Venom: It Could Save Your Life

By Frederick Boyce

Snakes are widely feared and avoided by most people because a small fraction—actually less than 10% overall—are venomous, though the vast majority of snakes are truly no more dangerous to humans than a common house sparrow. And while venomous snakes do indeed produce some of the most potent natural toxins known, these remarkable compounds have been found to have the power to heal as well as to kill.

Thanks to modern medical research, venom is now being used to save lives and treat, rather than cause, suffering. Venom is composed of many complex molecules, including proteins, peptides and lipids, each of which can have its own very specific function. Venom varies widely between species and even between snakes of the same species, so the potential medical and scientific applications of these molecules seem virtually limitless. Some act specifically on the blood and circulatory systems, raising or lowering blood pressure, while many other types of venom contain anticoagulants or procoagulants. A protein found in the venom of our own humble copperhead called contortrostatin has been shown to be highly effective in the treatment of breast cancer. Two of the three main drugs currently used to treat heart attacks in the U.S. are derived from snake venom. One of the first therapeutics to be derived from venom is captopril, a peptide found in the venom of a pit viper called the Jararaca that is native to the Brazilian Amazon (another good reason to be concerned about the destruction of the Amazon rainforest). Lisinopril, a synthetic version of captopril, is widely prescribed today in the treatment of high blood pressure.

Jim Harrison of Kentucky Reptile Zoo extracts venom from a rattlesnake. His facility is one of only a small handful that harvest and provide raw venom for research and anti-venom production in the U.S. It is a highly regulated process that requires advanced skill, knowledge and specialized equipment.

—Photo courtesy of Kentucky Reptile Zoo

It is important to note that none of these therapeutic agents contain actual snake venom, but are instead synthetic derivatives of agents found in venom that are isolated and replicated in the laboratory. Snake venom is widely used in the treatment of chronic pain, two well-known examples being cobroxin and nyloxin, which are both derived from the venom of the king cobra. Haditoxin, another protein recently mined from the potent venom of the king cobra, offers great potential in the treatment of a variety of neurological and neurodegenerative diseases, including Alzheimer's, Parkinson's, depression, anxiety and addiction to nicotine.

Probably the first person to realize that venom had the potential to save lives was William E. "Bill" Haast. A native of Paterson, New Jersey, Haast became fascinated with snakes at an early age and intuitively grasped the potential benefits of venom. He observes, "It seemed to me then that such a powerful, destructive force—like atomic energy—could be converted to many good uses if it were properly controlled."

Haast went on to found the Miami Serpentarium where he extracted venom from many thousands of snakes for research, blazing a trail that others would eventually follow. He famously immunized himself against cobra venom by injecting himself with minuscule amounts of raw venom, gradually increasing the dose as his resistance developed. Whereas he was roundly criticized at first for this risky undertaking, the fact that he survived over 170 bites (the most of any person) by the world's deadliest snakes, including kraits and even king cobras, would seem to indicate that it was a sound idea, at least in Haast's line of work. In 1949, after he was bitten by two cobras in rapid succession, his wife and dedicated assistant, Clarita, routinely noted the symptoms—paralysis, labored breathing, sporadic heart action, soaring temperature. When he had recovered, Haast studied the record and told Clarita, "That looks just like polio." At that time, polio was still among the greatest health threats in the world, so Haast presented his ideas to specialists at the University of Miami research laboratories, including Dr. Murray Sanders, who invited Haast to participate in an ongoing experiment with rhesus monkeys. The following account is taken from a 1978 New York Times article, "'Milking' Cobras for Cures," by Ben Funk:

> Polio virus was injected into all the animals, followed immediately by injections of detoxified venom in half of the monkeys. The ones who didn't get the venom contracted paralysis and other polio symptoms in the normal time. Those treated with venom were not affected until hours later. The university gave Haast a grant and sent him to India to collect more cobras. He was allowed to keep them in his serpentarium. In return, he supplied the university with venom at a low price. The experiments continued, and out of them came an exciting promise of a polio cure—just before the Salk vaccine came onto the scene.

It was an enormous setback and disappointment for Haast and Sanders that the Salk vaccine was the one to win final approval and adoption, and there was, in fact, no small amount of medical politicking involved in the decision, with some in the field openly scoffing at the idea of a venom-based cure. This fascinating story (somewhat akin to *The Current War*) is detailed in the Haast biography *Cobras in His Garden* by Harry Kursh, now out of print, but an extremely valuable little book that is highly sought by collectors (should you ever run across a copy at a yard sale). Haast was not one to be discouraged, however. "There's too much to be done with snake venom," he once said. "The surface has just been scratched." He continued to work with Dr. Sanders on developing venom-based treatments for Lou Gehrig's disease (A.L.S.) and multiple sclerosis

(Continued on page 6)