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Cover: If scientists could identify the gene for the mosquito's irritating whine, might they alter it in some way so that campers could get some sleep? Perhaps. But the first priority of recent efforts to manipulate mosquito genes is to strip the critters of their ability to spread disease. Preliminary results suggest that rationally mutated mosquitoes may become an important weapon in the global war against malaria and other insect-borne diseases. (Illustration: Taina Litwak)



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## Letters

### Galactic fingers

The computer image accompanying "Cosmic Cartographers Find 'Great Wall'" (SN: 11/25/89, p.340) contains a number of clearly artifactual elements in the form of ray-like structures directed radially away from the vertex. These artifacts must have their origin in some kind of error in the method used to calculate distance from the Earth. Do they represent clusters of an unusual type of galaxy for which the method is inapplicable (due to large errors in the calculated distances), or do they call into question the existence of the sheet-like structure the astrophysicists claim to have discovered (by showing the range of uncertainties in all the calculated distances)?

Brian Gaulke  
Bremerton, Wash.

*Astrophysicist Margaret Geller, who codirected the survey, responds: "The pronounced radial 'fingers' along the line of sight ('ray-like structures') are clusters and groups of galaxies*

*bound together by gravity. If we could map the actual positions of galaxies in real, three-dimensional space rather than in the redshift space of our map, they would have approximate spherical symmetry. The elongation in redshift space occurs because galaxies move in the gravitational potential of the cluster or group. The orbital velocities carry the galaxies across the system many times ( $\geq 10$ ) in the age of the universe. In fact, it is these 'fingers' which enable us to use Newton's laws to calculate the masses of galaxy clusters.*

*"Because the 'fingers' in redshift space are well understood, we can use statistical procedures to remove them from the maps. After removal, the large-scale patterns (the sheets and voids) in the map are unchanged."*

### Breakfast study defended

Professor Gill (Letters, SN: 11/25/89, p.339) would be correct in criticizing the design of our school breakfast program (SBP) study ("In-school breakfasts improve test scores," SN: 10/14/89, p.247) if we had presented the

data as *proof* of the hypothesis that SBP participation is associated with improved standardized test scores and rates of absence and tardiness. However, in our journal paper we were careful to point out that "this was not a controlled experiment, and thus causal inferences must be made with caution. Since the children's participation status was determined by self-selection, it was not possible to control for some potentially confounding factors, such as motivation." The data do demonstrate an association, which may be due to a number of factors, including a beneficial effect of SBP on performance.

We feel that retrospective studies, including the study of "natural experiments" such as ours, can provide valuable insight into important questions and may justify prospective controlled studies, which are usually more difficult and expensive to perform. We conclude in our paper that "further study of this important question is warranted, preferably using prospective controlled designs,

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resistance appears related to genes on the mosquito's second chromosome, with possible help from a few genes on chromosome three.

And just last year, Alison C. Morris, Paul Eggleston and Julian M. Crampton of the Liverpool (England) School of Tropical Medicine reported the first successful introduction of a bacterial gene into *Aedes aegypti*, a species that has developed widespread resistance to pesticides.

With the technique for inserting bacterial genes into *Aedes aegypti* now well established, the Liverpool researchers say they look forward to experimental insertions of various mosquito genes. "Such work should ultimately lead to an understanding and control of the molecular mechanisms involved in the transmission of pathogens by their insect vectors," they write in the January 1989

**L**arge-scale disease control through engineered insects remains "far down the road," says Beaty. Other approaches, including safer pesticides and new drugs, will no doubt play important roles along the way. But in light of growing pesticide resistance among insect populations, environmental concerns about large-scale drainage of ecologically sensitive wetlands where

mosquitoes breed, and the bleak prospects for rapid development of vaccines against such scourges as malaria and dengue, researchers say gene-altered mosquitoes start to look pretty good.

NIAID's Gwadz calls the replacement of entire insect populations a "very long-range goal" that will probably work best in specific circumstances, such as areas where targeted insect populations remain somewhat isolated or where an infestation is relatively new.

The genetic approach has some ecological advantages over a strategy of wiping out entire insect populations, Beaty adds. "Whenever you knock out something with pesticides, you create an ecological vacuum and something else moves in," he says. With improvements in genetic engineering techniques, "we may be able to enhance populations that are not good transmitters," without removing a significant piece of the ecological puzzle.

But any genetic traits scientists choose to enhance will have to work very efficiently in the altered mosquitoes. Gwadz notes that in Africa, mosquitoes typically inject 2,000 times more malaria-causing protozoans into humans than are needed to transmit the disease. Thus, even mosquitoes genetically engineered for a 99 percent reduction in their transmission efficiency would have little effect on the spread of malaria there, he says.



T. Litwak

On the brighter side, while scientists today know of only a few mechanisms by which insects become poor carriers of pathogens, other sources of vector incompetence — perhaps extremely efficient ones — probably await discovery, Gwadz asserts.

It will take time to understand these various biological mechanisms and to sort out the underlying genetics. Toward that end, entomologists and molecular biologists express excitement about a \$1.1 million program initiated this year by the Chicago-based MacArthur Foundation. The money is earmarked to forge a marriage between modern genetics and vector biology at five U.S. research centers.

Researchers note that a thorough understanding of even one good mechanism of vector incompetence could lead to wholesale reductions in the number of people suffering from mosquito-borne diseases. "However it happens," says Gwadz, "if the mosquito can't transmit the disease, then that's okay." □

#### Letters continued from p.67

and if such studies confirm these findings, it would appear that prudent public policy intended to address the educational disparity between poor and nonpoor children should include efforts to assure access to SBP for all low-income children."

Gill suggests children who tend to be absent and tardy also tend not to participate in SBP or to perform well in school, but there was no difference in absence and tardiness rates between SBP participants and nonparticipants in the year prior to SBP implementation.

Alan Meyers, Michael Weitzman  
Boston University School of Medicine  
Amy Sampson, Beatrice Rogers  
Tufts University School of Nutrition  
Boston, Mass.

#### Tasaday: Forked tongue?

It was misleading — ambiguous if not erroneous — to say in your report on the Tasaday that "the strange case . . . grows stranger still with new evidence presented at the annual meeting of the American Anthropological Association" ("Tasaday controversy grows more curious," SN: 11/25/89, p.343).

In fact, all new primary evidence at the meeting (chiefly genealogical and linguistic) supported the argument that the Tasaday were an authentic and distinct group of cave-dwelling food-gatherers who had resided in the Mindanao rain forest for at least several generations when researchers first contacted them in 1971.

There are disagreements on aspects of the

Tasaday, but the "clash" you cite between linguists is not over whether Tasaday language is authentic but over when it split from a root language and to what degree it is uniquely Tasaday. All linguists who have done field work with the Tasaday say their speech is related to but distinct from that of neighboring peoples. In other words, the Tasaday are real, not phonies, which was the major question raised before the meeting.

In affirming Tasaday authenticity, four researchers who presented new data joined the 11 other anthropologists who have done field studies with the Tasaday. None of the anthropologists you quoted as saying the Tasaday are impostors have ever met the people, visited their habitat or gathered primary evidence. If that is what your report meant by a "strange case," then I hasten to agree.

John Nance  
Portland, Ore.

Like cancer, AIDS and corruption, the Tasaday controversy refuses to die. The hoaxers, careless researchers and vested interests do not allow it. There are bucks to earn, reputations to protect, celebrity statuses to cultivate. The truth — well, it can wait.

Our paper argues that the Tasaday speak a distinct language and not a dialect of any Manobo language. Our analysis of Tasaday and representative Manobo languages reveals that Tasaday shares only 26 of its 100 basic vocabulary items with Cotabato, the Manobo language with which it was claimed to share 90 percent of its fundamental vocabulary at the meeting of the American Anthropological Association. A cognate sharing of 26 percent is very low, considering that the

cutoff figure for dialects is about 70 percent.

We found that several aspects of Cotabato syntactic rules were violated in the Tasaday speech of 1972, including sentence formation, pronominalization, time reference and focus affixation patterns. Nor was there in several instances a consistency of patterning of the syntactic aberrations. To say the Tasaday speech taped and transcribed by C. Molony in 1972 is a dialect of Cotabato is to say the following sentences represent one dialect of English: "I is going yesterday I house"/"I will go yesterday mine house"/"I went my house yesterday"/"House yesterday."

A possible explanation could be that the Tasaday in the early '70s were not speaking their own language but were trying to learn and speak another, perhaps a language of prestige to them, spoken by an individual or group with superior technology which they wished to acquire.

Tasaday bilingualism — and the ignorance on the part of the Tasaday and their interpreters of what the linguists were truly after in 1971 and 1972 — partly accounts for the kind of linguistic data collected at the time. Thus, a huge chunk of those linguistic data is not Tasaday but Cotabato Manobo or a dialect of Cotabato such as Blit — the language spoken by Dafal, the man who reportedly introduced the Tasaday to trapping and hunting technology, and to Manuel Elizalde Jr., who introduced them to the outside world.

As the issues clarify themselves, it becomes clearer that the hoax is the hoax.

Araceli C. Hidalgo, Cesar A. Hidalgo  
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