

# CURARE, A SOUTH AMERICAN ARROW POISON

Any student who may be destined to become a mystery writer certainly should learn about curare. Curare has long been used in tropical South America as an extremely potent arrow poison. The name curare comes from some very similar Indian names for the concoction.

Sir Walter Raleigh and several other early explorers to South America reported on curare and its effect, but apparently it was the noted geographer Alexander von Humboldt (1807) who was the first reliable eyewitness of curare preparation. Actually, curare was a generic term for many different types of preparations, which included many elements but most frequently the deadly poisons of the bark of *Strychnos toxifera* or *S. guianensis* (Family Loganiaceae) and of the Menispermaceae, especially *Chondrodendron tomentosum* or *Sciadotenia toxifera*. Other plant additives helped to make this preparation into a general arrow poison. The usual method of preparation was to combine young-bark scrapings of *Strychnos* and the menisperms with other cleaned plant fragments and sometimes snake venom or venomous ants. This mixture was boiled in water for about two days and then strained and evaporated to become a dark, heavy, viscid paste with a very bitter taste. The potency would be tested, for example, by counting the number of leaps a frog would take after being pricked. Certain tribes had regional monopolies on curare production, which represented a source of wealth. Darts were tipped with curare and then accurately fired through blowguns made of hollow grass stems (bamboo). Death for birds would take one to two minutes, small mammals up to ten minutes, and large mammals (e.g., tapirs) up to 20 minutes. Curare was too expensive and scarce to be used in warfare.

Death from curare is caused by asphyxia, because the skeletal muscles become relaxed and then paralyzed. However, the poison only works in the blood; poisoned animals have no harmful effects on humans if ingested (orally). Its vapors are not poisonous, although natives believed they were. In 1811, Sir Benjamin Brodie noted that during curare poisoning the heart continues to beat, even after breathing stops, which means that heart function is not stopped by curare.

The principal chemicals of curare are alkaloids that affect neuromuscular transmission. Among the many alkaloids present in curare preparations, the most common ones are curarine and tubocurarine, and the latter is marketed in a special form as Tubarine, Metubine Iodine, Tubadil, and Mecostrin. These drugs are employed as relaxants of skeletal muscles during surgery to control convulsions. Research has shown that curare causes a weakening or paralysis of skeletal muscles by interfering with the transmission of nervous impulses between the nerve axon and the contraction mechanism of the muscle cell. Specifically, the alkaloid interferes with the activity of acetylcholine (to depolarize the cell end plate) at the surface where it functions, thereby blocking

the neuromuscular junction.

The horror of curare poisoning is that the victim is very much awake and aware of what is happening until the loss of consciousness. Consequently, the victim can feel the progressive paralysis but cannot do anything to call out or gesture. If artificial respiration is performed throughout the ordeal, the victim will recover and have no ill effects.

Curare is still used in many chronic situations, such as for muscle trauma or spasms, acute arthritis, poliomyelitis, as well as in the interesting cases of patients who must be completely immobilized during extremely delicate surgery, kept alive by machines.

Curare should not be confused with the very different alkaloids obtained from species of *Strychnos* (e.g., *S. nux-vomica*) from Africa, which are used in strychnine, a common rodent poison, which can also be a very quick, deadly poison for humans. Strychnine, like curare, is extremely bitter, but unlike curare, strychnine is a convulsant poison--it increases the reflex excitability of the spinal cord and the medullary centers. Asphyxia is the final cause of death, but the victim first suffers convulsions of all voluntary muscles, twitching, followed by tetanus, violent changes in blood pressure, and spasmodic respiration.

In Africa arrow poisons are made from plants that have cardiac glycosides, and one famous genus containing these compounds is *Acokanthera* (Family Apocynaceae). The principal chemical is ouabain--0.002 grams of ouabain is a lethal dose for an adult human. Cardiac glycosides, e.g., digitalis, slow the heart rate, increase cardiac output, decrease cardiac enlargement, and reduce venous pressure by working on the vagus nerve. Cardiac glycosides are also found in other members of the Apocynaceae, such as oleander (*Nerium*), as well as the closely related milkweeds (Family Asclepiadaceae).

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