

Curare and a Canadian connection

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One cannot refuse a drink of *chicha*, especially when it is handed to you by Babe, warrior and chief of the head-hunting Huaroni tribe from the Tiguino area of Ecuador. So, when I, Charles, was offered such a drink (in the presence of personal bodyguards, 2 heavily armed commandos from the Ecuadorian elite jungle unit) on a recent trip to South America, I accepted.

Looking back, I recall closing my eyes in a futile attempt to forget that the processing of the traditional low-alcohol drink was routinely sped up by chewing the maize and spitting it into large fermentation vessels. It was hard not to count the myriad possible pathogens growing in that bitter, sour-tasting medium. I looked at Anne, a tropical medicine specialist with whom I was traveling, and followed her example of swallowing and not spitting. Later on, our dinner's main course included mebendazole, ciprofloxacin, and metronidazole.

My adventurous side, however, did have its limits that night. I adamantly refused a taste of grilled monkey, killed earlier that day by a blowgun dart dipped in curare. In addition to my distaste for the idea of consuming primate, my major concern was that of a horrifying death after eating curare-poisoned food. Despite my worry, the evening brought no emergency calls from poisoned Huaroni tribe members; they all felt well following their exotic meal. Why?

I fell into my thoughts that night, drowning in the history of curare. Sherlock Holmes. Pharmacology textbooks. Adventures of Sir Walter Raleigh and Alexander von Humboldt. Fears of allied forces during the Gulf War. A Canadian doctor. My memories, emotions, and dreams

associated with this romanticized but deadly poison were overwhelming.

In the blood

Curare grows as a large liana, or vine, found in the canopy of the Ecuadorian rainforest. According to Sir Walter Raleigh and Alexander von Humboldt, who were the first to describe curare preparation, *curare* is a generic term for many different types of preparations, which include many elements, most frequently the deadly poisons of the bark of *Strychnos toxifera* or *Stylosanthes guianensis*.

The Huaroni tribe's method of preparation is to combine young bark of "curare-vine" with crushed roots and stems, and mix them with snake venom. The mixture is boiled in water for about 48 hours, then strained and evaporated to become a dark, heavy, viscid paste. Potency is tested by counting the number of leaps a frog takes after being pricked with the substance. Tribe members

tip darts with curare and fire through blowguns made of iron tree. Death for mammals like tapirs and monkeys takes up to 20 minutes.

The principal chemicals of curare are the alkaloids curarine and tubocurarine, which act by blocking neuromuscular acetylcholine receptors; typically, the toxin kills only if it enters the bloodstream. The amount of curare used to hunt animals is easily broken down in our intestines, making the killed game safe to eat.

Curare does not cross the blood-brain barrier; therefore, a victim of curare poisoning can be aware of what is happening until the very end. In fact, if artificial ventilation



Dr Czarnowski with a dead poisonous snake, killed by Babe.

is performed, the victim usually recovers without negative effects.

Muscle relaxant

Curare, usually in the form of d-tubocurarine, was the first muscular relaxant to be used for medical purposes. Nowadays synthetic drugs with similar molecular structure are used in surgery, especially in abdominal surgery where the muscle-relaxant effect of curare facilitates operative procedures, such as wound closure and suturing. All surgeons know how difficult, almost impossible, it is to close an open abdomen without proper muscle relaxation.

The first lifesaving application of curare was performed by German surgeon Arthur Lawen in 1912.¹ Sadly, however, in the 30 years that followed, curare's therapeutic possibilities were lost, this time not in the remoteness of the tropical jungle, but in the labs of medical science.

On January 13, 1942, history was made by Dr Harold Griffith, a Canadian doctor working as Chief of Anesthesia at the Homeopathic Hospital in Montreal, Que. He used curare during anesthesia on a young man undergoing an appendectomy. Twenty-four surgical procedures using anesthesia with curare followed, and the era of anesthesia began.^{2,3}

The introduction of curare caused profound changes in the effectiveness and safety of anesthesia. It made possible the development of true balanced anesthesia and the elimination of explosive inhalation anesthetics. The concept of "inoperability" due to severe pathology or extreme age became less dominant. It is hard to envision how general anesthesia, open-heart surgery, organ transplant, and brain, thoracic, and abdominal surgery could have developed without curare.^{1,4,5} Dr Griffith's introduction of muscle relaxants for routine use in anesthesia is considered by many to be one of the 10 most crucial developments of medicine in the past 100 years.^{2,5,6}

Canadian in the jungle

The day after our *chicha* and curare-stricken monkey dinner, we learned that we had been guests at a celebration for the successful surgery of Babe's grandson. A few days before our arrival, he was taken by helicopter to a military hospital in Coca. Diagnosed with a snake-bite and acute appendicitis, he successfully recovered from surgery performed under general anesthesia with the use of a muscle relaxant.

Babe speaks Huarani, a thus far unclassified language, and I only English and broken Spanish. Yet, when I watched the joy in Babe's eyes as he embraced his grandson that day in the jungle, I might as well have been a polyglot. Brought together by the commonality of paternal love and Dr Griffith's scientific advancement, a sense of pride and wistfulness stirred my heart. In the end, it was not fear of poison, but a Canadian connection in the jungles of Ecuador that made me long to return home. 

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Competing interests

None declared

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