Venomous Exchange?

Steve Grenard contends that the venoms of many rattlesnake species across North America have grown more potent within the past two to five decades ("Is Rattlesnake Venom Evolving?" 7/00–8/00). The notion of such rapid evolution is suspect when one considers the relatively long time span between generations—five years or more. (These snakes are not exactly *Drosophila* in a bottle!)

Mojave rattlesnake

JOHN CANCALOSI

Even if we assume that such a change has taken place, Grenard fails to present convincing explanations. Most preposterous is the concept of rapid introgression of Mojave toxin genes from Mojave rattlers into timber rattlers. Since only a handful of hybrid rattlesnakes have ever been found in the wild, it is difficult to conceive of the mechanisms by which genes from one population would enter another and increase in frequency so rapidly that we could detect them in a matter of decades.

Rather than spending so much time discussing a hybridization hypothesis, the author could have explored the possibility that Mojave toxin genes arose in an ancestral species and have been variably preserved or expressed in different species and populations.

Unfortunately, Grenard's sweeping assertion about venom toxicity will be read as gospel and lead to increased persecution of rattlesnakes, many of which are already imperiled.

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STEVE GRENARD REPLIES: While evidence for increases in the toxicity of rattlesnake venom is still anecdotal, many medical facilities I've contacted are concerned about recent cases of apparently neurotoxic envenomation—several of which have been reported in medical journals. (See, for example, S. P. and E. Siedenburg, "Neurotoxicity Associated With Suspected Southern Pacific Rattlesnake *[Crotalus viridis helleri]* Envenomation," *Wilderness and Environmental Medicine* 10, 1999.) My article presented hybridization as only one of several hypotheses that might explain alterations in rattler venom. Documented cases of hybridization between various wild and captive rattlesnake species have established that gene flow is possible in the wild. I also stressed that venom does not come in standard formulas for each species but in a range of variations, so small quantities of neurotoxins may always have been present in some populations. This possibility is not inconsistent with Andrew Holycross's view that the trait may have derived from common ancestors.

I did not claim that venoms have changed composition in the past ten to fifty years, only that unexpected neurotoxic symptoms of snakebite began to appear during that time. Certainly the evolution of venoms in response to prey resistance has occurred over millennia.

As for the complaint that my assertions foster increased persecution of rattlesnakes, I emphasized that rattlers will not bother people if people don't bother them and that most species in the United States are severely threatened by habitat degradation and by "rattlesnake roundups."

Runs, Hits, and Errors

Although Stephen Jay Gould ("Jim Bowie's Letter and Bill Buckner's Legs," 5/00) warns against the way humans "misstate easily remembered and ascertainable facts in predictable ways" because we need our myths about those facts, he unfortunately falls victim to this very disease. In the tenth inning of the amazing sixth game of the 1986 World Series, the Red Sox were leading by two runs, not three. And when Wilson's ball went through Buckner's legs, Ray Knight scored from second base, not third.

As Mr. Stengel said, "You could look it up."

I love the professor, and I would prefer to think he is testing his readers to be certain that they understand his point.

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Early Warming

In his article on mitochondria ("Symbionts and Assassins," 7/00–8/00), Guy C. Brown restates the common misconception that birds and mammals evolved endothermy "toward the end of the reign of dinosaurs." In reality, the first mammals and dinosaurs appear in the fossil record at about the same time, in the late Triassic period. The ancestors of mammals, the pelycosaurs and therapsids, may have been warm-blooded as early as the late Carboniferous period, a full 235 million years before the end of the dinosaurs' reign. Birds show up in the Jurassic and coexist with dinosaurs for at least another 85 million years. Moreover, dinosaurs themselves may have employed endothermic mechanisms for some parts of their life cycles.

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