Lactose-Fermenting *Salmonella*

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*Salmonella* species are generally considered to be unable to ferment lactose and sucrose according to *Bergey’s Manual*. Recently, however, J. M. Bulmash, McD. Fulton, and J. Jiron (J. Bacteriol. 89:259, 1965) and L. J. Kunz and W. H. Ewing (J. Bacteriol. 89:1629, 1965) have reported two separate species of *Salmonella* capable of fermenting lactose and sucrose. The organism reported here again illustrates that certain strains of *Salmonella* are capable of fermenting lactose and sucrose rapidly and can resemble very closely lactose-fermenting members of the *Enterobacteriaceae*. The organism isolated was the etiological agent of a rapidly fatal septicemia resulting from an infection of the uterus in a 21-year-old female during the first trimester of pregnancy, who aborted spontaneously. The organism was isolated from the blood and placental tissue during the course of illness and from postmortem blood and uterine cultures.

Primary isolates of the organism on MacConkey agar (Difco) resembled a coliform organism, owing to their rapid fermentation of lactose. Results of primary biochemical reactions led to a tentative identification of the organism as a strain of *Citrobacter freundii*. Because of the fulminating nature of the infection, further biochemical investigation of the organism was indicated. Inconsistencies were noted between expected results of *C. freundii* and those obtained with the organism under investigation with regard to the ability to decarboxylate certain amino acids. Results of serological agglutinations with *Salmonella* polyvalent antiserum indicated a serological resemblance to a *Salmonella* species. The organism was forwarded to W. H. Ewing, Communicable Disease Center, Atlanta, Ga., who identified it as a lactose- and sucrose-fermenting strain of *S. tennessee*.

Table 1 clearly illustrates the close resemblance, both biochemically and serologically, between *S. tennessee* and *C. freundii*. The results are evidence that the ability or failure to attack lactose, alone, cannot be depended upon for the separation of the *Salmonella* species from other lactose-fermenting organisms. The accurate differentiation between *S. tennessee* and *C. freundii* must be made on the basis of decarboxylase reactions and serological agglutinations.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th><em>Salmonella tennessee</em></th>
<th><em>Citrobacter freundii</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactose broth</td>
<td>Acid and gas</td>
<td>Acid and gas</td>
</tr>
<tr>
<td>Sucrose broth</td>
<td>Acid and gas</td>
<td>Acid and gas</td>
</tr>
<tr>
<td>Maltose broth</td>
<td>Acid and gas</td>
<td>Acid and gas</td>
</tr>
<tr>
<td>Mannitol broth</td>
<td>Acid and gas</td>
<td>Acid and gas</td>
</tr>
<tr>
<td>Dextrose broth</td>
<td>Acid and gas</td>
<td>Acid and gas</td>
</tr>
<tr>
<td>Methyl red</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Voges-Proskauer</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Simmons citrate</td>
<td>Growth</td>
<td>Growth</td>
</tr>
<tr>
<td>Motility</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Nitrites to nitrites</td>
<td>Positive</td>
<td>Positive</td>
</tr>
<tr>
<td>Kligler’s iron agar (acid butt)</td>
<td>Acid and gas butt with H₂S</td>
<td>Acid and gas butt with H₂S</td>
</tr>
<tr>
<td>Decarboxylase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lysine</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>Arginine</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Ornithine</td>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td><em>Salmonella</em> polyvalent antiserum</td>
<td>Agglutinated</td>
<td>No agglutination</td>
</tr>
<tr>
<td><em>Salmonella</em> group C (somatic)</td>
<td>Agglutinated</td>
<td>No agglutination</td>
</tr>
</tbody>
</table>
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