

PUBLIC HEALTH ASPECTS OF FOODBORNE OUTBREAKS¹

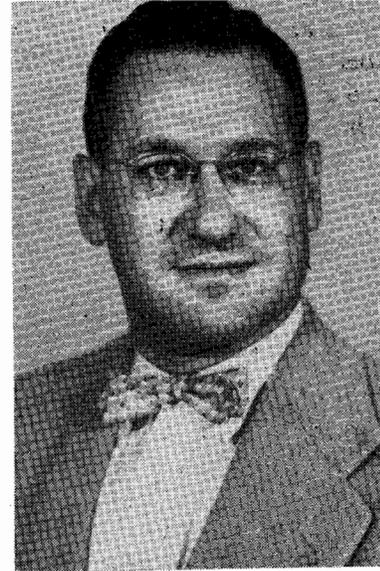
S. H. HOPPER

*Department of Public Health
Indiana University School of Medicine
Indianapolis, Indiana*

With the public spending more than one-fifth of its income on foods, the food industry is now larger than sixty billions of dollars per year (1). As this business has grown, the public health agencies have been faced with new procedures in the transportation, refrigeration, preparation and storage of foods. Although the present trend in voluntary and official agencies is toward increased emphasis on adult health and chronic disease, one must bear in mind the ever present potential disease producing capacity of those items of health usually relegated to the area of sanitation. Note that the term of environmental sanitation was not used, since the author is not familiar with items of sanitation that are not in some kind of an environment. Perhaps it is time this redundant term is discarded since it is commonly accepted that we speak of the hygiene of the alimentary canal and the sanitation of the Panama Canal!

The milk borne outbreak of paratyphoid fever at Lancaster, Pa., is a current example, if proof is needed, of the necessity for continued vigilance by health agencies in the field of sanitation. An excellent editorial in the American Journal of Public Health (5) points out that the epidemic was mild, with only 200 symptomatic cases reported and 40-50 less manifest infections. The outbreak was an unmistakable exhibition of the value of full time local public health supervision, and the concomitant difficulty of trying to accomplish a proper milk sanitation program where the central authority is divided. Bacteria are unaware of economics, and health programs should be within the province of persons trained in this field.

Preventive sanitation via the team approach of nurses, laboratory technicians, veterinarians, physicians, health educators, and sanitarians is a well established technique in public health. The work is quite prosaic however for it lacks the spectacular success of a vaccine or of brain surgery, but it is just as necessary as either of these if the humane and legal aspects of public health are to be carried out. It is evident at this point, then, that although a milk plant, or for that matter a water purification plant, can be made to work automatically, that automation



Dr. Samuel H. Hopper received the Ph.D. degree in Bacteriology from the Massachusetts Institute of Technology in 1937. He has served on the academic staffs of the Georgia Technological Institute, the University of North Carolina, and presently is Chairman of the Department of Health, Indiana University. Dr. Hopper is a Fellow of the APHA and of the AAAS, and is a consultant to the Indiana State Board of Health.

does not necessarily entail complete protection because the human element is always present. It should be abundantly clear, also, that food borne outbreaks can be held to a minimum just so long as the responsibility for this is kept in a properly staffed local health department.

Our environment is a combination of many factors, among which the physical, biological and social are probably the most important. It is the study of these aspects of health and disease by epidemiologic techniques that we have developed diagnostic methods which help us to define a health problem, to determine methods and principles for control programs, and to evaluate our accomplishments. As was pointed out earlier, preventive medicine has changed, and we now have more emphasis on cancer, the degenerative diseases, mental illness and accidents. However public health practice may change, we can never lose sight of one of its foundation stones, i.e., sanitation.

The chief reason sanitation has remained in public

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health is because it was founded on sound bacteriological knowledge. This is important, because all of our health practices should develop from known facts. We have been proud to obtain ordinances for the protection of the public, and have substantiated our demands with sound public health reasons. Is it time now to re-evaluate the Restaurant Code and ask ourselves what value each item has in the prevention of food borne outbreaks? Is there any evidence in our voluminous literature to prove that floors, walls and ceilings which are dirty have ever had a part in the causation of disease? Should we assign some value to the aesthetic side of restaurant sanitation? For example, if ants were cooked into a browned pork tenderloin they would hardly improve the flavor of the meal, even though said arthropods would be sterile.

In the light of our present knowledge, some of the items in our ordinances have been given public health significance where in reality we would be hard to put to it to justify the relative weights already assigned. Has anything been left out? Should personnel be tested on personal hygiene and sanitation and their score incorporated in the total inspection? It is an item of importance and considerable practical value in public health. Does it seem reasonable to ask that a study of our ordinances and codes by a national agency would be in the public interest? Certainly, new knowledge requires new evaluations and possibly new techniques. Examples of this are numerous.

Each of us is familiar with the sanitary significance of the coliform group of bacteria in water supplies. We know that these organisms are widely distributed in nature, but just because they are firmly established as an index of pollution in one area should not lead us to conclude that their presence in other places indicates fecal contamination. Proof by analogy is not proof. The sanitary significance of coliforms in various foods and food products is not firmly established. The coliforms are part of our daily menu (3).

Turning now to a group of organisms which are the most common in cases of food poisoning, let us summarize some of the facts about the genus *Micrococcus*. We know that this includes what used to be called *Staphylococcus aureus*, but is now called *Micrococcus pyogenes* var. *aureus*. Millions of these bacteria are in our food and do not cause illness; in fact many strains do not produce an enterotoxin. For those which do produce a toxin, a relatively large amount of human suffering occurs annually. This type of sickness or disability is not reportable, and consequently it is difficult to estimate the exact number of cases. The toxin is heat stable, that is, boiling for one hour does not destroy it. Furthermore, laboratory investigation of suspected foods is hard to evaluate because a re-

liable method of assay for the toxin is not available. There is one general procedure, however, which can be followed and that is to provide conditions which would be unsuitable for the development of the enterotoxin. Reference is made here to the value of good refrigeration and to the necessity for education of the public on this simple and effective preventive method.

In a report on 243 outbreaks of food borne illness in the Navy, Cook (2) points out how the reports "vary in their completeness". The Navy studies centered around shigellosis, but included viruses. They are still trying to find answers to the fundamental questions concerning how the organisms were actually transmitted. Although some of these facts may seem discouraging, is there anything else that sanitarians can do about food poisoning caused by the toxin of *M. pyogenes* var. *aureus*? Of course there is.

No one has ever seen an atom and yet we have succeeded in accomplishing some very practical things with them. Similarly, we are justified in practicing well established public health principles until further scientific evidence and methods are forthcoming. The specific principle the writer has in mind is covered by the general term health education. There is no question about the health benefits which may accrue to the public from the food handlers who are motivated on their own, to carry out simple hygienic measures and good sanitation practices.

Turning now to another kind of toxin about which considerably more has been done let us consider the group of toxins produced by two species of the genus *Clostridium*, the anaerobic spore forming rods. These toxins are the most potent nerve toxins known to man, and it is established on the basis of work done with mice, that the toxic dose for man is about one ten thousandth of a part per million (6). Poets and philosophers have dealt with comparisons of the moral integrity and the relative bravery of mice and men, so a comparison of the biologic effects of a potent toxin may have some literary justification, if no other. It is important to point out that during the last 25-30 years, or for about a generation, no cases have been attributed to commercially canned products. The food industry has earned well deserved praise for this accomplishment. We can conclude our consideration of botulism with the comforting knowledge that it is not a common disease.

Usually summaries of food borne outbreaks have an appalling percentage listed as miscellaneous, with respect to causative organisms.

This large number is a monument to our present ignorance and a challenge which must be met. It appears that viruses are probably involved in many cases. No statistics are available to prove this point as diagnostic methods are still in the developmental

stages. The facts at hand show that the alimentary tract of healthy individuals can carry many viruses, such as poliomyelitis, hepatitis, coxsackie, herpes simplex, mumps, influenza and others. One group effects the nose, throat and lungs and is known either as the ARD-acute respiratory disease group or the ADC-meaning adenoido-pharyngo-conjunctival group, or RI-67². Many of these are recognized by the destructive effect they have on monkey kidney tissue (9). In fact the monkey kidney tissue cultures have revealed the existence of a whole new group of viruses present in large numbers in healthy children. It should be pointed out that viruses are measured in terms of millimicrons and there is more than enough room in one drop of water to hold a hundred million million particles.

Still another group of viruses is given the name ECHO, meaning enteric cytopathogenic human orphan viruses. The use of the word "orphan" does not mean that the virus is found only in children who are orphans. It is merely a name for a virus of uncertain classification and unknown reactions. One investigator (8) says, "Orphan virus, as the term is used here, are a heterogeneous group not neutralized by poliomyelitis or Coxsackie antisera, and non-pathogenic for monkeys or suckling mice." They are commonly present in the intestinal tract and there are many types. Their relationship to illness is still poorly defined. It is known that the peak seasonal incidence is between June and October, and that the larger numbers are found in the poorer socio-economic groups where hygienic practices and sanitation may not be very good.

As Dr. J. E. Gordon points out (7), the manual of the American Public Health Association "Control of Communicable Disease in Man" lists 20 diseases caused by known viruses and 9 others in which viruses are implicated for a total of 29 out of 118 listed in the manual. Public Health control can be planned if the diagnosis is made, but methods for the viruses are new and difficult and laboratory methods are still in the developmental stages. This puts us right back on the track of personal cleanliness, sanitary practices and health education as the means to achieve the end.

The public health aspects of food borne outbreaks can go on and on. Not much attention has been paid to amoebic dysentery. Yet the parasitologists tell us that between 5 and 20 percent of the population are

carriers of *Endamoeba histolytica*. Explosive outbreaks of amebiasis are uncommon but this is an endemic disease since eight to thirty-two million Americans are presumably carriers. The task of finding technicians, laboratories, and financial assistance to discover and treat these people is unsurmountable. The administrative difficulties have been overcome by good sanitation and this endemic disease has not caused great concern. We must ever be mindful of the fact that environmental health includes many other important areas besides food poisoning. Among these are the disposal of products of atomic fission, synthetic chemicals, air pollution, noise, and accidents to mention just a few. When one considers the complexity of health department problems which may range from legislation, to budgets, program planning, office procedures, legal issues, and interpersonal relationships, he can only conclude that the sanitarian has his hands full now and the future holds little promise for a rest.

In summary: the public health aspects of food borne outbreaks include consideration of the team approach in health department investigations. The epidemiologic method defines problems and determines methods and principles for control programs. It is recommended that it is time to re-evaluate many items in the Restaurant Code. Research on the sanitary significance of the coliforms in various foods is needed, and the same holds true for the viruses. The importance of personal cleanliness, refrigeration, sanitary practices, and health education is stressed.

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²All of these now known as adenoviruses.