**BRIEF NOTE**

*Salmonella typhimurium* Infection in Imported Passerine and Psittacine Birds

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Isolation of *Salmonella* from pet birds has been reported by several investigators [11]: recently, *Salmonella typhimurium* was isolated from imported grey parrots [9] and *S. typhimurium*, *S. dublin* and *S. wasenaar* were recovered from pet finches, parrots, parakeets, and canaries [2] in West Germany; *S. typhimurium* and *S. arizonae* were isolated from psittacine birds including parrot, cockatil, macaw, lory and parakeet in the United States [6]. In Japan, *S. typhimurium* subsrvarer *copenhagen* has been isolated from imported pet pigeons [8], but there are no other reports on the incidence of salmonellae in Japanese pet bird populations. Consequently, the following is a case report concerning the prevalence of septicemic infections of *S. typhimurium*, including subsrvarer *copenhagen*, identified in finches (*Erythraша puina*), 3 species of lories (*Trichoglossus haematod*, *Lorius garrulus* and *Eos squamata*) and 2 species of parakeets (*Psophotus haematonotus* and *Psittacula krameri manillensis*).

From September to November, 1980, approximately 2,000 finches and 120 lories were imported to a Japanese distributor from the Republic of Indonesia. An additional 600 parakeets were also brought in from the Netherlands and India. During the 2 week period after importation, a large number of these birds either died or became moribund. Among the moribund birds 327 finches, 22 lories, and 120 parakeets were examined bacteriologically. Samples of livers and spleens, especially those with lesions, were cultured onto DHL agar plates (Nissui). Resulting *Salmonella*-like colonies were examined biochemically and serologically. Biotyping of isolates was done by the method of Duguid et al. [1] and tartrate utilization tests were modified according to Kauffmann and Petersen [3]. Drug sensitivity of isolates was tested by the agar dilution method using streptomycin (SM), kanamycin (KM), chloramphenicol (CP), tetracycline (TC), ampicillin (AM) and sulfadimethoxine (SDM). Heart infusion agar (Nissui) was used for testing drugs other than SDM for which Mueller Hinton agar (Nissui) was used. Drug-resistant isolates were re-examined in detail for detection of R plasmids according to previous descriptions [7, 8].

Table 1 summarizes the isolation of *S. typhimurium*, biotypes, drug resistance, and conjugative R plasmids of the isolates. Sixty (18.3%) finches, 6 (27.2%) lories and 2
Table 1. Isolation, biotypes, drug resistance, and conjugal R plasmids of S. typhimurium from imported pet birds

<table>
<thead>
<tr>
<th>Species</th>
<th>Exporting country</th>
<th>No. examined</th>
<th>No. of isolates</th>
<th>Biotype</th>
<th>0 antigen S</th>
<th>No. of resistant isolates</th>
<th>Drug resistance pattern</th>
<th>No. of R* isolates</th>
<th>Resistance pattern of R plasmids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finch</td>
<td>Indonesia</td>
<td>327</td>
<td>60</td>
<td>25i (50)</td>
<td>50</td>
<td>2 7 60</td>
<td>SDM (54)</td>
<td>0</td>
<td>SM-TC-SDM (5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25di [9]</td>
<td>2</td>
<td>1</td>
<td>SM-TC-SDM (6)</td>
<td>6</td>
<td>SM-TC (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27i [1]</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lory</td>
<td>Indonesia</td>
<td>22</td>
<td>6</td>
<td>25i (5)</td>
<td>5</td>
<td>5 6</td>
<td>SDM (4)</td>
<td>0</td>
<td>SM-TC (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27i [1]</td>
<td>1</td>
<td>1</td>
<td>SM-TC-SDM (2)</td>
<td>1</td>
<td>SM-TC (1)</td>
</tr>
<tr>
<td>Parakeet</td>
<td>Netherlands</td>
<td>27</td>
<td>1</td>
<td>25i (1)</td>
<td>1</td>
<td>1</td>
<td>SDM (1)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>India</td>
<td>93</td>
<td>1</td>
<td>31i (1)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>469</td>
<td>68</td>
<td>60 8 67</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a): No. of S. typhimurium. (b): No. of S. typhimurium subserovar copenhagen. (c): No. of isolates.

(1.6%) parakeets were infected with S. typhimurium. Seven (11.7%) isolates from the finches and 1 from the parakeets were S. typhimurium subserovar copenhagen. The biotyping results indicated that the finch isolates belonged to 25i (83.3%), 25di (15%) and 27i (1.7%); the lory isolates belonged to 25i (83.3%), and 27i (16.7%); and the 2 parakeet isolates belonged to 25i and 31i, respectively. Among the isolates of S. typhimurium subserovar copenhagen 87.5% and 12.5% were of biotypes 25di and 31i, respectively, but none belonged to the prevalent biotype 25i. All of the isolates were sensitive to KM (3.13–6.25 μg/ml), CP (3.13–6.25 μg/ml), and AM (1.56–3.13 μg/ml). Of 68 isolates, 67 were resistant to SDM (≥200 μg/ml), while only one isolate of biotype 31i was sensitive (50 μg/ml). Six (10%) of the 60 finch isolates and 2 (33.3%) of the 6 lory isolates were resistant to SM (≥100 μg/ml)-TC (≥100 μg/ml)-SDM (400–800 μg/ml). Seven (87.5%) of the 8 triple-resistant isolates (SM-TC-SDM) from finches and lories had conjugal R plasmids. Five (71.4%) of the 7 R* isolates conferred triple resistance and the remaining 2 conferred double resistance (SM-TC). Biotype had no relation to drug resistance.

An interesting feature was the high incidence of S. typhimurium infection in the birds imported from Indonesia. These birds developed clinical signs of disease including ruffled feathers and anorexia soon after importation. It is very likely that both the finches and lories aquired subclinical infections of Salmonella following capture in Indonesia which surfaced to clinical disease following the stress of handling, overcrowding and transportation. The two parakeet isolates were especially interesting. Since one isolate was similar to the prevalent finch and lory biotype, 25i, it is possible that cross-infection occurred in the parakeets which were kept in a nearby room. The other isolate, belonging to biotype 31i, was unlike any of the others, thus its epidemiology is less clear. Seven triple-resistant isolates which conjugated R plasmids were detected in finches and lories, possible due to the prophylactic use of antibiotics for the prevention of disease.

The most prevalent primary biotype was 25 (95.6%), which has also been isolated from food-poisoning outbreaks in man [5]. In addition, it is known that pet tortoises have been source of human Salmonella infections [4], and that domestic poultry and other avian species constitute the largest single reservoir of Salmonella organisms in nature [10, 11]. Therefore, pet birds may be a very important source of human,
animal and bird *Salmonella* infections which emphasizes the importance of strict quarantine practices with imported pet birds in Japan.

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References


要約

輸入フィンチおよびインコ類に発生したネズミチフス菌感染症（通報）：澤英之・平井克哉・金城俊夫*・柴田光・鳥倉省吾（岐阜大学農学部獣医学科家畜散生物化学教室，*農医公衆衛生学教室）——インドネシア共和国から輸入後発症したフィンチ 327 羽中 60 羽およびインコ 22 羽中 6 羽の肝臓・脾臓から、また、オランダおよびインドからのインコ 120 羽中 2 羽からも飼育に *Salmonella typhimurium* が計 68 株分離され、このうち 8 株がカパンハーゲン型であった。Duguid らの生物型では 25i (56 株)，25i (9 株)，27i (2 株) および 3ii (1 株) の 4 型に型別され，R プラスマドを持つ 3 種耐性菌 (SM-TC-SDM) が 7 株検出された。輸入愛玩鳥によって人および家畜の環境がサルモネラに汚染されることを防止するために，愛玩鳥の輸入検疫が厳重に実施されなければならない。