



Excerpt from the April 16, 1966 issue of *Science News*

50 YEARS AGO

Multiple sclerosis clue significant

A possible link between environment and multiple sclerosis (MS) could be a valuable tool in searching for the cause and cure of the disease.... Cases of MS seem to appear in clusters, and there is apparently some as yet unknown environmental factor that is distributed in the same way, reported Dr. John F. Kurtzke.... The highest frequency of MS is found in northern United States, southern Canada and northern Europe, where there are 30 to 60 cases per 100,000 population.

UPDATE: Researchers still aren't sure what causes MS, a debilitating disease in which the body's immune system attacks the insulation around nerve cell fibers. But people who grow up farther from the equator, with less sun exposure, may indeed have increased risk. The human body makes vitamin D in response to sunlight, and studies link lower levels of vitamin D to higher MS risk (*SN Online*: 9/10/15). Genetics and infections may also play a role in the disease. Today, MS prevalence is up to almost 150 cases per 100,000 U.S. population.



The dark blob on the back of this thumbnail-sized mimic poison frog is a pampered, high-maintenance tadpole that needs a ride.

IT'S ALIVE

Piggybacking tadpoles are epic food beggars

Tadpoles don't cry to get their way. But some of them sure can beg.

Each bout of hungry-baby drama among mimic poison frogs (*Ranitomeya imitator*) occupies both parents for hours. The tadpoles get so crazy-frantic that researchers wanted to know whether the begging is an honest call for help or a histrionic scam.

Frogs can lay globs of eggs by the thousands and leave them to fend for themselves. But the two- to three-egg clutches of mimic poison frogs (the only known monogamous frogs) get coddled, says Kyle Summers of East Carolina University in Greenville, N.C. Dad repeatedly checks in, sitting on the eggs and shedding some paternal pee if they're drying out.

When the eggs hatch, dad gives each tadpole a piggyback ride to its own private pool. To find a little rainfall cupped between a leaf and stem, he'll haul youngsters four meters or so. "A bit of a hike," Summers says, since dad is only about a

centimeter or two long himself.

These baby pools are pretty empty: home to only some algae, maybe some small insects. "The good news is that your offspring are not likely to get eaten; the bad side is that they don't have anything to eat," Summers says.

This is where the begging comes in. Frogs can't make milk like mammals or regurgitate bugs like birds. But this species is one of the rare frogs whose moms, after considerable persuading, will lay an unfertilized egg for the tadpoles' breakfast.

When parents show up on their weekly visit, a youngster stops regular swimming, noses up to a parent and goes into a frenzy of vibrating its tail. "The parent cannot miss a hungry tadpole," Summers says.

Bouts of persuasion go on for several hours as the tadpole begs, stops, begs more and then more. Mom often makes several false starts, entering the pool but leaving it without any egg action. During all this, "dad will be the cheerleader," calling in trills and stroking her, Summers says.

Analyzing tadpole frenzies in the lab, Summers' then-student Miho Yoshioka found that tadpoles on short rations begged more as hungry weeks dragged on. Parents fed these hungrier tadpoles more reliably than the babies that researchers slipped treats to, Yoshioka, Summers and Casey Meeks report in the March *Animal Behaviour*. Overall, the relentless frenzy shows honest need, not tadpole greed. — Susan Milius

This yellow frog (tadpole aboard) is the same species as the one above. Poisonous themselves, adults in four different regions "mimic" the coloring of a different local poisonous frog.



Watch a video of a tadpole begging at bit.ly/SN_tadpoles

LIFE & EVOLUTION

Killer prairie dogs make good moms

Females that attack squirrel neighbors rear more offspring

BY SUSAN MILIUS

White-tailed prairie dogs — those stand-up, nose-wiggling nibblers of grass — turn out to be routine killers of baby ground squirrels. And the strongest sign of successful white-tailed motherhood could be repeat ground squirrel kills, researchers say.

At a Colorado prairie dog colony, females that kill at least two ground squirrels raise almost three times as many offspring during their lives as nonkiller females, says John Hoogland of the University of Maryland Center for Environmental Science in Frostburg. The “serial killers,” as he calls repeat-attack females, rarely even nibble at the carcasses and aren’t getting much, if any, meat bonus. Instead, the supermom assassins may improve grazing in their territories by reducing competition from grass-snitching ground squirrels, Hoogland and Charles Brown of the University of Tulsa in Oklahoma propose in the March 30 *Proceedings of the Royal Society B*.

“This really caught me by surprise,” Hoogland says. Carnivorous mammals killing other carnivore species wouldn’t be surprising, but prairie dogs and ground squirrels eat plants. He knows of no other systematic study documenting routine fatal attacks by one herbivore species on another.

“It’s also striking because it’s so subtle,” he says. He had been watching prairie dogs for decades and white-tailed ones in the Arapaho National Wildlife Refuge for a year before he noticed an attack. A female “jumped on something, shook it, shook it hard, kept attacking — and then walked away,” he says. The encounter lasted just minutes.



White-tailed prairie dog moms that kill the young of another grass-eating species tend to raise more pups during a lifetime (three pups shown) than moms that don’t kill.

Hoogland rushed from his observation tower to the scene of the fight and, to his surprise, retrieved a dead baby squirrel.

Once he and colleagues knew what to look for, they saw 101 such lethal attacks (mostly from females, but also from some males) over six years and inferred 62 more from carcasses. A propensity for killing ground squirrels turned out to be the only factor (among such possibilities as body mass, age and number of neighbors) that predicted a tendency toward lifetime success in raising lots of young. That success, which biologists describe as fitness, is a big deal in analyzing how populations change and species evolve.

Hoogland and Brown propose that prairie dogs and ground squirrels compete for grazing. An analysis of the animals’ diets finds at least six plant species in common, the researchers say.

Hoogland didn’t directly test to see if the serial killer prairie dogs just had great territories that attracted lots of ground squirrels and thus provided more opportunities for killing. But if that were true, he says, he would predict that the holders of this prime territory would have robust body sizes, and therefore there would be some link between maternal body size and number of kills.

No such link shows up, he says. The best hypothesis explaining the benefit of killing squirrels that Hoogland can think of, he says, is that prairie dogs slay the competition for food resources.

Still, the idea that prairie dogs and ground squirrels compete for plants needs more investigation, says ecologist Liesbeth Bakker of the Netherlands Institute of Ecology in Wageningen. The total of ground squirrel kills was an impressive number, she says, but it’s unclear what percentage of the local population it represents. If the deaths remove only a small proportion of ground squirrels, competition isn’t likely to ease much. Also, any effect would be weakened by the relative sizes of the species. “The ground squirrels are about half the size of the prairie dogs and thus eat less food,” she says.

Behavioral ecologist James Hare wonders why ground squirrels venture into prairie dog territory if it’s so dangerous. One idea Hoogland suggests is that prairie dog vigilance in raising alarms about other predators might make the risks of hanging out in a colony worthwhile. Hare, of the University of Manitoba in Canada, also wonders whether ground squirrels have trouble finding good habitat free from prairie dogs.

Hoogland too is left with questions, including one about the big-family bonus of interspecies killing. “Is this really unique to prairie dogs, or is this more common?” ■



A white-tailed prairie dog kills one of the small ground squirrels that graze in prairie dog towns.