reports: Professor R. E. Kelly, Dr. H. Wallace Jones, Mr. H. C. W. Nuttall, Mr. R. Watson Jones, Dr. A. J. McCall, Dr. J. P. Steel, and Dr. MacWilliam.

REFERENCES

- Browder, J., and DeVeer, J. A. (1935). *Amer. J. Cancer*, **24**, 507.
 Clarke, B. E. (1934). *Amer. J. Path.*, **10**, 693.
 Connolly, A. E. (1935). *Brit. J. Radiol.*, **8**, 781.
 Davidsohn, I., and Feldman, L. (1937). *Trans. Chicago path. Soc.*, **15**, 16.
 Fried, B. M. (1934). *Amer. J. Cancer*, **20**, 791.
 — (1935a). *Ibid.*, **23**, 247.
 — (1935b). *Ibid.*, **25**, 738.
 Frost, T. T., and Wolpaw, S. E. (1936). *Ibid.*, **26**, 483.
 Geschickter, C. F., and Denison, R. (1934). *Ibid.*, **22**, 854.
 Graef, I., and Steinberg, I. (1936). *Amer. J. Roentgen.*, **36**, 293.
 Hare, E. S. (1838). *Lond. med. Gaz.*, **23**, 16.
 Jacox, H. W. (1934). *J. Amer. med. Ass.*, **103**, 84.
 — and Baker, M. R. (1937). *Radiology*, **29**, 525.
 Kelman, H., and Schlezinger, N. S. (1937). *Arch. Path.*, **23**, 383.
 Marcil, G. E., and Crawford, B. L. (1936). *Amer. J. Cancer*, **26**, 137.
 Pancoast, H. K. (1924). *J. Amer. med. Ass.*, **83**, 1407.
 — (1932). *Ibid.*, **99**, 1391.
 Ryce, J. L. (1938). *British Medical Journal*, **1**, 1304.
 Samson, P. C. (1935). *Amer. J. Cancer*, **23**, 741.
 Stein, J. J. (1937). *Texas State J. Med.*, **33**, 293.
 Steiner, P. E., and Francis, B. F. (1934). *Amer. J. Cancer*, **22**, 776.
 Tobias, J. W. (1932). *Rev. méd. lat-amer.*, **17**, 1522 (quoted by J. J. Stein).
 Tuttle, W. M., and Womack, N. A. (1934). *J. thorac. Surg.*, **4**, 125.

AN OUTBREAK OF SONNE DYSENTERY

BY

Colonel C. J. TRIMBLE, C.B., C.M.G., D.P.H.

Medical Officer of Health, Preston Rural District

AND

W. C. V. BROTHWOOD, M.A., M.D., D.P.H.

Chief Assistant County Medical Officer of Health,
Lancashire County Council

On January 31, 1938, the bailiff of a farm in the Preston rural district gave information that some of the consumers of the milk produced there had been troubled with diarrhoea. The farm was visited forthwith and the following facts were elicited:

Particulars Concerning the Outbreak

1. The outbreak had started on January 26, and was characterized by diarrhoea and slight abdominal pains. The stools were slimy, but no blood was visible.
2. The cases were few, were limited to the consumers of the milk produced at the farm, and not all the consumers were affected. Among those affected were the four farm employees concerned with the production and delivery of the milk.
3. The quantity of milk produced was eight gallons daily. Four gallons of this were distributed. The remaining four gallons were mixed with milk from other farms and made into cheese.
4. No person at the farm had previously suffered from a similar illness.
5. The water supply to the farm was from two sources: (a) A shallow well: this water was used for washing the milk utensils. (b) A spring: this water was used for drinking purposes.
6. There had been no addition to the cattle for more than a year.

It was clear that the outbreak was milk-borne, and after consideration of the main features it was thought to be probably due to the Sonne dysentery organism. The following steps were accordingly taken:

(a) Distribution of the milk was prohibited for a period of two weeks in order that investigations could be made. Use of the milk on the farm was not prohibited providing it was boiled before use. No action was taken with regard to the cheese which had been made. The proportion of contaminated milk used in its manufacture was very small, and, further, it was known that conditions during "ripening" are so unfavourable that pathogenic organisms of the type under consideration do not survive.

(b) A list of consumers was obtained from the bailiff. (The list was subsequently shown to be incomplete, and this fact accounts for the delay in taking specimens in some cases.) Four of the households supplied with milk lived in the adjoining Garstang rural district. By arrangement with the medical officer of health of that district they were investigated by officers of the Preston rural district.

(c) Each household taking the milk was visited. Inquiries were made, specimens of faeces were taken where it was considered necessary, and instructions were given as to the disinfection of the hands, soiled clothing, and faeces of affected members.

(d) Samples of water from the well and spring were taken for bacteriological and chemical examination.

(e) All doctors practising within the area were notified of the occurrence of the outbreak.

The milk was supplied to twenty-four households, but only twelve were affected by the outbreak. Eighty-six persons were at risk, but only twenty-one became ill. The graph shows the daily distribution of the cases, five occurring on the first day.

It is interesting to speculate as to the number of cases that were "primary" and the number "secondary"—that is, the number which resulted from the consumption of milk that was in a contaminated state when received, and the number which were infected by members of their own households. It must be accepted that the cases occurring on January 26 and 27 were "primary" cases, and it is clear that those occurring on February 4 and 6 were "secondary," because the milk supply had been stopped on February 1. The position with regard to the cases which occurred from January 28 to February 1 inclusive is not clear: it is possible that all these were primary, and due to a common continuing source of infection. On the other hand, in all cases except one there was in the household an infected member of at least forty-eight hours' standing, and in the exceptional case there was abundant opportunity for it to be infected secondarily. The possibility of "secondary" infection cannot therefore be dismissed. The advent of secondary cases indicates that the instructions given to members of affected households were not efficiently carried out.

Graph of the outbreak, showing the daily distribution of cases.

The Water Supply

Samples of water were taken from both the shallow well and the spring, and were submitted to bacteriological and chemical examination. The bacteriological examination gave the following results:

	Shallow Well (Washing Water)	Spring (Drinking Water)
Bacterial colonies per c.cm.:		
Agar 37° C., 48 hours	450	60
Presumptive <i>B. coli</i> :		
Calculated number of organisms of <i>coli-aerogenes</i> group per 100 c.cm.	1,600	70
<i>B. dysenteriae</i> Sonne could not be isolated.		

The figures show that both samples were markedly polluted, and that they were unfit for domestic use. The *chemical examination* also showed that the water was unfit for use. The results are expressed in parts per 100,000.

	Shallow Well (Washing Water)	Spring (Drinking Water)
Total solids in solution	22.8	48.8
Oxygen absorbed from perman- ganate in 15 minutes	0.144	0.028
Oxygen absorbed from perman- ganate in 3 hours	0.291	0.058
Ammonia	0.015	0.004
Albuminoid ammonia	0.038	0.0165
Nitrogen as nitrates	0.18	0.008
Nitrogen as nitrites	0.0022	Nil
Combined chlorine	2.3	3.2

As soon as the significance of the results of the examination of the water was communicated to the farmer he ceased to use it. He is now using for all purposes wholesome water carried from another farm, and he is considering the question of having the public water supply laid on.

Results of Examinations of Faeces

Bacteriological examinations, the results of which are given in the accompanying table, confirmed the suspicion that the outbreak was due to the Sonne dysentery organism. Several features are worthy of notice. The general tendency in this outbreak was for the organism to be present in the faeces for seven or eight days after

Table showing the Results of the Bacteriological Examination of Faeces

Initials	Date of Onset	Result of Examination of Faeces on											
		February								March		Ap.	Nov
		3	4	5	9	16	21	28	7	21	4	24	
1 Mrs. P. . .	Jan. 26				Neg.	Neg.							
2 Miss C. . .	"	Pos.			"	"							Neg.
3 Miss R. W. .	"				"	"							
4 Miss J. W. .	"						Neg.						
5 Master A.W. .	"				"	Pos.	"						"
6 W. S., jun. (Delivers milk)	Jan. 27				"	"	"	Neg.	Neg.				"
7 Mr. A. S. . .	"	Pos.			"	Neg.							"
8 Master R.M. .	"				"	"							
9 Mrs. C. . .	Jan. 28							"					
10 Miss A. M. .	Jan. 29					"							
11 Mr. G. S. . .	"						"						
12 Master F. J. .	"				"	"							
13 W. S., sen. (Bailiff)	Jan. 30			Neg.	"		"	"					
14 Miss D.C. . .	"		Pos.		Pos.	Pos.	"	Pos.	Pos.	Neg.	Neg.	"	
15 Mr. J. C. . . (Milker)	"		Neg.		Neg.	Neg.	"	"	Neg.	"	"	"	
16 Miss J. G. . .	"				Pos.	"	"						"
17 Mr. H. C. . . (Milker)	Jan. 31		Pos.		Neg.	"	"	Neg.					"
18 Miss P. . .	Feb. 1				"	"							
19 Mrs. D. . .	"				"	"							
20 Mr. J. . .	Feb. 4				Pos.	"	"						"
21 Mr. P. . .	Feb. 6				"	Pos.	Pos.	Pos.	Pos.		"	"	"

the attack, and to be absent after fourteen days. Exceptional behaviour, however, was shown by one or two cases. Thus Case 14, which began on January 30, was still excreting the organism on March 7, and Case 21,

starting on February 6, was also excreting the organism on March 7. Case 15 (a milker) was exceptional in that negative results on February 4, 9, 16, and 21 were followed by a positive result on February 28, and this by four negative results.

Release of the Milk

On February 17 the question of releasing the milk was discussed, and it was decided to permit the distribution of the milk subject to certain safeguards:

(a) The continued use of the wholesome water for the washing of milk utensils.

(b) The suspension from duty for an indefinite period of the boy who delivered the milk: he was still excreting organisms on February 16 (Case 6).

(c) Scrupulous attention to personal cleanliness by the bailiff and his two milkers.

(d) Further examinations of the faeces of the bailiff and the two milkers at weekly intervals. The bailiff (Case 13) and Case 15 had been consistently negative. With regard to Case 17, two negatives had succeeded the positive of February 4.

(e) The households taking the milk to be kept under observation.

It is particularly fortunate that (c) and (d) were insisted upon, because on February 28 one of the milkers (Case 15) was found to be excreting the Sonne organism. He was therefore prohibited from handling milk. Following negatives on March 7 and 21 he was allowed to resume work.

The Origin of the Outbreak

Though it seems clear that the outbreak was milk-borne, it is not clear as to the manner in which the milk became contaminated. On the one hand, it is possible that the polluted water which was used for washing the milk utensils was at fault. On the other hand, the milk might have been contaminated by one of the farm servants who handled it. There was, however, no history of any previous attack, and all of them were affected in this outbreak. The boy who delivered the milk can be excluded because he had not been connected in any way with the milk supply of three of the infected households.

Summary

An outbreak of Sonne dysentery due to contaminated milk has been described. About a quarter only of the persons exposed to infection suffered.

It was not found possible to determine the source of the contamination.

Administrative action was followed by a prompt cessation of the outbreak, except for two "secondary" cases.

The outbreak demonstrates the importance of repeated examination of the faeces of those infected if secondary cases are not to occur through a person's ignorance of the fact that he is still excreting the organism long after he appears to have recovered.

It also shows that it is particularly important during an outbreak of this type that repeated examinations should be made in the case of persons actually handling milk, and that they should be scrupulous in their personal cleanliness.

Our thanks are due to Dr. J. H. Cooke of the Preston Royal Infirmary, and Mr. J. R. Stubbs, the county analyst, for carrying out the bacteriological and water examinations.