott Keeter of the Pew Research Center said in a telephone briefing. The center conducted the wide-ranging telephone survey in collaboration with the American Association for the Advancement of Science, or AAAS.

The research included responses from 2,533 scientists in the AAAS,

and 2,001 responses from the general public.

It found most Americans value the nation's scientific achievements, but not as much as they did a decade ago.

Although 27 percent of Americans said scientific advances are the nation's greatest achievement, this was down from 47 percent in the group's May 1999 survey.

The Obama administration has promised that science will lead health care and climate change policy, and has pledged to seek a cure for cancer, now the No. 2 killer of Americans.

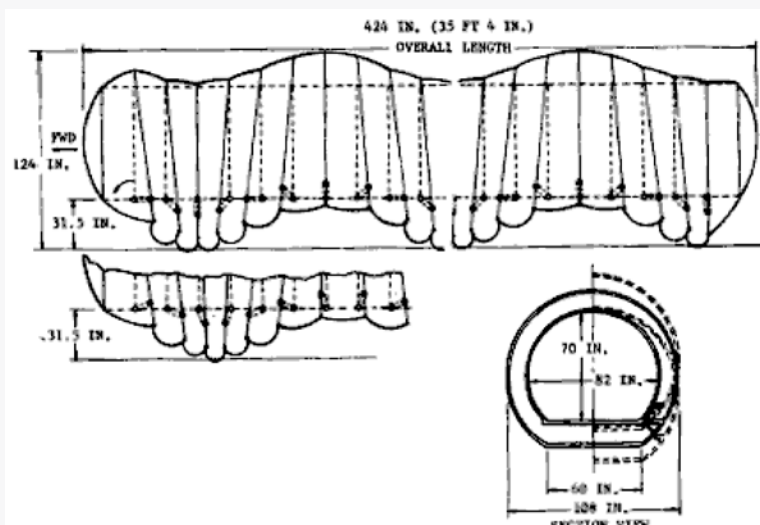
According to the survey, most scientists and the public agree it is appropriate for scientists to take part in political debate over issues such as stem cell research.

And even Americans who disagree with scientific conclusions think highly of scientists. More than two-thirds of those who say science conflicts with their religious beliefs still say scientists contribute significantly to society.

# Lunar worm: The idea that never took shape

By LEONARDO VINTIÑI  
Epoch Times Staff

"For many years Aeronautronic has conducted studies of improved concepts for off-road vehicles based on analyses of mobility in nature. One of the first things learned in a study of animals is that most of them—in particular the ones which move closer to the ground—tend to be long and slender. The extreme examples of the slenderizing trend are the snakes and various species of worms. These animals take advantage of their elongated form to spread their weight over a large area, and the resultant low ground pressure allows them to move over very soft ground."—NASA report, 1966



PROMISING PROJECT: In 1966, engineers presented NASA with a unique idea for traveling on the moon. NASA

The Lunar Worm...a truly unique proposal! No, this isn't about a three-eyed worm from the cartoon "Lunar Jim," but a space rover project that never materialized, presented by the Aeronautronic division of the Philco Corporation.

Inspired by the undulating movement of certain snakes, the Lunar Worm project seemed promising. It was presented to NASA in 1966, and it was studied as a possible means of mobility in a low-gravity environment such as the moon.

But the Lunar Worm was not to be; the project was never approved, but its advantages were obvious: with a contracting move-

ment, a great cylindrical-shaped vehicle would be able to inch its way around in the most difficult terrain, and at a considerable speed (5 mph). This ingenious design could overcome challenging geographical obstacles that would stop more conventional vehicles in its tracks.

Aside from increased mobility offered by this sine-wave shaped travel, the slithering Lunar Worm would also have other advantages over its rivals on wheels. First, the hazardous lunar dust, capable of worming its way into every crevice, moving part, and electronic circuit of a conventional space craft, would be of no concern for the Lunar

Worm, whose flexible bellows would be completely covered by a protective membrane.

Furthermore, the internal space inside such a craft would allow for more room. One model proposed a Lunar Worm that could carry scientific equipment and two crew members, and also act as an appropriately pressurized, temporary dwelling. Another slower-moving but larger version described a mobile shelter that could house a group of astronauts for up to a year.

There were also plans for a similar unmanned design for exploratory purposes.

The Lunar Worm was to be an economical design as well. Power

requirements for this rib-walker were thought to be much less than other vehicles of a similar size.

Still, engineers met with some significant obstacles when designing a large, mechanical worm. According to the extensive and dedicated reports about the Lunar Worm, one of the major challenges of the proposal was the selection of a flexible membrane to seal the expandable bellows. This material would need to be capable of tolerating the friction, temperatures, and the continual erosion brought on by the environment.

The peristaltic vibrations of its waveform travel made it the perfect vehicle for soft soils, but at the same time it would produce a smooth voyage, without rebounds. Plus, it could be neatly folded up for easy shipping or storage. But despite its list of advantages—and decidedly whimsical shape—NASA decided not to go with the unusual design; the worm never won.

Although an actual vehicle never materialized, the calculations, diagrams and design ideas of the Lunar Worm still exist for posterity...or future inspiration. [http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19660022562\\_1966022562.pdf](http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19660022562_1966022562.pdf)

Perhaps the concept is merely waiting for its true calling: to jump out of the pages of a science fiction story.

## Moon landing tapes got erased, NASA admits

WASHINGTON (Reuters)—The original recordings of the first humans landing on the moon 40 years ago were erased and re-used, but newly restored copies of the original broadcast look even better, NASA officials said.

NASA released the first glimpses of a complete digital makeover of the original landing footage that clarifies the blurry and grainy images of Neil Armstrong and Buzz Aldrin walking on the surface of the moon.

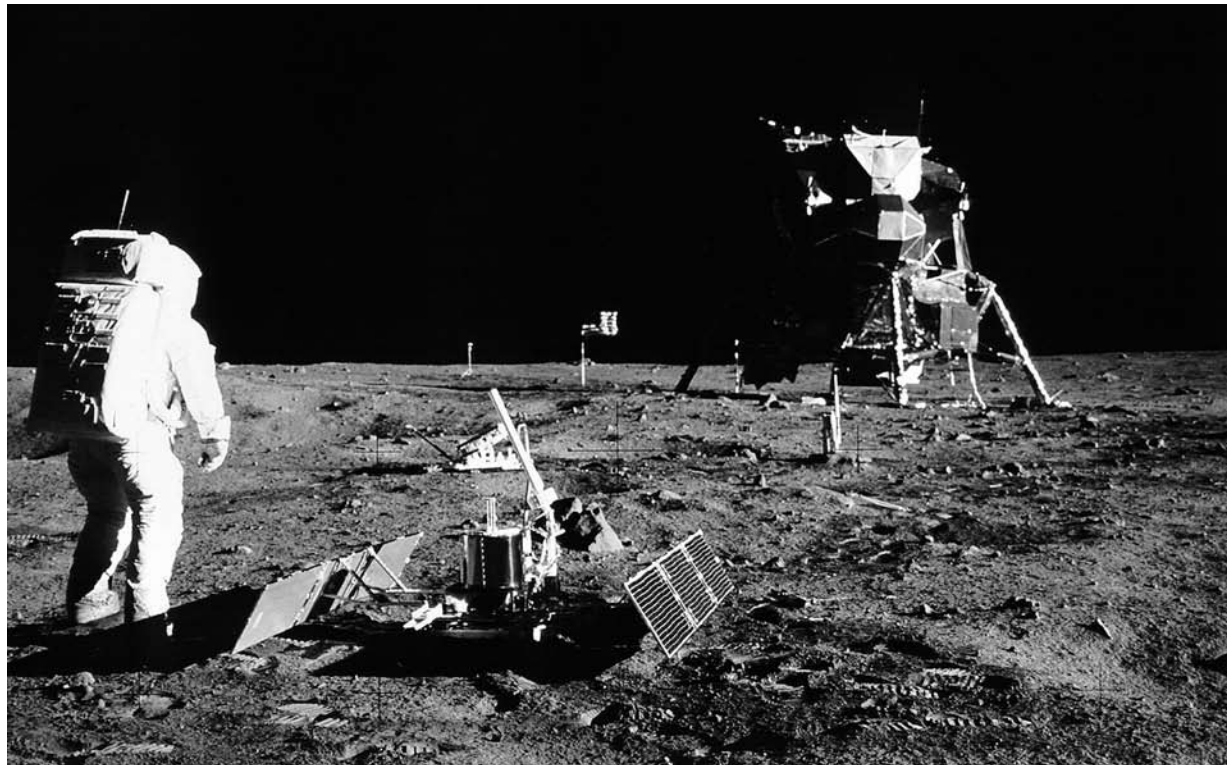
The full set of recordings, being cleaned up by California-based Lowry Digital, will be released in September. The preview is available at <http://www.nasa.gov>.

NASA admitted in 2006 that no one could find the original video recordings of the July 20, 1969, landing. Since then, Richard Nafzger, an engineer at NASA's Goddard Space Flight Center in Maryland, who oversaw television processing at the ground-tracking sites during the Apollo 11 mission, has been looking for them.

The good news is he found where they went. The bad news is they were part of a batch of 200,000 tapes that were degaussed—magnetically erased—and reused to save money. "The goal was live TV," Nafzger told a news conference.

"We should have had a historian running around saying 'I don't care if you are ever going to use them—we are going to keep them,'" he said.

They found good copies in the archives of CBS news and some recordings called kinescopes found in film



MISSING MOONLANDING: Man's first landing on the Moon occurred July 20, 1969, but NASA claims to have erased the tapes of the event. NASA/NEWSMAKERS

vaults at Johnson Space Center.

Lowry, best known for restoring old Hollywood films, has been digitizing these along with some other bits and pieces to make a new rendering of the original landing.

Nafzger does not worry that using a Hollywood-based company might fuel the fire of conspiracy theorists who believe the entire lunar program that

landed people on the moon six times between 1969 and 1972 was staged on a movie set or secret military base.

"This company is restoring historic video. It mattered not to me where the company was from," Nafzger said.

"The conspiracy theorists are going to believe what they are going to believe," added Lowry Digital Chief Operating Officer Mike Inchalik.

And there may be some unofficial copies of the original broadcast out there somewhere that were taken from a NASA video switching center in Sydney, Australia, the space agency said. Nafzger said someone else in Sydney made recordings too.

"These tapes are not in the system," Nafzger said. "We are certainly open to finding them."

## Potato famine striking home gardens in U.S.

CHICAGO (Reuters)—Late blight, which caused the Irish Potato Famine of the 1840s and 1850s, is killing potato and tomato plants in home gardens from Maine to Ohio and threatening commercial and organic farms, U.S. plant scientists said.

"Late blight has never occurred this early and this widespread in the United States," said Meg McGrath, a plant pathologist at Cornell University's extension center in Riverhead, New York.

She said the fungal disease, spread by spores carried in the air, has made its way into the garden centers of large retail chains in the Northeastern United States.

"Walmart, Home Depot, Sears, Kmart, and Lowe's are some of the stores the plants have been seen

in," McGrath said in a telephone interview.

The disease, known officially as *Phytophthora infestans*, causes large mold-ringed olive-green or brown spots on plant leaves, blackened stems, and can quickly wipe out weeks of tender care in a home garden.

McGrath said in her 21 years of research, she has only seen five outbreaks in the United States. The destructive disease can spread rapidly in cooler, moist weather, infecting an entire field within days.

"What's unique about it this year is we have never seen plants affected in garden centers being sold to home gardeners," she said.

This year's cool, wet weather created perfect conditions for the dis-

ease. "Hopefully, it will turn sunny," McGrath said. "If we get into our real summer hot dry weather, this disease is going to slow way down."

**FUNGICIDES WILL CONTROL BLIGHT**  
According to its Web site, the University Maryland's Plant Diagnostic Lab got a suspect tomato sample as early as June 12, very early in the tomato growing season, which runs from April-September.

McGrath said the risk is that many gardeners will not recognize it, putting commercial farms and especially organic growers at risk.

"My concern is for growers. They are going to have to put a lot more time and effort in trying to control the disease. It's going to be a very tough year," she said.

"This pathogen can move great distances in the air. It often does little jumps, but it can make some big leaps."

McGrath said the impact on the farmer will depend on how much the pathogen is spread. "Eastern New York is seeing a lot of disease," she said.

She said commercial farmers will be able to use fungicides containing chlorothalonil to control the blight.

And while some sprays have also been approved for organic use, many organic farmers do not use them, making it much harder to control.

"If they are not on top of this right from the very beginning, it can go very fast," she said.