Extracts

Miami Blue Butterfly Gets New Lease On Life

The critically endangered Miami Blue butterfly, one of the rarest insects in North America, returned to South Florida in May when University of Florida researchers released several hundred butterflies that had been bred in captivity.

"Last year, the entire Miami Blue population was down to about 50 adults, and their habitat was restricted to Bahia Honda State Park in the Florida Keys," said Thomas Emmel, director of UF's McGuire Center for Lepidoptera and Environmental Research in Gainesville. "We hope the release will establish a new, self-sustaining colony that will eventually increase in number and repopulate other areas of South Florida."

Several hundred mature caterpillars or larvae were released in Everglades National Park and emerged as butterflies in 10 to 15 days. The adult insects, and their offspring, are being monitored closely to see how well they are reproducing.

At one time, the Miami Blue butterfly was common in the coastal areas of South Florida. Beginning in the 1970s, coastal development and activities such as mosquito spraying caused the population to drop to critically low levels. After Hurricane Andrew swept through the area in 1992, Emmel and other researchers thought the Miami Blue was extinct.

Emmel was surprised to find a colony of Miami Blue butterflies in the Florida Keys in 1999.

To raise the butterflies in captivity, Jaret Daniels, director of the project, harvested 100 pinhead-sized butterfly eggs from nickerbean plants in Bahia Honda State Park. The Miami Blues were then reared in UF's new lepidoptera research facility at the Florida Museum of Natural History in Gainesville.

Josh Wickham

Jaret Daniels

> "In the wild, anywhere from 1 percent to 5 percent of butterfly eggs result in a reproducing adult. In our captive propagation program, that number is closer to 70 percent."
>
> — Jaret Daniels

Jaret Daniels, director of the Miami Blue butterfly research project at UF's McGuire Center for Lepidoptera and Environmental Research, releases mature caterpillars in Everglades National Park.

"In the wild, anywhere from 1 percent to 5 percent of butterfly eggs result in a reproducing adult," Daniels said. "In our captive propagation program, that number is closer to 70 percent."

Emmel and Daniels have raised 13 generations of Miami Blues over the past 15 months, resulting in more than 9,000 individuals.

Federal and state fish and wildlife agencies have provided funding for the UF research project. Additional cooperation has come from the Florida Parks Department and the National Park Service.

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Patti Bartlett

Research Indicates Butterflies "Talk"

Butterflies may seem like the quietest of creatures, but a University of Florida researcher has uncovered new evidence that many of the colorful insects actually spend much of their time "talking" to each other.

UF entomologist Mirian Hay-Roe found that blue-and-white longwing butterflies emit a barely audible series of clicks when they come into contact with other butterflies. The finding adds to a small but growing number of studies suggesting that some butterfly species use sound to communicate.

Marisol Amador

UF entomologist Mirian Hay-Roe holds two blue-and-white longwing butterflies. She found that the butterflies make faint clicking sounds while interacting with one another, suggesting some butterflies use sound to communicate.

"It's one of those accidental discoveries that sometimes happen in science," said Hay-Roe. "I wasn't looking for communication in butterflies. I just noticed that these butterflies were making noise."

Hay-Roe says she isn't sure how the butterflies make the clicks. The blue-and-white longwing appears to have no specialized structure for making sound, she said. Future researchers are more likely to be interested in finding the insect's "ears," which butterfly experts say could be used as models for miniature microphones or improved hearing aids.

The blue-and-white longwing, also known by the scientific name *Heliconius cydno*, is a butterfly found in South and Central America. Adults of the species spend their days eating pollen from tropical flowers, and they congregate by the hundreds at night in trees.

> "When I told my fellow researchers that these butterflies were making noises, I think they thought I was going crazy. The sound they make is very faint, but if you listen very closely you can hear it."
>
> — Mirian Hay-Roe

Several years ago, Hay-Roe was working with a different species, and sharing greenhouse space with a researcher who was working with blue-and-white longwings, when she noticed something peculiar. The blue-and-white longwings seemed to be bullying her butterflies.

"They were chasing my butterflies all around the greenhouse," she said.

Soon she noticed another odd thing: The longwings seemed be making a faint clicking sound as they chased the rivals out of their territory. Further observation revealed the butterflies often made the sound when they encountered members of their own species. Longwings often clicked at each other during flight, when two of the butterflies were so close they almost touched. They also clicked at each other while roosting at night.

"When I told my fellow researchers that these butterflies were making noises, I think they thought I was going crazy," Hay-Roe said. "The sound they make is very faint, but if you listen very closely you can hear it."

Armed with a simple tape recorder and lots of patience, Hay-Roe captured some of the butterfly sounds on tape. She and co-author Richard Mankin, an entomologist with the U.S. Department of Agriculture, analyzed the sounds and published their results earlier this year in the *Journal of Insect Behavior*.

Hay-Roe said it will take further research to prove the sounds are a form of communication. But based on the context in which the sounds are made, she said, it is likely the butterflies are using the noise to shoo others out of their territory.

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Tim Lockette

Extracts

Study: Owls Use Dung As "Tool" To Lure Beetles

An old adage says you can catch more flies with honey than vinegar. But the burrowing owl has come up with another alternative: manure.

University of Florida scientists have a new explanation for burrowing owls' odd habit of collecting and scattering animal feces within and around their shallow burrows. They believe the owls are simply using the feces as bait to attract a favorite insect meal — dung beetles.

The findings are significant because they are based on what the scientists say are the first controlled experiments of tool use — dung as bait, in this case — by wild animals, a hot issue because of the enormous difficulty of interpreting animal behavior.

"What makes this study unique is its experimental approach, documenting how effective tool use is. Tool use in general is a very controversial field because it's often difficult to know whether an animal is doing what you think it's doing," said Doug Levey, a UF professor of zoology and the lead author of a paper on the research in the journal *Nature*.

Burrowing owls, known scientifically as *Athene cunicularia*, range from Canada to Chile, with a handful of small populations in Florida. Observers throughout their range have long noted their curious habit of hoarding cow, horse, buffalo, dog and other dung in and around the entrance to their nesting burrows, shallow holes that may be up to 3 feet deep and 6 to 9 feet long.

Levey said a UF undergraduate ornithology class' routine outing to view a burrowing owl population in North Florida led to the beetle hypothesis. He and others noticed that the indigestible pellets the owls had regurgitated contained large numbers of dung beetle parts.

Unlike most other types of owls, burrowing owls are active during the day, when they often can be seen seemingly standing sentry outside their burrows. Many dung beetles also forage during the day.

"You can go out there and see these owls standing in front of their burrows and it looks like they're not doing anything," Levey said. "But I think it's pretty clear that they've got that old line in the water, fishing for these beetles."

To test the hypothesis, the researchers removed all the dung from the ground surrounding about a dozen of the owls' burrows at the sites of two separate North Florida populations. They then added similar amounts of cow manure to half the burrows, leaving the others without any. After four days, they collected all the pellets and prey remains near the burrows, then repeated the experiment by switching the control and experimental burrows, putting manure by those that had none in the prior test.

Examinations of the pellets and beetle parts around the burrows revealed that at those with dung, the owls "consumed 10 times more dung beetles and six times more beetle species than when dung was not present," according to the *Nature* paper.

The researchers do not believe the owls evolved their behavior solely to attract dung beetles, Levey said.

Levey also cautioned that the researchers make no claims the owls are consciously using the dung as bait, but rather that it has simply proved to be an effective and lasting behavior from an evolutionary standpoint.

The research was funded with a $500 grant from UF's University Scholars undergraduate research program. The paper's other authors are R. Scott Duncan, a faculty member at Birmingham-Southern College in Alabama who earned his doctorate at UF, and Carrie Levins, who earned her bachelor's degree in zoology at UF.

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Aaron Hoover

Ronald G. Wolff

Anti-Drug Ads For Thrill Seekers Most Effective

Expensive government advertising campaigns, which play an important part in the national drug strategy, do little, if anything, to dissuade teenagers from using drugs, according to a study by University of Florida researchers.

The study, which used a new method to examine the influence of anti-drug advertising, showed that although certain types of messages were found to be effective in changing young adults' attitudes toward using illegal drugs, there are just as many being used that have no influence on teens' thoughts and behavior, said Jon Morris, a UF advertising professor who presented the findings at a Society of Biological Psychiatry conference in New York. Of four types of anti-drug messages currently in use, only one was found to have a significant effect on feelings against drug use.

Messages that showed and were tailored to thrill-seeking teenagers, who are attracted to competitive and active behavior, were found to be the most effective at changing the feelings and intentions of young adults regarding drug use, Morris said. This type of ad was more effective than those conveying negative or threatening images, he said.

The study also found that ads involving self-esteem and relationships with friends were related to feelings about drug use. Those that lowered self-esteem produced higher emotional responses toward drug use, while those displaying strong emotional bonds with friends lowered it, Morris said.

Anti-drug ads are a major tool in the nation's anti-drug arsenal. In 1998, a Congressional act allocated $975 million to be spent between 1999 and 2002 to produce these messages, including television commercials, printed advertisements and billboards. Funds have since continued to be provided at a reduced level, with $150 million appropriated for the campaign last year.

Prompted by concerns raised by politicians and others about their effectiveness, Morris and three colleagues sought to determine just how well the ads were getting through to teens. For the study, they narrowed about a dozen anti-drug television public service announcements to the four that best represented each one of four different types: transformational, informational, sensational and provocative. The ads, all of which were funded by the U.S. government, were then showed to 150 university undergraduate communications majors.

The transformational type features a narrator explaining why people should not use drugs. The ad researchers used showed a collection of great plays with Yankees baseball player Derek Jeter saying he wouldn't be able to perform such acts if he took drugs. Informational-type ads detail the physical consequences of taking drugs. The study used an ad showing a coroner reading the autopsy report of someone who died from a drug overdose. Provocative ads are designed to make a viewer think or to provoke emotion, such as the famous "This is your brain on drugs" commercial. Sensational ads, which researchers found to be the most effective, show people who seek excitement, possess a certain skill and are experiencing a physical sensation. The study ad illustrating this type showed a teenager performing daring moves on a skateboard and then indicating that if he took drugs, he would be unable to accomplish his skill.

After being shown the four ads, participants filled out questionnaires in which they were asked to select a drawing that best represented their feelings about the ad. The pictorial representations measured on a nine-point scale various characteristics, such as pleasure, arousal and dominance.

The researchers found the sensational ad impacted all nine of these characteristics and was the only type that influenced participants' behavioral intentions regarding drug use. The provocative ad affected all of the emotional dimensions but not behavior, while the transformational ad influenced a single emotion and the informational ad had no impact at all.

Morris and his team plan to continue the research, focusing next on a large sample of middle school students, at whom most anti-drug messages are aimed because they are most at risk for trying drugs, he said

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Jessica Orr

Extracts

Low-Carb Potato Headed To Florida Fields

Potatoes may be on the no-no list for high-protein diets, but a University of Florida researcher says a new low-carb potato will help win back die-hard carbohydrate counters.

"Consumers are going to love the flavor and appearance of this potato and the fact that it has 30 percent fewer carbohydrates compared to a standard Russet baking potato," said Chad Hutchinson, an assistant professor of horticulture with UF's Institute of Food and Agricultural Sciences.

"The potato doesn't look or taste like anything that's now on the market, and it's not a genetically engineered crop," Hutchinson said. "When it comes to beautiful potatoes, this one is a real winner for growers and consumers."

Hutchinson said five seasons of evaluation in his research program at UF show the tuber can handle Florida weather extremes and is ready to be marketed as a premium, gourmet potato. UF is the first test site in the United States for the European import, which was developed by HZPC, a seed company based in the Netherlands.

Available to consumers in January 2005, the new spud will be marketed under a yet-to-be determined name, and it is expected to be a boon for Florida's $120 million potato industry.

Hutchinson said 3 ounces of the new potato contains about 13 grams of carbohydrate compared to around 19 grams in the same size serving of a Russet Burbank potato.

"Although potatoes are not part of the Atkins diet, the fact of the matter is that potatoes contain no fat and they are a good source of fiber, protein and vitamins. They have vitamin C and B-6 and are low in sodium and high in potassium. And, potato skins are an excellent source of fiber," Hutchinson said.

Independent research in Canada confirmed the spud's low-carbohydrate profile. Hutchinson said it is due in part to the lower specific gravity, which relates to the amount of starch in the potato, compared to the more widely recognized Russet Burbank baking potato. "The smooth, buff-colored skin and light yellow flesh will make this potato an attractive and tasty alternative in many traditional potato recipes," he said.

Don Northcott, marketing manager for HZPC Americas Corp., said the potato can be harvested in 65 to 75 days, compared to more than 100 days for existing potato varieties grown in Florida. The shorter growing period will allow spring and fall crops to be produced for harvesting from January through June.

Chad Hutchinson, cmhutchinson@ifas.ufl.edu

Chuck Woods

Chad Hutchinson, an assistant professor of horticulture, displays a low-carb potato that will be available to consumers in January.

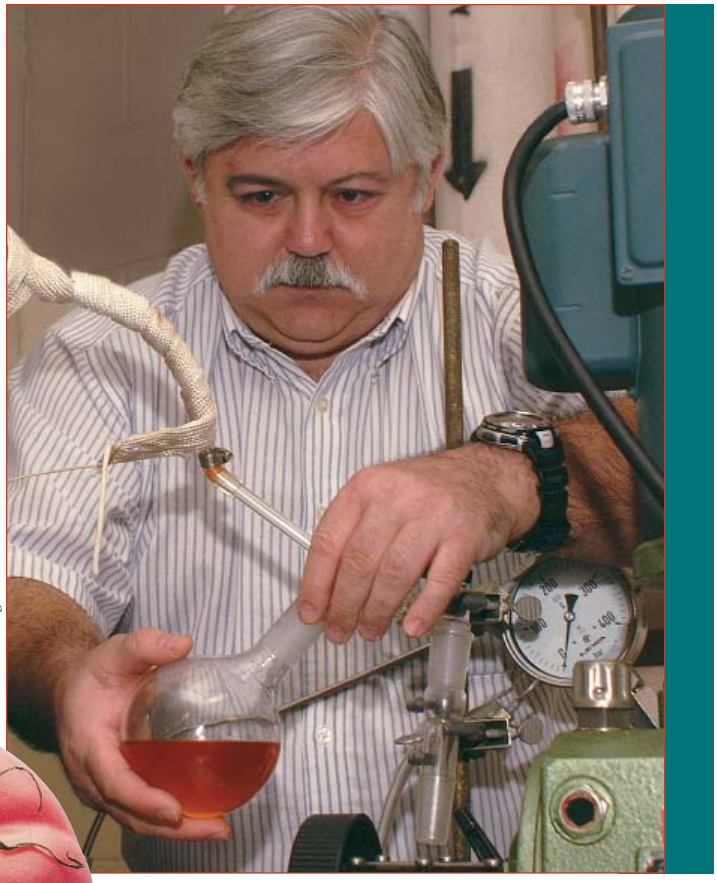
Thomas Wright

Blemished Tomatoes Source Of Antioxidant Lycopene

Researchers at the University of Florida have found an inexpensive way to extract the antioxidant lycopene from tomatoes, a technology that could turn a mountain of discarded produce into a marketable commodity.

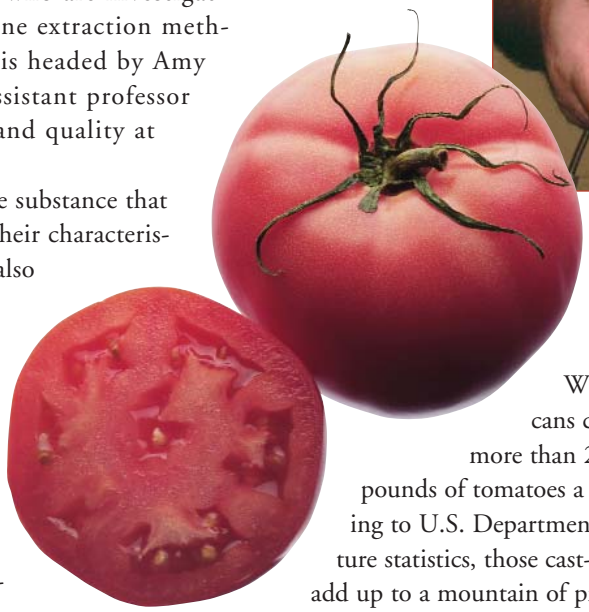
"It's a very good solution to two problems," said Murat Balaban, a professor of food engineering and processing at UF's Institute of Food and Agricultural Sciences. "You have a shortage of lycopene, which costs $2,500 per kilo in its pure form. And you have farmers with tons of blemished tomatoes that they can't sell or even give away."

Balaban is part of a team of six UF researchers who are investigating new lycopene extraction methods. The team is headed by Amy Simonne, an assistant professor of food safety and quality at UF.



Thomas Wright

Murat Balaban, a professor of food science and human nutrition, collects a solution of lycopene and ethanol in his Gainesville laboratory.



Lycopene, the substance that gives tomatoes their characteristic red color, is also a powerful antioxidant, one of a family of chemicals that promote health by protecting cells from damage caused by oxidation.

Pure lycopene has traditionally been extracted from tomatoes through a process using chemical solvents — but lycopene suppliers are having difficulty keeping up with the new demand.

Even so, there's no shortage of raw material for the fledgling lycopene industry. Every year, packing and processing plants throw away about one out of every 10 tomatoes brought in by farmers, UF and industry experts say.

With Americans consuming more than 25 billion pounds of tomatoes a year, according to U.S. Department of Agriculture statistics, those cast-off tomatoes add up to a mountain of produce. The discarded fruit typically isn't in very bad condition, but even minor cosmetic problems — such as blemishes or an odd shape — can keep a tomato from meeting USDA quality standards.

For packers, those tomatoes are worse than worthless. Packing houses must foot the bill for disposal of the tomatoes, which is governed by federal rules meant to prevent runoff of the fruit's acidic juices. With luck, a packing house can find farmers willing to take away at least some of the discards for use as cattle feed.

But Balaban and his colleagues may have solved that problem. By putting tomatoes in a supercritical gas extractor — like the machine used to decaffeinate coffee beans — they can remove a few grams of expensive lycopene from a few hundred pounds of cast-off produce.

"Any new use for these tomatoes would be of tremendous value to us," said Jay Taylor, president of Taylor and Fulton, a packing house in Palmetto. "It's sad to see this much food going to waste, particularly when so many of these tomatoes have only minor problems."

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Tim Lockette

Extracts

Student Project Helps Soldiers Detect Bombs

Soldiers suspicious that a truck or box may contain explosives or chemical weapons may soon be able to find out for sure by shooting the target with a sticky little projectile that can detect the danger and report it from afar.

The crayon-sized sensor, fired from a standard paintball gun, was invented by a team of University of Florida undergraduate engineering students as part of a government- and corporate-supported engineering research and education program at UF. Lockheed Martin's Orlando-based Missiles and Fire Control, which sponsored the project, plans to refine the projectile and put it into production, and there is a chance it could be used in Iraq, Lockheed officials say.

"That (use in Iraq) was the original genesis," said Leslie Kramer, director and engineering fellow for Missiles and Fire Control, explaining the sensor would be an ideal tool for identifying improvised explosive devices, or IEDs — disguised homemade bombs that have injured and killed scores in Iraq.

"A lot of these things are being buried in piles of trash," he said. "If you had a good chemical sensor on this projectile, you could fire it into the trash and stand back and determine whether it could detect TNT leaking out of an artillery shell."

Guided by mechanical and aerospace engineering Professor Loc Vu-Quoc, a team of six engineering seniors designed and built the projectile over the course of the year-long Integrated Product and Process Design, or IPPD, program.

The team built a tiny circuit board containing a transmitter, sensor and wire antenna, all powered by a watch battery. They inserted the circuit board in a cylindrical case tipped with a sticky industrial polymer.

"We made its tip heavy so it's like a dart, it doesn't tumble over," said electrical engineering student Felipe Sutantri.

Chemical and explosive detectors are expensive and difficult to work with, so the team tested their prototype using a tiny accelerometer, a sensor that registers movement. In a variety of tests, the team showed that accelerometers and other electronics could survive being shot out of the gun and striking a target. They were able to measure the accelerometer's data remotely at impact using oscilloscopes and laptop computers, much the way laptop-equipped soldiers might glean information from a deployed version of the projectile on the battlefield

"I think the most important thing for the proof of concept was to see if the electronics could survive the impact," Sutantri said.

The students' tests proved the transmitter could report data up to 240 feet from the laptop, while the paintball gun could shoot the projectile at least 65 feet. Both distances could be extended in the production version, and engineers also likely will shrink the projectile's size and weight.

Tara Plew, a research engineer at Missiles and Fire Control and the employee who worked most closely with the students, said the projectile "has created all kinds of excitement in the company," with two U.S. military bases asking for written descriptions of the device.

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Aaron Hoover

Head Lice Links Modern And Archaic Humans

New research showing that lice evolve with the people they infest demonstrates that a now-extinct species of human, *Homo erectus*, came into direct contact with modern humans, *Homo sapiens*. That contact happened as recently as 25,000 years ago.

Evidence of contact between the two species of humans is surprising, scientists say, because researchers long had thought that *Homo erectus* became extinct hundreds of thousands of years ago.

The study's findings appeared in the Oct. 5 online issue of the Public Library of Science journal, PloS, Biology.

People today have two distinct types of head lice: one that evolved on *Homo erectus*, and one that evolved on *Homo sapiens*. The only way that could have happened, say scientists, is by direct contact between the two species.

"It's amazing to know that we had physical contact with another species of human," said David Reed, curator of mammals at UF's Florida Museum of Natural History and the lead scientist on the study. "We touched them, and that's pretty dramatic to think about. We either battled with them, or lived with them or perhaps even mated with them."

Scientists already believed that early ancestors of our species diverged from other archaic humans about 1.2 million

Egyptian comb: Te Papa. Close-up: Vince Smith.

A 6th-century wooden nit comb from the Egyptian city of Antinoe, alongside its modern plastic counterpart. Inset is a close-up of a human head louse.

Audiologists Warn Of Motorcycle Noise Dangers

When Steppenwolf sang of heavy metal thunder in "Born to be Wild," their classic ode to the freewheeling biker lifestyle, they equated rocking out with the ear-pounding experience of riding a motorcycle. The notion that loud music can damage hearing is common knowledge, but the noise produced by motorcycles poses similar risk to riders, University of Florida experts caution.

In a pilot test of 33 motorcycles, UF audiologists at the College of Public Health and Health Professions have found nearly half produced noise above 100 decibels when throttled up — equivalent in intensity to a loud rock concert or a chainsaw. The ongoing UF effort is the first scientific study aimed at producing quantifiable data on noise levels for motorcyclists.

The National Institute for Occupational Safety and Health cautions that exposure to noise at 100 decibels is safe for only 15 minutes. Permanent hearing loss can occur with prolonged exposure to any noise measuring 85 decibels or higher.

"Almost all of the motorcycles we tested reached action-level noise, which in the workplace would require ear protection," said Joy Colle, one of the study researchers. "The loudest bike we tested measured 119 decibels with the engine revved, and the recommended exposure time at that level is only 11 seconds.

"Potentially, the vast majority of motorcyclists could be exposed to dangerous levels of noise," Colle said.

More than 5 million Americans are registered motorcycle owners, according to the U.S. Department of Transportation. Of the 28 million Americans who have some degree of hearing loss, about one-third can attribute their hearing loss to excessive noise exposure.

In addition to sound levels, the UF researchers are noting the make, model, engine size, year manufactured and any modifications to the engine and exhaust systems of each motorcycle. They will then develop an online database to provide motorcyclists with bike-specific data on noise exposure so riders can make informed decisions about hearing protection.

In the UF study, noise levels were tested at riders' ear levels from stationary motorcycles when idle and throttled up. Further research should include measurement of noise levels when the motorcycles are driven at cruising speeds to account for the effects of wind noise, Colle said.

Jill Pease

Lisa Baltozer

Andrea Pierce, a University of Florida audiology graduate student, uses a noise dosimeter to measure the loudness of Dano Roller's motorcycle.

years ago. Reed's study shows that two nearly identical but genetically different strains of head lice diverged at about the same time. Each of the two kinds of head lice infested a different species of early human as the human species diverged, Reed and colleagues propose.

"This research pioneers the use of parasites to tell us about the natural history of humans and other animals," said Carter Kimsey, program director in the National Science Foundation's division of biological infrastructure, which co-funded the research with NSF's Division of Environmental Biology. It gives biologists and anthropologists a new tool, said Kimsey.

"We've discovered the 'smoking louse' that reveals direct contact between two early species of humans, probably in Asia about 25,000 to 30,000 years ago," said co-author Dale Clayton of the University of Utah. Other authors of the paper include Alan Rogers of the University of Utah, Vincent Smith of the University of Glasgow in Scotland and Shaless Hammon of the University of Utah.

"The record of our past is written in our parasites," said Rogers.

Lice require direct physical contact between hosts for transmission. They also form new species each time the host, in this case humans, does, Reed said, making them excellent markers for tracing human evolutionary history.

After infesting *Homo erectus* for a million years, one type of louse jumped from that soon-to-be-extinct species onto *Homo sapiens*.

The research confirms the "out-of-Africa" theory that the population of *Homo sapiens* rapidly expanded after a small group of our early ancestors left Africa between 150,000 and 50,000 years ago. Other recent studies had suggested that *Homo sapiens* indeed may have had contact with *Homo erectus* not in Africa, but in Asia, 50,000 years ago.