PHS CHRONICLES

PHS Chronicles presents short articles about significant happenings in the nearly 200-year history of the Public Health Service. The Office of the PHS Historian oversees preparation of the Chronicles. Contributions of less than 1,500 words are welcomed. Contact John Parascandola, PhD, PHS Historian, 17–31 Parklawn Bldg., 5600 Fishers Lane, Rockville, MD 20857, tel. 301–443–5363, FAX 301–443–0358 (E mail jparasca@oash.ssw.dhhs.gov).

The Public Health Service and Jamaica Ginger Paralysis in the 1930s

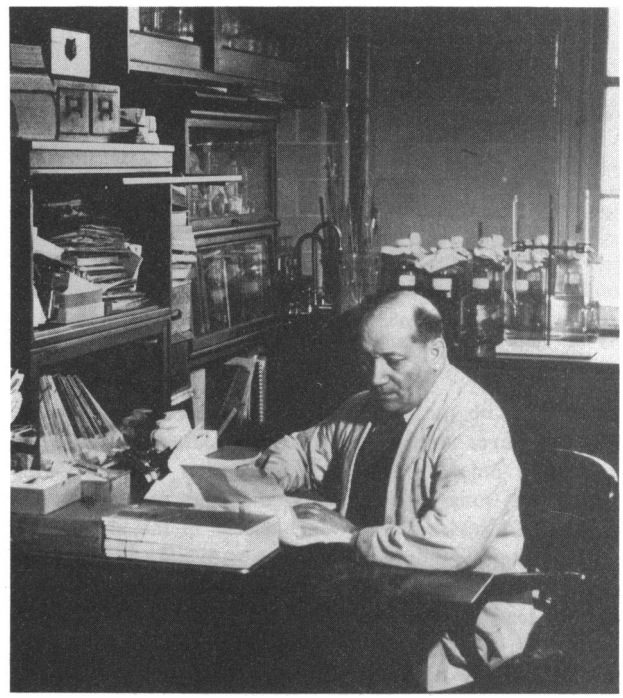
Early in the year 1930, newspapers in the American South and Midwest began to report on a strange new paralytic illness that was affecting relatively large numbers of persons. Victims of the disease would typically notice numbness in the legs, followed by weakness and eventual paralysis with "foot drop." In most cases, this condition was followed within about a week by a similar process in the arms, resulting in many cases in "wrist drop." Although the disease was rarely fatal, recovery was very slow, and in many cases the damage to the nervous system left the patient with permanent disabilities.

Although the disease resembled certain other neurological problems, the symptoms did not conform exactly to any known condition. The number of cases of this mysterious affliction reached epidemic proportions over the course of 1930 and 1931, eventually affecting an estimated tens of thousands of people in many States, from New York to California.

Cause of the illness. It did not take long after the first appearance of the illness to determine its general cause. Two Oklahoma physicians were apparently the first to associate the condition with the ingestion of fluid extract of Jamaica ginger. Invariably, the onset of the disease seemed to have been preceded by the consumption of the ginger extract, usually about 2 weeks before the symptoms appeared. The majority of the victims were adult males.

Jamaica ginger, or "Jake" as it was commonly referred to, was a convenient way of imbibing alcohol during the era of Prohibition. It had an alcohol content of about 70 percent and was readily available in pharmacies, where it was sold as a carminative, headache remedy, and general aid to digestion. A popular method of drinking Jake was to mix the contents of the 2-ounce bottle with a soft drink to help dilute the strong ginger flavor.

Alcoholic extracts of ginger had been available in the United States since the 19th century, and even before the advent of Prohibition they were popular as alcoholic beverages in "dry" areas of the country. With the coming of Prohibition, only the fluid extract described in the United States Pharmacopeia (USP) was legally marketable. The



Elias Elvove, the NIH chemist who assisted Maurice Smith in the investigation of the Jamaica ginger poisonings. (Courtesy of the National Library of Medicine.)

Prohibition Bureau classified the USP extract as nonpotable because it contained enough of the oleoresin of ginger to give it a very pungent taste, which made it less desirable as a beverage.

Perhaps desperate people consumed it anyway, but a variety of illicit preparations labelled as the official fluid extract also began to appear on the market. These products were highly adulterated, substituting ingredients such as molasses, glycerin, and castor oil for most of the oleoresin of ginger, thus greatly reducing the objectionable ginger taste.

Since Jake had long been in use by 1930, and generally did not produce any ill effects other than those that could be attributed to the alcohol, the reason for the sudden appearance of many cases of paralysis of the extremities

Maurice Smith, the NIH pharmacologist who directed the research on the toxicity of the adulterated ginger extract. (Courtesy of the National Library of Medicine.)

associated with the product was not immediately obvious. Was the ginger used in this particular extract contaminated with some poison? Had the manufacturer adulterated the extract with some poisonous ingredient not previously used in Jake? Or was some new denaturant in the alcohol the culprit? The symptoms of the disease did not match those induced by poisons known to cause polyneuritic afflictions, such as lead and arsenic.

Solution of the mystery. The mystery was solved in the laboratories of the Public Health Service's National Institute of Health (NIH), which had just been created out of the old Hygienic Laboratory. The medical detective who headed the NIH investigation of the adulterated ginger extract was pharmacologist Maurice Smith of the Division of Pharmacology. He was assisted by NIH chemist Elias Elvove, as well as by chemists from the Prohibition Bureau.

Maurice Smith was born in Russia on November 17, 1887, and became a naturalized U.S. citizen at the age of 10. After obtaining his BS degree from the College of the City of New York in 1909, he attended the Cornell University Medical School, where he earned the MD degree in 1913. He then taught pharmacology at the medical schools of the University of Michigan and the University of Nebraska for the next few years, also briefly holding a post as a pharmacologist at the Hygienic Laboratory for part of 1918.

In 1920, Smith joined the staff of the Hygienic Laboratory on a more permanent basis, spending most of the rest of his career in the PHS. He left the PHS for a brief period in 1925 to become Director of the Glandular and Pharmaceutical Department of Lederle Laboratories in Pearl River, NY.

In his letter of resignation, Smith praised the working conditions at the Hygienic Laboratory but explained that "the compensation is so inadequate and the possibilities for future advancement seem to be so uncertain" that he was compelled to take a more remunerative position. His annual salary at Lederle was some $2,000 more than he earned in the PHS, $5,500 (plus royalities) as opposed to $3,600. In 1926, he was lured back to the Hygienic Laboratory as Senior Pharmacologist at a salary of $5,000. He remained with the PHS, holding the title of Principal Pharmacologist at NIH from 1931 until his retirement in 1950. Smith died on January 26, 1951.

Obtaining samples of the product consumed by the victims for the study of Smith and Elvove turned out to be a difficult problem. Most of the patients had completely consumed the contents of the 2-ounce bottles that had brought on their illness. Even if they had not, it was not always easy to locate the discarded bottle. For example, many of these bottles had been discarded in outdoor toilets, and a number of these bottles were retrieved by methods that are not specified.

Eventually 13 samples were collected for Smith and Elvove. Several of these samples had been seized from distributors and were suspected of containing the poisonous ingredient. But a number of the samples were clearly associated with patients suffering from the disease and thus could provide more conclusive evidence as to its cause.

The NIH scientists were able to demonstrate convincingly that the paralysis was caused by a phenolic compound whose presence had been detected by Prohibition Bureau chemists in adulterated samples of Jamaica ginger, namely, tri-orthocresyl phosphate. This compound produced in experimental animals a specific type of motor paralysis of the extremities that was very similar to the condition of the human victims who had consumed the adulterated Jake. Tri-orthocresyl phosphate had been used as an adulterant for the oleoresin of ginger because it was soluble in alcohol, miscible with the true oleoresin, and cheap.

Indictments and convictions. The Food and Drug Administration (FDA), in cooperation with the Prohibition Bureau and State health officials, seized various lots of the contaminated product. Investigators found that the bottles of poisonous Jake could be traced almost always to a particular firm in Boston—Hub Products. Federal grand juries in several cities returned indictments against Hub president, Harry Gross, and his brother-in-law, Max Reisman, a part owner of the firm.

In February 1931, the various cases pending against Gross and Reisman were consolidated for trial in Boston. The two men were charged with conspiracy to violate and with violations of both the Prohibition Act and the Food and Drug Act. Gross and Reisman apparently convinced the prosecuting attorneys and the judge that the real culprits were some New York bootleggers from whom they had obtained the Jake that they sold. Under a plea-bargaining arrangement, their sentences were to be light in exchange

for their willingness to help provide evidence to convict the New York criminals. They were fined $1,000 each and each was sentenced to 2 years in prison, but the prison sentences were suspended and the men placed on 2 years probation instead.

The FDA had not been consulted on the plea-bargaining agreement, and its officials were very unhappy with the results of the conviction. So the agency began to conduct further investigations of its own. The FDA soon acquired evidence that cast serious doubts on the existence of a New York supplier and pointed to Hub Products as the manufacturer of the poisoned Jake.

In 1932, Gross was charged with violation of his probation. Evidence was presented at a hearing to show that Gross himself mixed the poisonous Jake. On the basis of this new evidence, he was ordered to serve his 2-year prison term. The judge in the case refused, however, to hear the Government's case for revocation of the probation of Reisman.

Effect of "Jake." The Jake incident affected enough people that the victims actually founded the "United Victims of Ginger Paralysis Association," an organization that claimed 35,000 members. Jake was also mentioned in popular songs of the day. Two scholars who have looked at the music related to Jake have identified a dozen songs recorded by rural southern artists that mention the product. Most of these songs, with titles such as "Jake Leg Blues" and "Jake Walk Papa," refer specifically to the poisonous effects of the adulterated Jake and were presumably inspired by the tragedy.

In many ways this incident was a forerunner of the more famous Elixir Sulfanilamide tragedy of 1937, helping to point out the need for more effective food and drug legislation. Although there were very few fatalities that could be attributed to the consumption of the poisoned Jake, thousands suffered long-term, sometimes permanent, damage to the nervous system. Like the Elixir Sulfanilamide disaster, the problem was not the active ingredient itself, but an additive. In the case of Elixir Sulfanilamide, however, the effort was not to adulterate the product but to find a suitable solvent. The solvent chosen, diethylene glycol, was unfortunately toxic, as was the adulterant chosen in the Jake incident.

But there were no requirements in the 1906 Food and Drug Act for premarket testing and approval of drug products, and so neither Hub Products nor the manufacturer of Elixir Sulfanilamide broke the law simply by putting their products on the market without testing them for safety. What Gross and Reisman were actually prosecuted for under the food and drug law was for selling something that was supposedly fluid extract of ginger USP but which differed from the standard of strength, quality, and purity of fluid extract of ginger as set down in the USP. They were also in this particular case liable for prosecution under the Prohibition Act. Likewise, the manufacturer of Elixir Sulfanilamide was prosecuted for misbranding and adulteration, not directly for the toxic results, and he escaped with just a fine and no jail sentence.

As the 1930s progressed, pressure for reform of food and drug legislation increased. The death of more than a hundred persons, many of them children, in the previously mentioned Elixir Sulfanilamide tragedy of 1937, finally stirred up enough public outrage to lead to the passage of the 1938 Food, Drug and Cosmetic Act. This act did finally prohibit the marketing of new drugs in interstate commerce until their manufacturers provided FDA with satisfactory evidence of their safety.

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