

The ToxSquad

Who among this year's group stands out in various categories of "too much of a good thing?"



The "Poison Squad" and the Advent of the Food and Drug Regulation

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*"O, they may get over it but they will never be the
same,
That kind of a bill of fare would drive most men insane.
Next week he'll give them mothballs, a la Newburgh or else
plain;
O, they may get over it but they'll never look the same."*

Chorus from "Song of the Poison Squad"
Lew Dockstader's Minstrels, October 1903

A century ago, 12 men sat down to a plate of food laced with poison and came back for more. Blessed by Congress, the dinner was the first in a series of meals containing steadily increasing doses of toxic chemicals. What better animal to test toxicity in humans, than a human?

The infamous five-year human feeding experiment took place in the basement of the Agricultural Department's former Bureau of Chemistry, located on what is now Independence Ave., in

Washington, D.C. Complete with a kitchen and dining room and backed by a government laboratory, the project was the brainchild of scientists from the Bureau of Chemistry (now the Food and Drug Administration). Chief chemist Harvey W. Wiley, M.D., considered by many to be the founding father of the FDA, spearheaded the effort to such tests himself. Wiley hoped to learn "whether preservatives should ever be used or not, and if so, what preservatives in what quantities." Ultimately, if Wiley could prove from his studies that food adulteration went beyond flagrant cheating to obvious harm, then both the public and Congress would likely support a national policy.

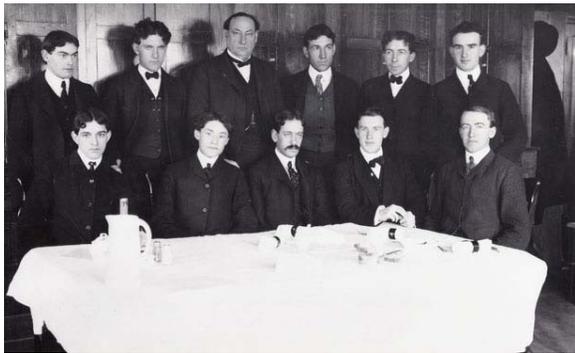
'None but the Brave Can Eat the Fare'

Three years after Wiley's initial request, Congress enacted new controls over imported foods, including provisions for the inspection and rejection of shipments. Historians write that greater knowledge about the safety

of common preservatives, it was believed, would served to strengthen the enforcement of these new laws. Therefore, Congress included funding in the chemical division's 1902 budget separate scientific facts on food safety from the recurrent food safety scares that had fast become the subject of growing public mistrust, inflammatory publications, and Congressional hearings. Wiley's earliest concerns stemmed from the widespread use of borax as a food preservative. And, in fact, fraud was so widespread that even products labeled "pure" were often counterfeits, such as purported "pure Vermont maple syrup" that was little more than colored and flavored Iowa corn syrup.

At the same time, however, manufacturers argued that certain preservatives, such as sulfur, were indispensable in processing products such as wine and raisins. Nevertheless, the public was becoming increasingly concerned about all kinds of toxic substances reportedly found in foods.

Although Wiley believed the burden of proving the safety of preservatives should fall with the manufacturers of such additives, still, he boldly asked Congress during Senate hearings on food adulteration in 1899 for money to conduct appropriations to care out the proposed "hygienic table trials."



Poison Squad group posing for picture with Dr. Harvey Wiley

Wiley and other scientists quickly assembled the first dozen young, able-bodied Department of Agriculture volunteers—dubbed the "Poison Squad" by newspapers—and fed them wholesome meals containing potentially harmful substances. The initial five preservatives studied were borax, salicylic acid, sulfuric acid, sodium benzoate, and formaldehyde. Dosages ranged from one-half gram daily to four grams by the end of the five-year study. Each

subsequent group of a dozen men tested one preservative, and in all of the five years, there was never a shortage of volunteers.

The squad pledged to eat all of their meals at the "hygienic table". They agreed not to consume any outside foods or beverages, except water. Even that had to be measured and reported. Each participant recorded his weight, temperature and pulse rate before each meal, and what he ate. Every week, physicians from the Public Health and Marine Hospital Service examined the squad members. Any symptoms were reported.

From the men's point of view, perhaps the most annoying aspect of the study was submitting all their urine and feces to government chemists for daily analysis. Additionally, a portion of the study was devoted to determining whether any preservative was eliminated through perspiration and respiration.

The man, of course, new they were eating potential poisons. They didn't know, however, which foods contained the substances. At first borax was added to butter, to which the men developed a sudden distaste. Wiley then tried it in milk, meat, and coffee. Evidently, as the men determined which food contained the substances, they began eating less of it and eventually avoided that food altogether. Therefore, early on in the trials, Wiley decided he would no longer hide the preservatives and began putting them inside gelatin capsules instead. Previous tests showed that then taken in the middle of the meal, the capsules would quickly dissolve into the digesting food, and in the case of borax, without discomfort. For the remainder of the five years, capsules were used for the study.

As daring as it was to submit to such testing in the first place, the men—who responded to Wiley's appeal to promote scientific knowledge while getting free meals—agreed to do so for at least six months. They also agreed to not hold the government responsible for any illness or injury that might result. The meals, which were prepared from high quality ingredients by a certified Civil Service Commission chef, represented but a small reward for the hardships borne by the volunteers, including the possibility of long term harm.

Bad Publicity for a Good Cause

Overnight, the Poison Squad became a national sensation. Wiley worried, however, that humorous banter about the squad would discredit the seriousness of his scientific project. But he also knew the importance of winning over the public—not only for the policy he was beginning to envision on chemicals in foods, but also for the progress of the pending federal food and drug law, then under debate in Congress.

After learning that reporters had taken to interviewing the Poison Squad's chef through a basement window, Wiley bowed to the inevitable interest and took reporters into his confidence. He reported to news papers every detail of the experiment and its effects on the men, and also had the nerve to join the group for most of his own meals.



William Carter with Wiley and the Poison Squad

Wiley stopped the experiments only when the chemicals made several of the diners so sick that they couldn't function—nausea, vomiting, stomachaches, and the inability to perform work of any kind. By this time, though, stories of the men's indigestion had run rampant and were being followed by fascinated readers all over the United States. The table trials even made the minstrel shows. In the end, the publicity helped Wiley gain a Congressional hearing, as well as support for his contention that chemical preservatives had no place in food.

The Science Behind Food Additive Regulation

Wiley's findings on borax were not impressive. The results reported in 1904 showed that borax was one of the least toxic of the preservatives studied. More impressive, however, were the symptoms reported in the individual case histories as dosages of borax and other preservatives were increased: diminished appetite, feelings of fullness and discomfort in the stomach, dull and persistent headache, and in some instances abdominal pain. The amounts of preservatives eliminated in the feces were found to be insignificant. The amount recovered from perspiration was not enough for a quantitative determination by the methods used back then. The respiration study came back without significant results.

For the sake of the food industry, which wielded a powerful influence over lawmakers, Wiley eventually admitted that very small amounts of preservatives might be harmless, and might even protect consumers from more serious dangers of food spoilage. But he argued that the accumulation of such additives was a danger to public health since he couldn't determine, much less control, quantities of a given substance that a person might ingest over time. Wiley was convinced that any kind of regulation would have to treat all preservatives alike—ruling out discrimination between food chemicals according to their risks and benefits.

Wiley didn't win all of his fights, and not many federal court cases were aimed directly at the chemicals fed to the Poison Squad. But four of the preservatives tasted by the Squad are long gone from the food additive market—borax, salicylic acid, formaldehyde, and copper sulfate.

In the end, the Poison Squad, and all that they ate, helped pave the way for federal regulation of foods and drugs in the United States—the Pure Food

and Drug Act of 1906, also called “Wiley Act” and later its successor, the 1938 Federal Food, Drug, and Cosmetic Act.

Although Wiley’s dining experiment was quite politicized, highly controversial, and remains scientifically contentious today, his efforts led to the scientific regulation of food additives, with rational limitations. The result?

Preservatives found safe could be legally added to foods, but not to cover up the use of ingredients unfit for human consumption.

As scientists learn more about the action of certain chemicals in our bodies, the FDA can use this information to re-evaluate further uses of preservatives.

Although not formal long-term follow-up was done on the members of the Poison Squad, anecdotal reports indicate that none were harmed. According to William O. Robinson of Falls Church, Va., the human guinea pigs suffered no permanent illness or injury. Robinson, a member of the Poison Squad, was 94 years old when he died in 1979.

Suzanne White Junod, Ph.D., FDA historian contributed to this story.



Courtesy of the FDA. Under the authority of the U.S. government, Harvey Wiley, upper right, presided over a team of borax-eating men known as the Poison Squad.

Public Radio Exchange (PRX) “The Poison Squad: A Chemist’s Quest for Pure Food”

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<http://blog.prx.org/2013/07/the-poison-squad-none-but-the-brave-can-eat-the-fare/>

The Poison Squad. PBS American Experience
<https://www.pbs.org/video/trailer-poison-squad-american-experience-d213gt/>
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