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LOMA LINDA UNIVERSITY
A Seventh-day Adventist Institution Integrating Health, Science, and Christian Faith

About LLU

Loma Linda University gets close and personal with snakes

Sean Bush, MD, gets a tongue flicking from a California kingsnake (Lampropeltis getulus californiae) he captured on a desert road near Cabazon. The snake flicks its tongue as a sensory-gathering exercise to gather sensory information by smell. After Dr. Bush let members of the expedition hold the animal, he released it back into the brush.

The Mojave Desert seems eerily dark. There are 11 of us out here hunting snakes and scorpions in a desolate stretch of Southern California near Cabazon. We can hardly see a thing. The clock says 9:25 p.m., but it feels like midnight. Black lights offer scant illumination, but not nearly enough. Take those dark forms, for instance. Are they snakes or sticks? There could be dozens of rattlesnakes out here . . . .

Call it excitement or call it fear, but the pounding in our chests is too insistent to deny. We might be wearing snake-proof leggings, but our nerves aren't.

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Kids get Sean Bush right. Adults may call him an emergency care physician, but kids recognize him as one of their own. He's a boy who loves snakes, only taller.

"I've been a snake lover all my life," says Sean Bush, MD. Loma Linda University Medical Center's affable venomologist knows more about snakes, spiders, and scorpions than anyone I know, with the possible exception of William K. Hayes, PhD, associate professor of earth and biological sciences, School of Science and Technology.

"My grandfather was a wildlife enthusiast," Dr. Bush explains. "He gave me a venomous snake for a pet when I was five. Not dangerously venomous, but venomous—a Hognose. It sparked an interest that has lasted my whole life."

Dr. Bush almost became a herpetologist instead of a physician. He finally decided, however, to pursue medicine with herpetology on the side. Seemed easier than the other way around. Scores of snakebite survivors owe their lives to that decision.

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The snakes in the laboratory of Dr. Hayes love him. Why else would they wag their tails when he walks in? One—a feisty Red Diamond Rattlesnake (Crotalus ruber)—lunges at Dr. Hayes in an impressive display of fang-baring machismo. Dr. Hayes deftly averts a painful bite, then fishes the animal out of its shelter with a hooked snake stick. After the rattler settles into a dangling repose, he notices you there and locks the full force of that cold, undeviating stare on you. A full 15 inches separates you from an agitated pit viper with highly toxic venom. Dr. Hayes says you're in no imminent danger, but if you don't

mind me asking, how's your comfort level right now?

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Dr. Bush shows up for tonight's rattlesnake hunt in a T-shirt covered in fat black spiders with red splotches. "Australian Redbacks," he states. Redbacks—like their Inland Empire kinfolk, the Black Widows—are members of the Latrodectus family. Females of both species cannibalize their mates at the conclusion of mating. Ouch!

The Bush family just returned from a sabbatical in Australia. "We get more snakebites here than in Australia," he says. "On a recent Monday, we treated five snakebite victims here. That's more than I saw the whole six months in Australia!"

Dr. Bush hesitates to contradict Steve Irwin, the late wildlife guru. "Steve was a very good man! I met him at the Australia Zoo, and I grieved when he died. But I’m not sure the deadliest snakes live in Australia. More people die from snakebites here."

Don't try this at home! Bill Hayes, PhD, professor of biology in the School of Science and Technology department of earth and biological sciences, holds a Southwestern Speckled Rattlesnake (Crotalus mitchelli pyrrhus) in his laboratory. The Biology of Rattlesnakes, the definitive textbook Dr. Hayes co-edited with three other venomology researchers, will be published this year by Loma Linda University Press.

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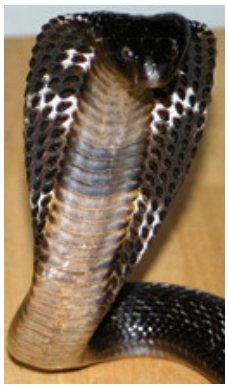
Despite his easygoing manner, Dr. Hayes is one of the world's leading experts on rattlesnakes. Later this year, The Biology of Rattlesnakes—the definitive textbook he co-edited with colleagues Sean P. Bush, MD, Kent R. Beaman, PhD, of the Natural History Museum of Los Angeles County, and Michael D. Cardwell, a retired San Bernardino County Sheriff administrator working on a degree in biology at California State University, Sacramento—is due from Loma Linda University Press. It features original contributions from nearly 100 authors, and its cover features a beautiful illustration of a Red Diamond rattler from noted reptile artist and surrealist William B. Montgomery. Purchase information will soon be available for the book at <www.biologyoftherattle snakes.com>.



Although not officially a member of the venomology research community at Loma Linda University, Rupert the Friendly Cobra—a Pakistani black cobra (Naja naja karachiensis) owned by herpetologist Samantha Ofelia Willis—is well-respected for his no-nonsense demeanor and handsome markings.

Some of the more striking species Dr. Hayes keeps in the basement of Mortensen Hall include Red Diamonds, Southern Pacifics, Speckleds, Mojave Greens, Mexican Blacktails, an Eastern Diamondback, a Sidewinder or two, and assorted others.

Southern California's own Mojave Green—more officially known as the Mohave Rattlesnake (Crotalus scutulatus scutulatus)—is a very toxic snake with a strong neurotoxin. Greens are named for the olive green hues they often exhibit and are among the most venomous snakes in North America, if not the world. Other local pit vipers—

such as the Western Diamondback, Southern Pacific, and Red Diamond—also pack a wallop.

The hills behind Loma Linda are teaming with Red Diamonds. Like most rattlesnakes, Red Diamonds are generally non-aggressive, but not always. Ask Eric Dugan. While studying Southern Pacifics and Red Diamonds for his doctorate, Dugan stepped on a Red Diamond hidden in thick grass. The snake bit him, of course, but since Eric was wearing protective snake leggings, he escaped harm. Moral of the story: wear protective leggings, avoid confrontation, and watch for snakes in the grass.

Dr. Bush describes a snake hot spot as "anywhere with new construction in areas that were wilderness before. Wherever they dig up raw ground with bulldozers. We get lots of bites from places like Yucaipa, Beaumont, Murrieta, and the High Desert."

Could rattlers actually be good for your health? "If all the rattlesnakes suddenly died, we'd have a deadly plague like the hantavirus," Dr. Bush says. "Rats and mice carry plagues, but snakes kill rodents. I wouldn't live in an area without snakes."

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As professor of biology in the department of earth and biological sciences at Loma Linda University, part of Dr. Hayes' job is to inject as much of his enthusiasm for venomous critters into his graduate students as he can.

Does he succeed? Consider the case of Gerad Fox. As you read this, Gerad is either down in the lab milking the scorpions he's already captured, or out in the boonies collecting more. His master's thesis will settle a dispute you've doubtless obsessed about for years: Do the stings which male Desert Hairy Leg Scorpions (Hadrurus arizonensis) inflict on females during the mating ritual contain venom or not? If nothing else, Gerad should forever dispel the notion that research isn't romantic!

Carl Person's project may challenge the way scientists think about specific variations.

If accepted into the program, Mr. Person will use Sidewinders and Pacific Rattlesnakes to resolve phylogenetic relationships over a species' entire cline, defined as a gradual change of features in that species over its geographic area. His project is controversial for two reasons. First, researchers usually employ mitochondrial DNA testing for this type of experiment, but Mr. Person thinks nuclear DNA offers greater accuracy. Second, Mr. Person disbelieves in the existence of subspecies. He hopes to prove that differences in related snakes from various locations reflect mere isophenes—local variants in a trend of variation across the animal's range—and not subspecific factors. Although he's taking on the scientific equivalent of City Hall, Carl isn't afraid of confrontation. I've seen him charge up a rock talus after a rattlesnake, in his—not the snake's—stocking feet. (Please don't try that, kids. You're so much cuter alive!)

Like to wear blue jeans? Then meet your new best friend, Scott Herbert, PhD. Dr. Herbert earned his 2007 doctorate from LLU for discovering that denim clothing reduces the risk of death from snakebite. "The presence of denim reduces the amount of venom injected by approximately two thirds," Dr. Herbert found, and "can potentially result in a substantial reduction of venom injected and, thus, a notable reduction in the likely severity of the bite." So wear them blue jeans, baby—they just might save your life!

Two other students of Dr. Hayes are increasing our knowledge of venomous creatures. Zia Nisani just received his PhD for studying the African Buthid Scorpion (Parabuthus transvaalicus). Dr. Nisani found that "scorpions regulate their venom expenditure during defensive stinging and squirting in the most complex manner yet described for any venomous organism." Who knew? Aaron Corbit is evaluating human interactions with

Red Diamond Rattlesnakes in the Inland Empire. Don't go out and encounter a snake just to get in the study, but if you happen across a Red Diamond, Aaron would love to hear about it. Contact him at <acorbit@gmail.com> and say you read about his research in your favorite newspaper.

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The scorpion Dr. Bush just found doesn't mind that all 11 of us are hovering around it. He spotted the glowing phosphorescent arthropod with a sweep of his black light.

"That's a female Desert Sand Scorpion," he says. "Pregnant, too." We move in close with cameras blazing to commemorate scorpion maternity in all its glory. Despite her lengthy nomenclature, Paruroctonus mesaensis looks like a diminutive spiny lobster.

Dr. Bush grabs her by the business end, avoiding the stinger, and lifts her five inches off the ground. She struggles until he sets her down, then resumes waiting for a meal to wander by. She's much nicer than the Redbacks and Black Widows.

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A few years ago, when Dr. Bush was starring on the Animal Planet series Venom ER, a fan gave him a toy Green Mamba Snake before a lecture at the Aquarium of the Pacific. Dr. Bush gave the toy to his son, Jude, who was two-and-a-half at the time. The next day, Jude found another "toy" snake—a baby rattler—in the backyard.

Do we have to tell you what happened next? When Amy Bush heard Jude's screams, she dialed 911. Then she called her husband at the Medical Center. When the helicopter arrived, Dr. Bush administered 14 vials of antivenom to his son. But even at $1,200 per vial, the Bushes know it was worth every penny! The only aftereffects Jude suffers are a painful memory, and a healthy new respect for snakes.

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Ramon Mena Owens, a photographer with the Press-Enterprise, departs our excursion right after the scorpions. That leaves 10 of us to look for snakes. Besides Dr. Bush, our group includes Darrell Santschi, a Press-Enterprise reporter, Joy Jameson, media relations specialist for the office of public and media relations at LLUMC, Nancy Yuen, director of marketing for the LLU School of Dentistry, Dr. Bush's two teenage nieces, three of his friends, and myself. We've seen six or eight scorpions in our 40-minute tromp through the desert, one Kangaroo rat, a Red-Spotted Toad, but not even one snake. Aren't there any buzzworms out here?

But just like that, our luck improves. Dr. Bush bolts from the car and comes up with an exquisite snakelet. This living jewel is seven inches long, banded in cream and chocolate, and very adorable. "A juvenile Mohave Shovel-nosed Snake," he beams.

We take turns holding this gorgeous creature. A member of the constrictor family, Chionactis occipitalis occipitali coils around our fingers. Every detail is flawless; every element executed to Lilliputian perfection. I love this little charmer of a snake!

Dr. Bush releases the Shovel-nosed and it vanishes into the night. I want to keep it for a pet, but Dr. Bush says the only snakes out here that aren't protected by law are the rattlers. Just as well: my wife would shoot me if I came home with a snake!

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Why do snakes hold such an inordinate place in our litany of fears? Are they truly that

deadly? Dr. Bush says "fewer than six" people die from snakebites in the United States each year. "The trouble starts," he says, "when people—often young males trying to prove their bravado—interact with snakes. They may be trying to catch a snake, kill it, or give it a bad time." Bites also occur when people walk at dusk, hike in rocks and brush, mountain bike, or garden at evening when snakes are active.

What if you get bitten? Dr. Bush says to forget that old adage about cutting an X over the wound and sucking the venom out. "Just call 911. Don't worry if you have to walk to a phone; call 911. It's the fastest way to get help." He also says you should remove any rings you might be wearing, because you're going to swell.

When Dr. Bush said this trip could turn dangerous, we thought he meant the snakes, but he had Interstate 10 in mind. Is the freeway really more dangerous than desert rattlers? The U.S. Department of Transportation says there were 42,642 traffic deaths in the United States in 2006. You do the math!

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At 10:35, Dr. Bush points the car up the winding road where we started earlier tonight. This is our last chance; all eyes on the road. Hey, wait. What's that?

"Snake!" yells Dr. Bush.

By the time we jump from the car, he's already holding a three-foot California Kingsnake that keeps flicking its tongue. Lampropeltis getulus californiae is a study in black and yellow; it seems relaxed, docile, even friendly.

"You won't find rattlesnakes around here!" Dr. Bush says. "Kingsnakes eat rattlers."

What you will find are the 10 happiest snake hunters on the planet! We came to the desert with our very own snake doc, suffered zero bites or injuries, saw several scorpions, and got to hold two fabulous snakes. What an awesome evening!

By James Ponder

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