Introduction
At a recent convention, 174 participants experienced severe diarrhea within 24 hours of a banquet. Fifty-seven had to be admitted to hospitals after blood appeared in their stools and their diarrhea continued unabated. Fifteen others were also admitted and treated for dehydration and electrolyte imbalance. Health officials questioning the caterer and patrons found that those who had skipped the salad were unaffected by the outbreak. An inspection of the kitchen found the area where the salad was prepared to be adjacent to the area where the chicken had been prepared (1). Samples were obtained from both food preparation surfaces and Salmonella enterica ssp. enterica was found in each.

This investigation revealed that sufficient evidence exists to pinpoint the cause of the diarrhoeal outbreak to be cross-contamination of fresh vegetables with bacteria from raw chicken through shared cooking surfaces or utensils. The microbe recovered, Salmonella enterica ssp. enterica, is a common cause of gastroenteritis and is frequently associated with digestive systems of animals (2).

Materials and methods

Sampling Methods
Based on Health Department investigation and interviews with those attending the dinner, samples were obtained from unprepared and prepared dishes and from food preparation surfaces and brought to the microbiology lab for analysis. Foods and surfaces were sampled using methods prescribed by U.S. Public Health Service guidelines. Once returned to the microbiology laboratory, samples were cultured using standard laboratory media and incubated using standard laboratory conditions (24h, 37°C), as outlined by the U.S. Food and Drug Administration standard methods, as described previously (3).

Identification Methods
Pure cultures were obtained via streak plating, and colonies were Gram stained (Fig. 1). Identification was initiated using a battery of standard biochemical test methods listed in Table 1. Results obtained helped direct the additional tests necessary to complete the identification (Table 3). All tests were performed and interpreted following the guidelines as described in VirtualUnknown™ Microbiology Help Files (4).

Results & Discussion
Initial isolation of the suspected source of the outbreak was accomplished on standard bacteriological media. Upon observation of the Gram stain, the organism was determined to be a Gram negative bacillus (Figure 1). The cells were arranged as singles with occasional pairs observed. Based on this information, a preliminary battery of tests was performed to narrow the range of possible organisms (Table 1). Growth on TSA agar suggested the microbe was able to ferment glucose and produce gas, but was unable to ferment lactose. These results were confirmed through completion of the O-F glucose and phenol red lactose fermentation tests. Also observed on the TSA medium following growth was the presence of hydrogen sulfide (H2S), appearing as a black precipitate. The IMViC results were negative for indole, Voges-Proskauer, and citrate utilization, but positive for methyl red. These results combined to eliminate 68 of the 71 possible bacteria found in the database.

The three remaining possible organisms were Proteus mirabilis, Proteus penneri, and Salmonella enterica ssp. enterica. Upon review of the identification Matrix found in VirtualUnknown™ Microbiology Internet Edition 2012, it was determined that two tests would resolve the identity of the organism. Those tests were performed and the results indicated the organism was Salmonella enterica ssp. enterica.

These results are completely plausible, based on the niche and typical ecology of the microbe and the symptoms of the victims. Further confirmation could be obtained by evaluating stool specimens from victims for the same microbe found in the foods.

Conclusion
Based on the results of this study, it appears the outbreak of gastroenteritis was caused by Salmonella enterica ssp. enterica inadvertently transferred from the poultry preparation surface to the fresh vegetable preparation surface. Because the vegetables were served uncooked, live enteric bacteria were transmitted to patients through this lapse in standard food safety operations.

Literature Cited

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For further information
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