Biology

From the Second International Conference on the Monarch Butterfly, held at the Los Angeles County Natural History Museum

Butterfly hide-and-seek

We've all been mightily impressed by monarch butterflies, those fragile insects that migrate thousands of miles each year. But what if they've just been running around the corner and acting inconspicuous? We'd all feel pretty silly.

One researcher has proposed something like that. According to Adrian Wenner of the University of California in Santa Barbara, the evidence is against true monarch migration, at least in the western United States.

For years, the idea has been that monarchs in the West winter on the central California coast, leaving it in February for the cooler regions of the Pacific Northwest and central Rockies. But after a study of patches of milkweed (the host plant for monarch larvae) in the Santa Barbara area, Wenner says, "We can find [monarch] caterpillars any time we want. We can follow the generations right through the summer."

Wenner proposes that, rather than a true migration, the butterflies undergo a large-scale but less dramatic yearly expansion and contraction of their range. Butterflies at the extremes of the range don't migrate, he says; they die off.

According to Patrick Wells of Occidental College in Los Angeles, results of his metabolic studies of the butterflies are also inconsistent with long migrations. Monarchs are loaded with fat stores when they reach their winter sites, he says, and lean when they leave. "If they had just flown two or three thousand miles, they should not be fat," he says. "If they left lean in the spring, they wouldn't have the fat stores necessary for migration."

Most of the other researchers at the conference were unimpressed by the arguments, according to Christopher Nagano of the Los Angeles County Natural History Museum. "It was an idea that was proposed, . . . investigated and discarded," he says. "A lot of the pieces [Wenner and Wells] were using to support their hypothesis just weren't correct."

Stephen Malcolm, who studies monarchs in the eastern United States, proposes an explanation for year-round monarchs in the Santa Barbara region. The same thing happens in southern Florida, he says, where milkweed is present throughout the year. The milkweed plants, and the mild environmental conditions associated with them, appear to dampen the migratory cues of the monarchs. Butterflies that stumble onto these areas as they head southwest toward the winter site in central Mexico sometimes settle down; like the monarchs Wenner found in California, they reproduce throughout the winter. "You can't extrapolate from one county in California, and suggest that monarchs in all of the western United States don't migrate," Malcolm says.

Different species of milkweed leave characteristic traces in the butterflies, and Malcolm and his colleagues, at the University of Florida in Gainesville, have traced the routes of the butterflies by analyzing these dietary "fingerprints." Their studies indicate that monarchs that, as caterpillars, feed on milkweed in the northeastern United States spend the winter in Mexico and then fly back north. Other researchers, using tags, have reported monarchs in Mexico that were tagged in Canada. And studies in Costa Rica, Nagano says, show that monarchs there migrate over the mountains from the Caribbean to the Pacific side of that country. (This suggests that conservation efforts should be expanded from the Caribbean side of Costa Rica to the Pacific, Nagano adds.)

Other research indicates it may not be so difficult for the butterfly to balance its metabolic budget. According to Nagano, David Gibo at the University of Toronto has reported that the butterflies ride thermal air currents, which could carry them long distances with minimal energy expenditure. Gibo, a glider-plane pilot as well as a biologist, has observed monarchs at altitudes of about 5,000 feet.

Biomedicine

From Birmingham, Ala., at the Sixth International Congress of the International Organization for Mycoplasmology

Missing mycoplasmas

Mycoplasmas are the smallest free-living microorganisms. Unlike bacteria, they lack a cell wall and are too small to be seen under a light microscope; unlike viruses, they live on their own. Mycoplasmas cause a wide spectrum of conditions, from kidney stones to premature labor. They are also elusive, and as a result they often go unrecognized even when causing disease, says Gail H. Cassell of the University of Alabama at Birmingham.

"Because of mycoplasmas' small size and fastidious growth requirements, most clinical laboratories in this country as well as those around the world don't perform routine diagnoses for them," she says. The microorganisms can take a month or more of cell culture to reach detectable levels.

While certain antibiotics, especially tetracycline, can kill mycoplasmas, failure to recognize that mycoplasmas are at fault can result in an ineffective antibiotic being used. "When it comes to [mycoplasma-caused] urinary tract infections and kidney stones, most times tetracycline is not one of the antibiotics used for treatment," Cassell says.

Their prevalence in certain diseases is known — mycoplasmas are a common cause of pneumonia, and may be the most common cause of premature labor, says Cassell. But at the moment there's no way to tell just how much disease is caused by mycoplasmas, Cassell says, because no widespread screening for the organisms has been done, and because researchers are in the process of finding mycoplasmas in more diseases.

Sexual mycoplasmas

Nongonococcal urethritis, the most common sexually transmitted disease in men, is an inflammation of the urethra caused by anything but *Gonococcus* bacteria. Several microorganisms, including *Chlamydia trachomatis* and *Mycoplasma hominis,* can cause it, and now David Taylor-Robinson has a new candidate: *Mycoplasma genitalium.*

Taylor-Robinson, of the Clinical Research Centre in Harrow, England, and his colleague Joseph G. Tully of the National Institute of Allergy and Infectious Diseases' facility in Frederick, Md., first isolated the microorganism from men with nongonococcal urethritis. In laboratory culture *M. genitalium* behaves like other disease-causing organisms — it sticks to red blood cells and bursts them, and also sticks to plastic surfaces.

The researchers have since found antibodies to the microorganism in women with pelvic inflammatory disease, but *M. genitalium*'s role in that disease has yet to be determined. "Antibody response does not equal disease," notes Taylor-Robinson. The organism has also been found in men and women with no symptoms of urogenital infection. This could mean that *M. genitalium* doesn't itself cause disease, or it could mean that mycoplasma strains differ from one another in virulence, he suggests.

The next step in studying an organism's infectivity is to inoculate with it. "The best animal model by far is the human," Taylor-Robinson says. Because few people are likely to volunteer, he and his colleagues resorted to various monkey species and mice and hamsters to determine whether the microbe can cause infection. While the mice, the hamsters and some of the monkeys were resistant, other primates, including chimpanzees, became infected. This suggests, says Taylor-Robinson, that *M. genitalium* may play a role in human genital tract infections.

The present detection tool — culturing for the organism — can take a month or so to demonstrate the presence of *M. genitalium.* With gene probes and monoclonal antibodies introduced at the meeting, the process would take only a few hours. These tools may bring *M. genitalium*'s role into the light, Taylor-Robinson says.