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PREPARATION OF THE HAITIAN ZOMBI POISON

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For many years travellers to the Caribbean island of Haiti have returned with sensational reports of *zombies,* the so-called living dead of the Voudou society. According to these popular accounts *zombies* are innocent victims, raised in a comatose trance from their graves by malevolent Voudou priests (*bokors*) and forced to toil indefinitely as slaves.

Serious students of Haitian culture, while noting that the vast majority of the peasantry believes in the physical reality of *zombies*, have usually considered the phenomenon as folklore (Herskovits 1937, Leyburn 1941, Mars 1945, Bourguignon 1959, Métraux 1959, Courlander 1960). Certain writers, however, have postulated a material basis for zombification (Hurston 1938). This basis is a reputed poison acting dramatically to lower metabolism and simulate death so much so that the victim is buried alive and later resusitated with an antidote administered by the bokor in the graveyard. (Hurston 1938, Leyburn 1941, Métraux 1959). Scientific interest in this zombi poison was recently stimulated by three cases of zombification, one of which may represent the first potentially verifiable instance (Douyon 1980, Pradel and Casgha 1983, Davis 1983). Physicians familiar with these three cases, fully cognizant of the medical potential of such a drug, asked me in the spring of 1982 to investigate its organic composition in Haiti.

During the course of three expeditions, the complete preparation of five poisons used to make *zombies* was documented at four widely separated villages in Haiti. Although each locality has an unique formula for the poison, botanical and zoological determination of the voucher specimens indicates that the principle ingredients are consistent at three of the four localities and in four of the five poisons. The formulae for the antidotes, on the other hand, show no consistency in these widely separated localities.

The ingredients and preparations discussed here were collected at three representative sites: the environs of Saint Marc and Gonaïves in the Artibonite valley of central Haiti, and the third on the Plain of Leogane, south of the capital of Port-au-Prince.

For the Voudouist, the creation of a *zombi* is essentially a magical act (Davis 1983) and thus prior to the preparation of each poison, the participants must seek spiritual and material protection. While this may be a simple matter of the *houngan*, or benevolent Voudou priest, rubbing a magical solution on each individual, it can involve rather elaborate ritualistic cleansings as well as the preparation of protective magic potions. At a small coastal fishing village, for example, this initial stage of the elaboration of the poison was particularly complex, as the following excerpt from my journal indicates:

> "The *houngan* began by dipping a small pre-Columbian axe-head, known to the Voudouist as a *pierre tonnere*, into a strong ammonia-based solution, and then rubbing vigorously all the participants. He sprinkled a small sample of the poison in a protected corner of the hut, and then handed me a robust rooster and a jar of water, instructing me to pour a portion of the water down the bird's throat. Moments later he took the rooster, placed it on top of the poison and covered it with a hemp sack.
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> "With the constant accompaniment of the sacred *asson*, or rattle, and the chants of the members of the secret society, the *houngan* sanctified my protection bottle. I named my intended victim, and he whispered it to the bottle. The *president* of the secret society, meanwhile, inverted a bottle of rum, causing it to bubble in a peculiar fashion, a certain sign that the poison would successfully complete my work. A match placed into the bottle exploded into flames and momentarily illuminated the entire enclosed temple.
>
> "The *madjaway* (see below) ground up pieces of *cadavre gatè* (an unidentified wood of the Capparidaceae) and mixed the dust with bits of a dried human cadavre and the shavings of a human tibia. The *president* pulled four feathers from the rooster's wing and instructed me to tie them in the shape of a cross as I asked them to bless my proposed work. At that point, Madame Jacques (my associate) accompanied the *madjaway* as he took the rooster to the sea in order to bathe its left foot. Upon their return to the temple, the *president* threw sulphur powder into a flame as he released the rooster to wander about the room. Placing seven drops of *clairin* (crude alcohol) and seven drops of rum into a bottle, the *president* began to mix the actual protection, adding sugar, basil leaves (*Ocimum Basilicum* L.), ground human bones, *cadavre gatè*, and

corn (*Zea Mays* L.). Then he rasped a human skull and added further bits of dried human flesh provided by the guardian of the cemetery. He then handed me three poisonous powders and gunpowder, instructing me to knead the powders into the wax before braiding the candles. When it came time to administer the poison, I was to light the candle and salute a sequence of stars before burying the candle beneath a path where I knew the intended victim would pass. To set the "trap" I had merely to sprinkle the poisonous powder in the form of a cross on the same spot, whilst repeating the victim's name. Each time I handled the poison, I was to drink from my protection bottle.

"By this time, the *president* of the society was possessed by *Ogoun*, the spirit of fire and the metallurgic elements, and I was told that for complete protection I would have to be bathed by the rooster. The energy of the bird would thus pass to me, and by the end of the bath the rooster would be dead. As I stripped for the bath, I was instructed to drink from the protection bottle. Then the president, with wide strokes of the rooster, washed my entire body with an aromatic herbal solution. Indeed, by the end of the bath, the rooster lay on the ground, flaccid and quite dead."

While the protective magical potions guard the individual from the power of his own poison, they may also serve as antidotes to neutralize the effects of the poison on the actual victim. The ingredients and the preparations of these antidotes, however, are completely inconsistent from one locality to the next. For example, the antidote prepared at Saint Marc consisted of over thirty ingredients. The *houngan* began by placing in a mortar several handfuls of dried or fresh leaves of six plants, *aloe* (*Aloe Vera* L.), *gaiac* (*Guaiacum officinale* L.), *cedre* (*Cedrela odorata* L.), *bois ca-ca* (*Capparis cynophyllophora* L.), *bois chandelle* (*Amyris maritima* Jacq.) and *cadavre gaté* (cf. *Capparis* sp.). The plant material was ground with a quarter ounce of rock salt and then added to a basin containing ten crushed moth balls, a cup of seawater, several ounces of *clairin*, a bottle of perfume, and a quarter litre of a solution purchased from the local apothecary and known as *magie noire*, or black magic. Additional ingredients included ground human bones, shavings from a mule's tibia and from a dog's skull, various coloured and magically named samples of talc, ground match heads and sulphur powder. At Gonaïves, on the other hand, the antidote contained a handful of *bayahond* leaves (*Prosopsis juliflora* (Sw.) DC), three handfuls

of *ave* leaves (*Petiveria alliacea* L.), a litre of *clairin*, and ammonia and three magically prepared lemons. The antidote prepared near Leogane consisted solely of ammonia, *clairin*, and various aromatic solutions purchased at the local apothecary.

At all three localities, the initial treatment of the victim involves the topical application of the antidote as a vigorous massage. The antidote, nevertheless, is effective only during the two or three weeks immediately following exposure to the poison. After that time the *houngan* must resort to the standard Voudou curing ceremony or *expédition* that is used to exorcise any death spirit.

The victim is laid in a hole in the ground, his feet and head bound with white cloth and his body covered with a white sheet. A *pierre tonnerre* and the skulls of a human and a dog are placed on top of the sheet, whilst a sucker of a banana plant (*Musa paradisiaca* L.) is placed alongside the victim's body. Three calabashes of food representing three sacred Voudou concepts, the crossroads, the cemetery and the spirit of the forest (*Grans Bois*) are placed at the victim's head, on his abdomen and by his feet. The *houngan* then takes a live chicken and breaks each of its limbs to extract the death spirit from the corresponding limbs of the victim. The sacrifice of the chicken is complete when the *houngan* bites off the head. The victim then partakes of the sacrificial blood and is bathed with the antidote. Finally, as the victim lies in the ground, seven handfuls of earth taken from the crossroads, the cemetery and the forest and flung into the grave. The victim leaps up and the spirit flees into the banana plant. After a ritual bath with the blood of the sacrificed chicken and a restful night in the sanctity of the temple, the victim is well.

Hence, in considering both the composition of the various antidotes, and the way that they are administered, it appears that the ingredients are probably either chemically inert or else used in insufficient quantities to result in any pharmacological activity. In short, the recognized antidotes are but symbolic supports for what is essentially a magico-religious healing ceremony.

Though the antidotes are relatively uninteresting from a pharmacological point of view, the poisons themselves contain some of the most toxic organic substances known.

The poison collected in the environs of the town of Saint Marc was prepared in a deserted brook in the middle of desolate scrublands far from the nearest settlement. The *houngan,* as healer and representative of all that is benign, has no contact with the poison itself; this destructive force is processed by his *madjaway* who is considered neither an apprentice nor an assistant, but rather the physical support of the *houngan*. The first precept of the Voudou religion is that the temple, or *hounfor*, must never collapse, and the *houngan* is the personification of the temple. The word madjaway means literally "do not fall down". In Voudou ceremonies, it is often the *madjaway* who actually carries out the ritual task.

Though the *madjaway* prepares the poison, it is the presence of the *houngan* that assures the safety of the participants. He initiates the ritual songs and rubs the bodies of all present with protective salves. It is the *houngan* who covers the mouth and nose of each participant with the red cloth, the symbol of the *Petro* rites, the most powerful and violent of the Voudou faith.

The first step in the actual elaboration of the poison involves placing a live toad (*Bufo marinus* L.) in a closed container with any type of 'snake'. The *houngan* at Saint Marc preferred to use a species of polychaete worm, *Hermodice carunculata* Pallas. According to Voudou belief, this procedure increases the toxicity of the toad; in fact, the 'snake' does agitate the toad, increasing the amount of toxic secretions from the paratoidal glands. These secretions contain at least 26 highly active compounds, including: a) cardioactive steroids known commonly as bufogenins and bufotoxins; b) phenylethlamine bases and derivatives such as dopamine, adrenaline, noradrenaline; and c) tryptamine bases and derivatives such as serotonin, cinobufagin and bufotenin (Kennedy 1982). The polychaete worm has setae that inflict a paralyzing effect (Mullin 1923) and may be venomous (Halstead 1978).

The seaworm and toad are then killed and sun-dried with two innocuous looking marine fish, the *fou-fou* (*Diodon hystrix* L.) and the *crapaud de mer*, the sea toad (*Sphoeroides testudineus* L.). These two species belong to a large pantropical order of fish (*Tetraodontiformes*), many of which have the deadly nerve toxin,

tetrodotoxin, in their skin, liver, ovaries and intestines (Halstead 1978). Toxin levels within the species of *Diodon* vary, leading some investigators to believe that the fish serve as transvectors of the tetrodotoxin (Hashimoto 1979, Halstead 1978). Members of the genus *Sphoeroides* are known to be particularly virulent.

The four sun-dried ingredients are placed on hot coals, along with fresh specimens of two lizards, *Ameiva chrysolaema* Cope and *Leiocephalus schreibersi* Gravenhorst, and several pieces of human bone. Neither species of lizard is known to be toxic, but *Ameiva dorsalis*, a related species from Dominica, is said by natives to make the hair fall out and the skin turn green. Skinned and gutted, the lizard may be eaten but a Dominican folktale cautions, "if the ground lizard were good to eat, it would not be so common." A species in the related genus, *Cnemiedophotus*, the Florida bluetail, causes, when ingested, loss of balance in domestic cats (Lasell, pers. comm.).

All six animal ingredients are roasted to a soft oily consistency and then placed on a wooden mortar to be ground with the burnt human remains. At this stage in the preparation, 10 fruits of *Mucuna pruriens* (L.)DC, a leguminous liana known as the *pois gratter*, the itching pea, are placed in the mortar. The pods are armed with urticating hairs that cause a maddening itch: the seeds contain psychotomimetic constituents and may have hallucinogenic properties (Schultes and Hofmann 1973). Approximately 30 seeds of a second leguminous plant, *tcha-tcha, Albizzia Lebbeck* L., are likewise ground into the poison at this stage. Although the chemistry of this species is poorly known (Raffauf pers. comm.), it is of note that in West Africa, near the original homeland of the Haitian ancestors, the bark of a related species, *Albizzia zygia* is used in a drug known as *ibok usiak owo*. This potion serves as a truth serum, "a medicine for mentioning persons" and is probably administered as an ordeal poison (Forde 1956).

All the ingredients are pounded to a coarse consistency, and then sifted in a metal strainer to yield the final product.

The *houngan* at the locality near Gonaïves distinguished three stages or "degrees" to the preparation of the poison. During the first approximately 20 grams of ground centipeds of the orders

Spirobolida and Polydesmida and two entire tarantulas, *crabe araignée* (Theraphosidae) were mixed with four plant products: 30 seeds of *tcha-tcha* (*Albizzia Lebbeck*), 40 seeds of *consigne* (*Trichilia hirta* L.), and four handfuls of dried leaves each of *pomme cajou* (*Anacardium occidentale* L.) and *bresillet* (*Comocladia glabra* Spreng.), both species of the Anacardiaceae capable of causing severe dermititis. These ingredients wére ground together in the mortar, placed in a jar and buried. After two days, two plants which were not available for collection, known locally as *tremblador* and *desmembre*, were added to form the second degree. Five days later, the third degree was marked by the addition of another set of plants capable of causing surface irritations. Two were members of the Urticaceae, *maman guêpes* (*Urera baccifera* (L.) Gaud.) and *mashasha* (*Dalechampia scandens* L.). The others were *calmador, Dieffenbachia Sequine* (Jacq.) Schott., the common dumbcane which contains calcium oxalate crystals in its tissues, and *bois piné* (*Zanthoxylum martinicense* (Lam.) DC.) which is covered with sharp spines. Finally, the *madjaway* added approximately three grams of the seeds of the *concombre zombi*, the zombi's cucumber (*Datura Stramonium* L.) to the preparation.

The elaboration of the animal constituents was rather similar to the process documented at Saint Marc. The *bango* toad (*Bufo marinus*) was placed in a small box with a common non-venomous snake. It was then killed and sun-dried with the three species of puffer fish, the *bilan* (probably *Diodon holacanthus*), the *fou-fou* (*Diodon hystrix*) and the *crapaud de mer* (*Sphoeroides testudineus*). As at Saint Marc, these ingredients were placed on hot coals and broiled to an oily consistency. A novel additive at Gonaïves was the *crapaud blanc* (*Osteopilus dominicensis* Tschudi), a fresh specimen of which was placed directly on the hot coals along with several human bone fragments. The skin of this tree frog is covered by irritating glandular secretions (Lynn 1958) and a related species *Osteopilus septentrionalis* Dumeril & Bibron has been reported in Cuba to cause temporary blindness (Williams pers. comm.). At the third degree, the animal and plant products were combined, ground in the mortar and sifted to produce the final powder.

The poison prepared at Leogane consisted only of animal constituents. Once again, the *bilan* (cf. *Diodon holacanthus*) and a *crapaud de mer* (*Sphoeroides testudineus*) were sun-dried, broiled and placed in a mortar. Fresh specimens of two tarantulas (Theraphosidae) and three non-venomous lizards the *miti verde* (*Anolis coelestinus* Cope), the *zanolite* (*Anolis cybotes* Cope), and the *mabouya* (*Epicrates striatus* Fischer) were roasted on coals with two locally recognised varieties of *Osteopilus dominicensis*, the *crapaud blanc* and the *crapaud brun*. The *houngan* at Leogane especially emphasised the toxicity of human remains and included both ground human bones and dried pieces of human flesh in the preparation. The final product at Leogane was a coarse powder.

In all three documented preparations, the consistent ingredients are readily identified. The plant additives include species with urticating hairs, anacardiaceous plants that produce severe dermititis, an aroid with irritating calcium oxalate crystals and a number of species with spines. The addition of these irritants is related to the method of applying the poison. Though topically active, any one of the variations is said to be particularly effective if inhaled or applied to an open wound. In one preparation obtained at Saint Marc, ground glass was added to the mortar. Another informant suggested pricking the victim's skin with a thorn before applying the toxic powder. Several of the plants induce such acute irritation that the victim in scratching himself may cause open wounds. The poison may be applied more than once to the victim, and undoubtedly these self-inflicted wounds increase susceptability to subsequent doses.

There are two constant animal ingredients, ground human remains and one or more species in two genera of puffer fish: *Diodon hystrix, Diodon holacanthus* and *Sphoeroides testudineus*. In each preparation, the human remains are burnt almost to charcoal and probably are chemically inert. The puffer fish are merely broiled, and it is significant to note that neither frying, stewing, boiling or baking denature tetrodotoxins (Savtschenko 1882, Halstead and Bunker 1953). Tetrodotoxin is one of the most poisonous non-protein substances known: as an anesthetic, it is 160,000 times more potent that cocaine (Mosher 1964).

Furthermore it is topically active (Boye 1911, Phisalix 1922) and is capable of inducing physical states of simulated death characterised by immobility, peripheral paralysis and extremely low metabolic rates (Akashi 1880, Kimura 1927, Leber 1927, Fukada and Tani 1937, 1941, Fukada 1951, Halstead 1978, Davis 1983). It would seem, in closing, that, if zombification has a real pharmacological basis, the active constituent of the toxic preparation would undoubtedly be tetrodotoxin.

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