Biology

Her diet changes her taste in guys

One of the more mystifying aspects of female choice has just gotten clearer, at least for predatory soil mites, report Izabela Lesna and Maurice W. Sabelis of the University of Amsterdam in the Oct. 7 NATURE. They and many other people have wondered why female preference for Mr. Good Genes hasn't wiped out Mr. Loser Genes and reduced the population's genetic variation.

The researchers collected *Hypoaspis aculeifer* mites from a quarter of a square meter in a lily field and tested the 1-millimeter-long terrors to see which of two species of prey—a *Rhizoglyphus* mite or a *Tyrophagus* copra mite—they preferred to eat. A single gene or several tightly linked ones seem to control the prey partiality.

What counted as the good gene in this case, the one that a discriminating mite should look for in a mate, depended on circumstances. As long as the researchers provide only one prey type, populations of the *Rhizoglyphus*-loving predator grew faster than those of the *Tyrophagus*-preferring strain did. Oddly enough, this was true even when the prey provided was *Tyrophagus*.

Bert Mans

The brownish predatory mite Hypoaspis aculeifer *(left) attacks the whitish prey mite* Rhizoglyphus robini *(right).*

When fed a mixture of the two prey, however, the *Rhizoglyphus*-loving predators faltered, seemingly because of digestive troubles. In contrast, the lineage that preferred *Tyrophagus* did not suffer from the mixed diet, and hybrids of the two strains flourished.

In choosing mates, females of the predatory mites picked the best male for a given food outlook. When fed mixed prey, females chose males of opposite preference from themselves, providing hybrid offspring that coped well with a mixed diet. When fed one type of prey, the *Rhizoglyphus*-preferring females picked males with the same taste, producing offspring to take advantage of the pure diet.

When the researchers fed the predatory mites one type of prey for many generations, the strain that flourished on pure diets eventually dominated. In the real world, the researchers say, prey varies, preserving the genetic diversity in the species. —*S.M.*

Souping up the eggs if dad's hot stuff

A female zebra finch with an attractive mate laces her eggs with more testosterone than a finch stuck with a dud.

That jolt of extra testosterone can give a chick a good start in life, driving it to beg for food more insistently and grow faster, explains Diego Gil, now at the University of Paris in Nanterre. In the Oct. 1 SCIENCE, he and his colleagues from the University of St. Andrews in Fife, Scotland, warn that the hot-male effect they've found complicates the study of preferred males. Their offspring's success could come from dad's good genes or mom's testosterone contribution.

Researchers can pretty much guarantee a male zebra finch's success with the ladies by putting red bands on his legs. The bands have a bigger attractive effect than any other male trait the researchers examined. Green leg bands have the opposite effect, and males wearing them lose out to red-banded dandies.

Gil and his colleagues gave 12 female finches either a red-banded or green-banded mate for one clutch of eggs and then provided a different bird with the opposite color for the next clutch. Testing the eggs for testosterone and the related compound DHT revealed that females invest significantly more of these androgens in clutches fathered by the more attractive males. —*S.M.*

Biomedicine

Gene therapy tackles hair loss

It may be the stiffest challenge ever faced by the popular video-game hero Sonic the Hedgehog. Scientists suggest that a gene named after the combative character could prove a potent weapon in the battle against a fearsome foe: baldness.

During embryonic development, the gene *sonic hedgehog* participates in the formation of the brain, heart, lung, skeleton, and many other tissues and organs. It's also active in the embryo as hair follicles arise.

To test *sonic hedgehog*'s role in hair growth, investigators used a virus to slip the gene into mouse hair follicles. Since they had dyed blond each animal's naturally black fur, the scientists could monitor new hair growth by looking for all-black hairs. The added gene triggered quiescent follicles into producing normal-looking hair, Ronald G. Crystal of Cornell University's Weill Medical College in New York and his colleagues report in the Oct. 1 JOURNAL OF CLINICAL INVESTIGATION.

Since *sonic hedgehog* activity may promote certain skin cancers, it's unclear whether an approach based on the gene is a safe way to tackle hair loss, caution the scientists. Moreover, in some forms of baldness, the follicles completely degenerate. Testing the gene-therapy strategy on human skin grafted onto mice would be a reasonable follow-up experiment, says Andrzej Dlugosz of the University of Michigan in Ann Arbor, who wrote a commentary accompanying the report. —*J.T.*

Tumor cells make debut on television

Christopher H. Contag has switched the channel on his television set from bacteria to cancer. Three years ago, the biologist took the genes that make fireflies light up and inserted them into some bacteria. Then, he used a sensitive video camera to watch how the glowing germs spread inside live mice (SN: 10/5/96, p. 220). Contag and his coworkers at the Stanford University School of Medicine have now performed a similar feat using luminescent cells of human cancers.

In the Oct. 12 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, the scientists report that they can detect as few as 2,500 glowing tumor cells in a live mouse. They watched tumors grow and, when the mice received chemotherapy drugs, disappear.

The technique will allow researchers to study cancer growth in mice without having to kill the animals to see where the tumor cells have spread, says Contag. The ability to follow relatively small numbers of tumor cells may also help scientists develop drugs that treat cancers before they progress to large tumors or to kill cancer cells that remain after a tumor is removed. —*J.T.*

Two genes equal one antibiotic

A ring of 18 amino acids formed through the joint action of two genes represents the latest natural antibiotic discovered by investigators. Over the past few years, scientists found that many animals synthesize small proteins called defensins that destroy bacteria, fungi, and other harmful microbes.

While investigating the defensins used by the immune cells of rhesus macaques, Michael E. Selsted of the University of California, Irvine and his colleagues came across rhesus theta defensin-1 (RTD-1). Unlike other defensins, which are relatively short chains of amino acids, RTD-1 is circular. The structure seems to aid the molecule's ability to kill bacteria and fungi. A linear version of the defensin was much less potent, Selsted's group reports in the Oct. 15 SCIENCE.

When the scientists tried to track down the gene for RTD-1, they got another surprise. Two different genes make precursor proteins for the antibiotic. A section of nine amino acids breaks off from each precursor, and the two pieces fuse to form the defensin. It's not yet completely clear how this unusual process occurs, but it doesn't appear to involve protein-splicing enzymes called inteins (SN: 10/2/99, p. 222), says Selsted. —*J.T.*