

An Outbreak of Salmonellosis Traced to Watermelon

By GILBERT E. GAYLER, M.D., ROBERT A. MacCREADY, M.D., JOSEPH P. REARDON, M.D.
and BERNARD F. McKERNAN, M.D.

WATERMELON as a vehicle in salmonellosis outbreaks is not thought to be an important public health hazard, but its possible danger should be recognized by public health officials.

This paper describes an outbreak of salmonellosis spread by watermelon. To our knowledge, its previous occurrence has never been reported. Indeed, while meat products, fowl, eggs, salads, and, occasionally, pastries are common vehicles of *Salmonella* infection, fruits are seldom implicated.

Epidemiology

Early in June 1954, 17 cases of gastroenteritis occurred in Upton, a rural town in Massachusetts. The 17 cases involved 5 family units, with ages of the patients varying from 2 to 80 years. The patients all had initial symptoms on the same day or the next day. The symptoms were those of nausea, vomiting, abdominal

cramps, diarrhea, and fever. The diarrhea in a number of the patients was unusually severe; it lasted for several days with resulting dehydration and prostration. The 80-year-old patient died of a complicating tibial artery thrombosis, and 1 of the 2 secondary cases of the outbreak occurred in the patient who shared the hospital room of this patient.

None of the 5 family groups had any apparent connection with one another. The only connection they had in common was the purchase of sliced watermelon from the same supermarket in the neighboring town of Milford. Symptoms began in each case 12 to 24 hours after the ingestion of the watermelon.

At first, watermelon appeared to be an unlikely vehicle for the infective agent of the outbreak. However, in 3 of the family units, 1 or 2 members or guests did not eat the watermelon. In each instance these individuals only were not ill. One member of a family ate sparingly of the melon and was only slightly ill. There was, therefore, apparently complete association between the eating of the melon and becoming ill afterward.

The market where the melons were bought was new and clean. The watermelons, which had been on sale for several days before the outbreak, were kept on an open counter. The melons were sold whole or sliced, and the sliced pieces that were awaiting sale were covered with wax paper.

Of the 3 watermelon samples submitted for

Drs. Gayler, MacCready, and Reardon are members of the Massachusetts Department of Public Health. Dr. Gayler is district health officer; Dr. MacCready is assistant director, biologic laboratories, and in charge of the diagnostic laboratory; Dr. Reardon is epidemiologist, division of communicable diseases. Dr. McKernan is a practicing physician in Upton, Mass.

examination to the health department laboratory—1 from each of 2 families and 1 from the supermarket—salmonellae were recovered in pure culture in immense numbers from the watermelons from both homes but not from the market watermelon. Stools were submitted from 9 of the 17 individuals who were ill. All were positive for salmonellae.

No enteric organisms were recovered from the knife used to slice the watermelons in the store, but salmonellae were recovered from the shelf where the knife was stored when not in use. However, no evidence of rodents could be found in the store, and traps especially set caught no animals. No enteric organisms could be recovered from the three clerks involved in slicing the watermelons; so far as could be ascertained, none of the clerks had had a recent enteric illness.

The Species *S. miami*

All of the salmonellae recovered were typed at the National Salmonella Center at the Beth Israel Hospital in New York, which classified them as *Salmonella miami*.

S. miami has been reported by Galton and Hardy as common in Florida (1, 2). They found this organism to be the cause of a food poisoning outbreak where contaminated pickle served in a restaurant was the disseminating vehicle. At various times they recovered it also from dogs, hogs, chimpanzees, and fowl. Although *S. miami* has been reported frequently in the other southeastern States as well as Florida, it is relatively rare elsewhere. It was, however, recovered in Massachusetts from 9 cases of gastroenteritis that occurred in July 1953, chiefly in the metropolitan Boston area. No definite connection between the cases could be discovered at the time, and we can only speculate as to their possible source.

Since the grower's label pasted on the outside of the watermelons indicated the fruit in the present outbreak came from Florida, and since *S. miami* is widespread in Florida (2), it seems reasonable to postulate that the organism may have come with the fruit from that State, rather than from some case or carrier within the store, where evidence of a human or animal source could not be found.

Some Speculation

How the individual watermelons became contaminated is, of course, an interesting question. On the supposition that the outside of the melon might, while in the field in Florida, have become contaminated with fecal material containing the organism and that the inside of the melon might have become contaminated only when the fruit was sliced before sale in the supermarket, we conducted a simple experiment at the diagnostic laboratory of the Massachusetts Department of Public Health.

In the experiment, the outside of a watermelon was swabbed with a dilute suspension of the *S. miami* organism, and then the watermelon was sliced with a clean knife. Cultures made from the cut surface, immediately and also after a few hours, each resulted in a few colonies on bismuth sulfite, but cultures made from the cut surface the following day, with the fruit remaining at room temperature in the meantime, resulted in innumerable colonies on bismuth sulfite. This would suggest that a knife by cutting through a watermelon that was contaminated on the outside with *S. miami* certainly could inoculate the watermelon so that the organisms would multiply upon the cut surface, under conditions prevailing in the supermarket where the melons were sliced for sale.

It was found also that a knife contaminated with a dilute suspension of *S. miami* could similarly inoculate a clean watermelon effectively. Thus, infection could be spread from melon to melon whenever the knife was not washed between cuttings.

Quite another method of contamination appears equally possible. The practice of injecting water into watermelons in this country, as well as in Asia, in order to increase their market weight, has been divulged on good authority. Obviously, contaminated water injected through clean watermelon surfaces, or clean water injected through contaminated watermelon surfaces could infect a number of melons.

Either of these means by which the melons could have become infected is, of course, hypothetical since the actual mechanics of the outbreak can hardly be proved. It does seem likely that the original source of salmonellosis was in

Florida where the melons were grown. In view of the huge number of watermelons sold in the market without previous reports of salmonellosis outbreaks, unless such outbreaks have escaped detection in the past, it does not appear that watermelons, whole or sliced, are a significant public health hazard, but they should be recognized by public health officials as a possible danger.

Summary

An outbreak of gastroenteritis caused by *Salmonella miami* is described. There were 17 primary cases among 5 families and 2 secondary cases.

The only article of food in common was sliced watermelon which had been purchased from the same market. Symptoms occurred 12 to 24 hours after the ingestion of the melon. *S. miami* was recovered from the sliced melon in 2 of the homes, from all of the stools submitted, and from the shelf in the store where the slicing knife was kept.

No evidence of human or animal source could be found in the store.

The melons were obtained from Florida, where *S. miami* is common, and the original

contamination of the melons may have occurred in Florida. Possible mechanics of the contamination of the watermelons are discussed.

. . .

Since writing this paper we have been informed of a similar outbreak of salmonellosis which occurred in Rochester, Minn., in August 1950. There were 6 cases in 2 families.

Each family had purchased half of a watermelon from the same roadside stand on the same day. Salmonella bareilly was cultivated from the remaining portions of the watermelon consumed by both families. Both specimens were heavily loaded with salmonellae. Only one stool specimen was submitted for examination, and this was negative for enteric organisms.

The outbreak was not reported in the medical literature.

REFERENCES

- (1) Galton, M. M., and Hardy, A. V.: Studies of acute diarrheal diseases. XXI. Salmonellosis in Florida. Pub. Health Rep. 63: 847-851 (1948).
- (2) Galton, M. M., and Hardy, A. V.: The distribution of *Salmonella* infections in man in Florida during the past decade. Pub. Health Lab. 11: 88-93 (1953).

Training in Rehabilitation

An intensive training course in methods and concepts of rehabilitation will be given at the University of California at Los Angeles, April 25-30, 1955, under the joint sponsorship of the university and the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare.

Designed to enable participants to serve as leaders in the advancement of coordinated services for disabled persons, the course is offered for the following rehabilitation supervisory personnel: physicians, nurses, physical therapists, occupational therapists, rehabilitation counselors, and social workers. Participants will be selected on the basis of leadership responsibility in key positions in five western States, but general sessions will be open to all interested members of the various professions.

Further information may be obtained from: Dr. W. A. Selle, Chairman, Committee on Rehabilitation, Department of Biophysics, School of Medicine, University of California Medical Center, Los Angeles 24, Calif.