

A note on some Enterobacteriaceae from the faeces of small wild British mammals

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SUMMARY

Over a four-year period 878 samples of faeces were collected from five species of small wild rodents and two species of shrews at sites in England, Scotland and Wales. A search was made for *Salmonella* in these samples but no isolations of this genus were made. Several other genera of Enterobacteriaceae were identified.

INTRODUCTION

Jones & Twigg (1976) searched for *Salmonella* in 16 species of wild mammals. Samples were obtained from 1269 animals but isolations of *Salmonella* were made from only eight house mice (*Mus musculus*) and seven of these were known to have been in contact with cattle artificially infected with *Salmonella*. These authors therefore concluded that infections with *Salmonella* in wild mammals in Britain were extremely rare. Gibson (1961 (cited in Jones & Twigg, 1976)) found a small incidence (0.6%) of infections with *Salmonella* in rats (*Rattus norvegicus*) and Taylor (1968) suggested that infections with *Salmonella* are rare in house mice that are not in contact with infected man or domestic animals.

A survey of the carriage of viruses by small wild British rodents performed between 1975 and 1979 (Kaplan *et al.* 1980) made possible a concomitant search for *Salmonella*.

METHODS

The samples were obtained from several sites in the United Kingdom (Table 1). Seven small mammal species were sampled (Table 2).

Laurieston, Llanerchyrfa and Oakfield were visited at intervals of approximately 6 weeks from 1975 to 1979. Alice Holt was trapped at intervals of 6 weeks during the first half of 1976 and Skomer was visited annually in August. The remaining sites were each visited once only during 1977 and 1978. Few samples were obtained from these sites which were grouped together as the 'subsites'.

The animals were captured in Longworth traps. To prevent dissemination of infection the traps were sterilized by autoclaving between each trapping session and the trap carriers were washed in 5% solution of Tegodor (Th. Goldschmidt Ag). Detailed descriptions of the study areas and trapping methods will be published elsewhere (Healing & Kaplan, in preparation).

Table 1. *Sampling sites in the United Kingdom*

1 Laurieston, Kirkcudbrightshire	7 Rye, E. Sussex
2 Llanerchyrfa, Powys	8 Avington, Hampshire
3 Oakfield, Berkshire	9 Sheffield, Yorkshire
4 Alice Holt, Hampshire	10 Tregaron, Dyfed
5 Skomer Island, Dyfed	11 Babraham, Cambridgeshire
6 Thatcham, Berkshire	12 Coxtie Green, Essex

Table 2. *Small mammal species sampled*

Woodmouse	<i>Apodemus sylvaticus</i>
Yellow-necked mouse	<i>A. flavicollis</i>
Bank vole	<i>Clethrionomys glareolus</i>
Skomer vole	<i>C. glareolus skomerensis</i>
Short-tailed vole	<i>Microtus agrestis</i>
Red squirrel	<i>Sciurus vulgaris</i>
Common shrew	<i>Sorex araneus</i>
Pygmy shrew	<i>S. minutus</i>

Table 3. *Numbers of samples of faeces*

	Laurio- ston	Llaner- chyrfa	Oak- field	Alico Holt	Skomer	Subsites	Total
<i>Apodemus sylvaticus</i>	48	22	207	—	5	10	301
<i>A. flavicollis</i>	—	—	3	—	—	—	3
<i>Clethrionomys glareolus</i>	20	4	191	—	—	6	221
<i>C. g. skomerensis</i>	—	—	—	—	68	—	68
<i>Microtus agrestis</i>	25	71	16	72	—	5	189
<i>Sciurus vulgaris</i>	1	—	—	—	—	—	1
<i>Sorex araneus</i>	14	31	37	—	7	5	94
<i>S. minutus</i>	—	1	—	—	—	—	1
Total (rodents)	94	97	417	72	73	30	783
Total (shrews)	14	32	37	—	7	5	95

Table 4. *Enterobacteriaceae from faecal samples*

	<i>As</i>	<i>Cg</i>	<i>Cgs</i>	<i>Ma</i>	<i>Sv</i>	<i>Sa</i>	<i>Sm</i>	Total (rodents)	Total (shrews)	Total
<i>Hafnia alvei</i>	5	7	3	2	1	13	1	18	14	32
<i>Citrobacter freundii</i>	1	1	1	—	—	1	—	3	1	4
<i>Proteus vulgaris</i>	1	—	—	—	—	—	—	1	—	1
<i>P. mirabilis</i>	1	—	—	—	—	—	—	1	—	1
<i>Escherichia coli</i>	2	1	—	—	—	—	—	3	—	3
<i>Yersinia</i>										
<i>enterocolitica</i>	1	—	—	—	—	—	—	1	—	1
<i>Klebsiella</i>										
<i>rhinoschleromatis</i>	—	—	—	—	—	1	—	0	1	1
Total	11	9	4	2	1	15	1	27	16	43

As, *Apodemus sylvaticus*; *Cg*, *Clethrionomys glareolus*; *Cgs*, *C. glareolus skomerensis*; *Ma*, *Microtus agrestis*; *Sv*, *Sciurus vulgaris*; *Sa*, *S. araneus*; *Sm*, *S. minutus*.

When animals defaecated while being handled, the faecal pellets were collected in 2 ml vials, which each contained 1 ml Selenite broth (Lab M). The samples were kept at ambient temperature. When returned to the laboratory the tubes of broth were incubated for 24 h at 37 °C and then subcultured on DCLS agar (Lab M). These cultures were incubated at 37 °C and examined after 24 h, and again after 48 h if no bacterial growth had occurred by the first examination. Bacterial colonies having the appearance expected of non-lactose fermenting bacteria growing on this medium were then subcultured on modified brilliant green agar and XLD agar (Lab M) and incubated for 24 h at 37 °C. Any samples that were not eliminated by these means were tested biochemically using the API 20-E system. Those few which were provisionally identified as *Salmonella* by this system were subjected to more tests by the Veterinary Investigation Centre, Coley Park, Reading.

RESULTS

The number of faecal samples obtained from the different mammal species and the different sites are listed in Table 3. Of the samples, 835 were eliminated on the basis of their growth characters on the three agars: 313 samples were tested on modified brilliant green and XLD agar and of these 270 had growth characters indicative of common Enterobacteriaceae other than recognized pathogens such as *Salmonella* and *Shigella*. Some of these results are given in Table 4.

DISCUSSION

The results obtained during the present study support the conclusion of Jones & Twigg (1976) that infections with *Salmonella* in populations of small wild mammals are very rare and that such mammals are unlikely to constitute an important reservoir of infection for domestic animals. The bacteria other than *Salmonella* identified by the API 20-E system are almost all common inhabitants of the mammalian gut. The only isolate of particular interest is *Yersinia enterocolitica*, which has been associated with a number of different human illnesses. Its effect on wild mice is not known.

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