

An outbreak of food poisoning caused by *Salmonella typhi-murium*, phage-type 12, probably spread by infected meat

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Not all outbreaks of salmonella food poisoning are explosive; some take the form of sporadic cases over a prolonged period of time. On inquiry, no common food and no single food premises are found to be implicated (Harvey & Phillips, 1961). Before the development of phage-typing of *Salmonella typhi-murium* (Felix & Callow, 1943; Callow, 1959; Anderson, 1960), many of the infections comprising such a group of related cases would have been regarded as sporadic. The use of phage-typing now enables the infections to be linked and allows them to be studied as a single episode instead of a series of apparently unrelated incidents of unknown origin (Anderson, Galbraith & Taylor, 1961). An outbreak caused by *S. typhi-murium*, phage-type 12, which occurred in South Wales in 1960, illustrates such a pattern of infection.

INVESTIGATION OF THE OUTBREAK

The human infections occurred over the period May to October 1960 (Table 1). The geographical distribution of the incidents is shown in Fig. 1. It will be noted that the main impact was experienced in Cardiff.

The patients were visited by staff of the City Health Department, and inquiries were made as to possible sources of infection. No single item of food could be implicated, but as meat was a possible cause of the outbreak, gauze swabs were placed in open drains in the abattoirs of Barry and Cardiff (Fig. 1). These drains were not subject to human pollution and it was considered that isolations of salmonellae from them would indicate the entry of infected animals into the abattoirs. The drains sampled received blood and faeces from the slaughtered animals. *S. typhi-murium*, phage-type 12, was isolated from the initial samples from both abattoirs and arrangements were made to receive regular specimens of drain swabs. Some samples of human sewage from Cardiff abattoir were also examined. The results are given in Table 1.

During the period of investigation, *S. typhi-murium*, phage-type 12, was isolated 14 times from Cardiff abattoir and 5 times from Barry abattoir. The prolonged

isolations of phage-type 12 from the Cardiff abattoir specimens over the 10-week period 8 July 1960 to 9 September 1960 is striking. In 5 years of abattoir swabbing, this is the only instance we have encountered of the isolation of the same salmonella strain from consecutive swabs for so long a period. The strain was isolated 14 times from drains receiving material from pig slaughter and 13 times from drains receiving material from cattle slaughter. The human sewage from Cardiff abattoir was sampled regularly from the week ending 22 July 1960 and was positive on

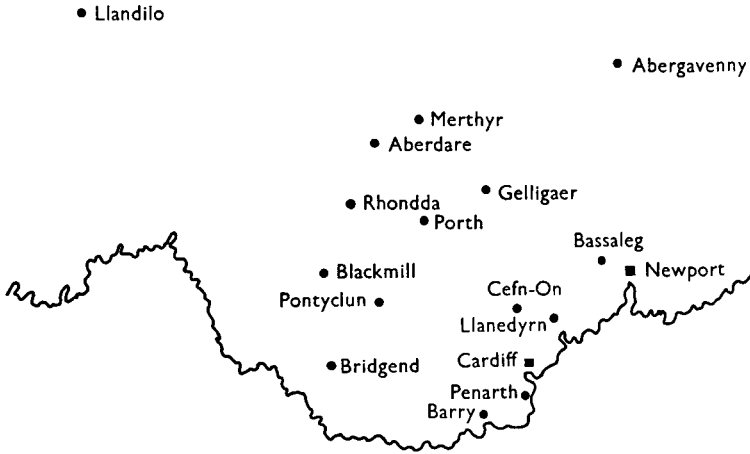


Fig. 1. Geographical distribution of human and animal incidents caused by *S. typhi-murium*, phage-type 12, in South Wales.

Human incidents		Animal incidents on farms		
Place	No. of incidents	Place	Date	Animals infected
Aberdare	1	Llandilo	12 October 1959	Pigs
Barry	4	Abergavenny	30 December 1959	Pigs
Blackmill	2	Bassaleg	7 July 1960	Cows
Bridgend	1	Llanedyrn	18 July 1960	Pigs
Cardiff	81			
Cefn-On	1			
Gelligaer	2			
Merthyr	2			
Penarth	6			
Pontyclun	1			
Porth	2			
Rhondda	2			
	105			
		Total human infections	= 122	
		Sporadic cases	= 95	
		Family incidents	= 10	

six occasions for phage-type 12. As the view is sometimes put forward that salmonella isolations from an abattoir may have a human source, the sampling of human sewage at Cardiff slaughter house was regularly continued after the end of the outbreak. This sewage was last found positive at the abattoir in the week

Table 1. Time relations in the outbreak, 1960

Month	May			June			July			August			September			October			November									
	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26	2	9	16	23	30	7	14	21	28	18	25	
Week ending	1	0	0	4	2	11	12	16	21	16	6	3	2	2	3	2	0	0	1	0	0	1	2	0	0	0	0	
Human incider
Cardiff abattoir material from
Cardiff abattoir
Cardiff abattoir 63 persons*
Cardiff abattoir faeces, 69 pigs*
Cardiff abattoir only one rat c
Retail shop dr
Retail shops, C 112 persons*
Barry abattoir material from

* Figure underneath + sign denotes number of animals or persons found positive.

ending 2 September 1960. Since then it has not once been positive over a period of 30 months, although frequent isolations of salmonellae have been made from drains receiving material from slaughtered animals. It is thus improbable that the salmonella strains isolated from the abattoir had a human origin. The technique of examination was that described previously (Harvey & Phillips, 1961).

From the records of the Veterinary Investigation Department, Cardiff, it was found that type 12 had been isolated from animals on three farms in South Wales in 1959–60. The isolations had been made twice from pigs and once from a cow. It was arranged during the outbreak to examine individual cow and pig faeces taken at the city abattoir. Altogether 201 cattle faeces and sixty-nine pig faeces were examined. All the cattle faeces were negative, but one pig faeces was found to be positive for *S. typhi-murium*, phage-type 12. The pig from which the positive specimen was obtained was traced to a farm at Llanedyrn—a village between Cardiff and Newport. The geographical position of all animal incidents on farms is given in Fig. 1.

One rat was caught in the Cardiff abattoir. *S. typhi-murium*, phage-type 12, was isolated from it.

Table 2. *Isolation of Salmonella typhi-murium, phage-type 12—food premises*

Food premises no.									Description of retail premises
	14 July	18–19 July	22 July	26–27 July	31 July	17 Aug.	25 Aug.	Later	
1	—	+	.	—	.	.	.	—	Butcher
2	+	—	.	—	.	.	.	—	Butcher
3	+	+	.	—	.	.	.	—	Butcher
4	.	+	.	—	—	.	.	.	Butcher
5	—	+	.	—	.	.	.	—	Butcher
6	+	+	—	—	Butcher
7	+	+	+	—	Butcher
8	+	.	+	—	.	.	.	—	Butcher
9	+	—	.	—	.	.	.	—	Butcher
10	+	+	.	+	.	.	.	—	Butcher
11	+	+	.	—	.	.	.	—	Butcher
12	+	—	.	—	.	.	.	—	Baker
13	+	—	.	—	.	.	.	—	Butcher
14	.	.	.	—	.	.	—	+	Butcher
15*	.	—	.	—	Butcher
16	—	+	.	—	.	.	.	—	Baker

* Drains receiving material from food preparation rooms negative, but butcher found to be excreting *S. typhi-murium*, phage-type 12.

In a previous group of related cases due to *S. typhi-murium*, 1a var. 3 (Harvey & Phillips, 1961), it had been possible to isolate the organism from farm animals in South Wales, from abattoir samples and from local human infections. In the present outbreak, we wished to follow the path of infection to retail food premises. As most of the human incidents occurred in Cardiff, it was decided to examine food shops in the city. The sampling technique used was identical with that previously employed in the drains of abattoirs.

The shops examined were selected either because they were directly associated with notified cases, or because they were located in the neighbourhood of groups of cases. They comprised fifty-four premises of mixed types.

Swabbing was carried out from July to September 1960. *S. typhi-murium*, phage-type 12, was isolated by the drain-swab technique from thirteen butchers' shops and two bakehouses. The latter premises sold made-up meat products in the form of sausage rolls as well as confectionery. Both bakehouses belonged to the same firm. Although the organism was not isolated by drain sampling from a further butcher's shop, one of the employees at this shop was found to be excreting phage-type 12. This man was also employed as an assistant slaughterman at the Cardiff abattoir. It was possible, therefore, to demonstrate the presence of the type on the premises of 16/54 of the selected food establishments. Details of the premises in which the organism was found are given in Table 2.

Other strains of salmonellae were also isolated from these food premises, namely *S. typhi-murium*, phage-types 2c, 1, 1a var. 3 and untypable; *S. thompson*, *S. give*, *S. kiambu*, *S. derby*, *S. coley-park*, *S. binza*, *S. brandenburg*. All these isolations were made from premises dealing in raw or processed meat.

Faecal swabs were taken from all the staff of the infected food premises (total 112). Of these employees, only one was positive—the man mentioned previously who was also an apprentice slaughterman at the abattoir (Table 2, food premises no. 15). This man was clear of infection on 10 August 1960.

SUMMARY

An outbreak of food poisoning caused by *Salmonella typhi-murium*, phage-type 12, in which 122 persons were infected, is described.

Isolation of the same organism from the drains of two large abattoirs, from pig faeces at one abattoir, and from the floor drains of fifteen out of fifty-four butchers' shops and bakehouses examined, together with records showing that this organism had been recently isolated from pigs and cattle in the neighbourhood, suggested that meat was the vehicle of infection.

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