Finding the “Sick” in Cheese

Victor Vaughan and Michigan Public Health in the Late 19th Century

By DEA BOSTER

FIRST CAME THE 1883 OUTBREAK, A relatively modest dozen or so cases in Oxford, Michigan. Over the next two years, hundreds more Michiganders suffered from what was apparently cheese poisoning. People across the state endured sudden and violent nausea, diarrhea, and dryness and constriction of the throat. Victor C. Vaughan, who became one of the University of Michigan’s first Medical School deans, investigated the mysterious poisonings — even testing his theories by essentially poisoning himself and his students.

Vaughan’s work helped arouse popular support for laboratory science and sanitary public health measures. Although Vaughan’s initial discovery of the dairy “poison” — a crystalline alkaloid he named tyrotoxicon — would be largely discredited by the early 20th century, his sanitary recommendations to combat the poison would contribute to lasting improvements in medicine, public health and food safety standards.

Vaughan received his Ph.D. in chemistry and his medical degree from the U-M in the 1870s, at a time when theories about the microbiological origins of disease were becoming more widespread in academic and popular discourse.

After the first reports of cheese poisoning, Vaughan conducted laboratory investigations to find the chemical origins of the outbreak. After identifying one major source of “sick” cheese — a dairy in Lenawee County, Michigan — Vaughan and his physiological chemistry students conducted a series of experiments in the U-M Chemical Laboratory to isolate the toxin. Vaughan identified tyrotoxin (a name he coined by combining the Greek words for “cheese” and “poison”) and classified it as a ptomaine, or a chemical poison thought to cause food poisoning. Vaughan was the first American researcher to claim that ptomaines could be found in dairy products.

Vaughan isolated the substance from the cheese through a variety of extraction methods and tested for toxicity by feeding the crystals to puppies, kittens, his own students and himself — reproducing symptoms like throat dryness, nausea, vomiting and diarrhea.

The local Ann Arbor press embraced Vaughan’s tyrotoxin theory. Despite the fact that no fatal cases were reported, the Ann Arbor Courier claimed that the alkaloid could be deadly, a terrifying prospect since tyrotoxin seemed impossible to identify without chemical analysis. In July 1885, the paper claimed that “sick” cheese was virtually indistinguishable from good cheese, and “there is no certain means aside from a chemical examination, by which a poisonous cheese can be distinguished from a wholesome one.”

Vaughan recommended a simple test that grocers and the general public could utilize to determine whether or not cheese might be “suspicious”: a piece of blue litmus paper pressed against a freshly cut cheese surface would reddish “instantly and intensely” if tyrotoxin was present.

Vaughan’s findings brought national attention and acclaim, and tyrotoxin became a popular subject of early bacteriological research. His discovery was seemingly reaffirmed in 1886, after an outbreak of ice cream poisoning began in Lawton, Michigan. Vaughan and others once again used their own bodies in research, consuming the dairy’s vanilla extract in an effort to rule out the possibility that flavoring chemicals caused the symptoms. They identified Vaughan’s discoveries brought him and the U-M national attention and became a significant source of pride in rural Ann Arbor.
tyrotoxicon ptomaine in under-refrigerated ice cream samples.

Vaughan soon came to be regarded as an expert in the emerging fields of American bacteriology and public health. He argued that tyrotoxicon was linked with other widespread diseases like cholera infantum and typhoid, and he published this claim in many professional and popular journals, including *Popular Science Monthly*.

His success would also influence the Michigan legislature and the U-M Board of Regents to fund the school’s Hygienic Laboratory and Physics-Hygiene Building — the first facility of its kind in the U.S. and only the second worldwide. The laboratory was instrumental in identifying the bacteria responsible for typhoid fever epidemics and other outbreaks of disease in the state.

There were skeptics who hesitated to accept Vaughan’s ptomaine theory. Some Michigan physicians disavowed microbiological explanations for the poisoning, particularly in the 1886 ice cream outbreak. Instead, they claimed that flavoring, additives, freezers contaminated with zinc or extreme indigestion from overeating caused the symptoms.

Others said chemical preservatives in dairies and groceries, often used at the recommendation of sanitary reformers, were to blame for the supposed poisoning. Vaughan himself later found that tyrotoxicon, and promaines more generally, were not the sole cause of toxicity in dairy foods, and there were some samples of “sick” products that showed no signs of the crystalline substance.

By the early 1900s, there were hardly any reports of such poisoning. Whether that was due to general improvement in food preparation and storage sanitation or because tyrotoxicon never actually existed is difficult to determine.

By 1909, Vaughan admitted that “practically nothing is known regarding the precise chemical nature of these bacterial poisons,” reflecting that the ptomaine theory had largely been dismissed by the early 20th century. Vaughan’s 1926 memoir only mentions his tyrotoxicon investigations in an appendix that notes “poisoning from cheese, ice cream and other milk products became rare and soon ceased so completely that some say the whole thing is a fairy story and never occurred.”

Nonetheless, Vaughan’s involvement and discoveries in Michigan’s “sick” cheese and ice cream poisoning outbreaks brought him and the U-M national attention and became a significant source of pride in rural Ann Arbor. In an 1893 column titled “Adrian Press Washtenawisms,” the *Ann Arbor Argus* took issue with the claim that Vaughan was “better known in England than America and more appreciated in New York than in Michigan,” stating that “the east is beginning to find out that low-necked clams, long-tailed coats and the gold standard never yet discovered tyrotoxicon in cheese.”