The diagnosis was now definitely established—a case of so-called undulant fever. Reference to the accompanying chart will show that the temperature was not of the typical undulating form. The rise in temperature from March 2nd to 5th was due, I think, to active congestion of liver, particularly the left lobe, or possibly to a masked splenitis, the pain from which gave the patient two bad nights, and was completely relieved by a hypodermic injection of scopolamine-morphine, and did not recur. There had been no treatment

beyond rest in bed, nourishing light diet, and for the first few days salol for the bowel condition.

As there is no known treatment I decided to try intramuscular injections of S.U.P. 36. This was done on March 5th, 8th, and 12th—that is, at the end of the sixth week of the disease, and the second week after I first saw him. A glance at the chart will show a quite dramatic change, considering that the average duration of this disease is fifteen and a half weeks. Beyond that was the fact that the following morning, for the first time since the beginning of his illness, the patient enjoyed his food—he had previously had some anorexia—and enjoyed a cigarette. His tongue, which had remained thickly coated, was cleaning, and within forty-eight hours was quite clean, and from that time his temperature remained at or about normal.

He returned home on March 16th, three weeks after I had first seen him. Six weeks later he telephoned to say he had been working full time for a month, and except for slight anaemia, he was quite well. The sequel to the use of S.U.P. 36 was possibly a coincidence, but I should certainly try it again, as I have found it very useful and even striking in somewhat analogous conditions, and in any case it is harmless. It is not suggested that this chemotherapeutic agent strikes at any particular micro-organism, but that it has a great influence on pyrexia and creates a general feeling of well-being in the patient is certain.

Through the activity of Dr. J. Rennie, medical officer of health, and the courtesy of the veterinary department of the West Riding, vaginal swabs, milk, and blood were obtained from the herd of nine cows owned by the farmer by whom the suspected milk was supplied.

All the swabs and milk were negative, but in the case of two cows, which were kept in different sheds, the blood agglutination test was positive—in one in titre 1 in 1,000, and in the other 1 in 500.

COMMENTS

The name abortus fever seems to me preferable to undulant fever, as, although there is a certain amount of undulancy, it is nothing approaching that of a typical case of Mediterranean fever, but bears a close resemblance to that found in tuberculosis, with the regular evening rise and morning fall.

The surprising thing is that the incidence of abortus fever is so low. It may be that the bovine strain is of relatively low pathogenicity for human beings, or that there are other factors of immunity responsible for the low incidence. It is also difficult to understand why children under 5 years of age appear to be almost immune. Is it possible that unrecognized cases in infancy account for the relatively high immunity in adults?

My thanks are due to Dr. A. E. Barnes for suggesting further blood tests, to Professor Edington and staff for their very great help and interest, and to Dr. Rennie for his help in linking up the disease with the source.

BIBLIOGRAPHY

- British Medical Journal*, October 3rd, 1931.
Lancet, September 26th, 1931.
Amer. Journ. Dis. Child., November, 1931.
Minnesota Med., August, 1931.
 Ministry of Health Report, No. 56.

A CASE OF UNDULANT FEVER IN DERBYSHIRE

BY

P. H. J. TURTON, M.D.ED., D.P.H.MANCH,
 PHYSICIAN, HEANOR MEMORIAL HOSPITAL

AND

C. F. PECKHAM

ASSISTANT BACTERIOLOGIST, DERBY COUNTY HOSPITAL

As undulant fever has not hitherto been reported as occurring in Derbyshire in any person indigenous to the county, the following case of this disease is perhaps worthy of record.

CLINICAL HISTORY

A farmer, aged 44, was first seen by one of us on November 20th, 1931. He complained that for a period of three or four weeks previously he had felt very unwell and run down, and had not looked well from the end of September. On October 27th he had a very bad headache when helping a friend to make some doors, and had to go home. The sensation of unwellness continued with bad headaches and tiredness. His appetite was poor, and he slept badly. The headaches were over the vertex and frontal regions. During this time he had no sweats.

He has been a dairy farmer for many years, and owns a herd of twenty cows. He does not live on the farm, which he rents; the occupants of the house at the farm, a maiden lady and her maid, have not, to our knowledge, been ill. He lives at a considerable distance from the farm, and the occupants of this house—his wife, two children, and his father—have all been well. His last illness was seven years ago. He does not visit neighbouring farms, and occasionally attends market at Derby. He works very little on the farm himself, as the milking is done by a man. In late September, 1931, a cow, which he has had two years, had difficulty in calving. He assisted the "vet.," but states that his only contact was to pull on the rope; the calf survived only a short time after delivery, as the mother was "short of room." Contagious or epidemic abortion among cattle is a very common disease in this county. Round Heanor there is scarcely a farm which has not been affected during the past five years. The patient states that his cow was healthy. In the spring of 1931 he had two cows which cast at seven months while running on grass, but he has had no other cases. The patient never drinks raw milk or cream, and only occasionally in summer-time eats home-made butter. No goats are kept on the farm.

On examination the patient had a temperature of 102° F. There was nothing in the chest, abdomen, or urine to note, and the heart sounds were normal. He complained of severe headache and malaise. On the previous evening he had had a rigor, followed by profuse sweating. This was repeated on the three following evenings. He had severe pains in the legs, thighs, and back. Later on he had tenderness and some enlargement of the spleen. The liver did not enlarge, and he did not develop orchitis or synovitis of any joints. During the time fever was marked, sweating at night was profuse and troublesome. On one afternoon during the second week following examination a dusky red, mottled rash was noted on the back and abdomen, and at this stage it was thought that the case was possibly one of paratyphoid. Since he was a farmer, and the symptoms were atypical, the blood serum taken at this stage was tested against a standard culture of *Br. abortus*, and it was found to be the only organism which

gave agglutination. The rash was of short duration; it had disappeared the next morning. During this time the stools were unhealthy-looking, offensive, pultaceous, and the colour of dark pea-soup. In a few days they became normal.

The temperature was not charted until November 30th. Between November 20th and that date it had fluctuated considerably, and before November 30th had begun to remit;

It finally settled down on December 16th. Except for abortive attempts on December 19th, 20th, and 21st there has not been any recurrence. The four-hour chart showed considerable variations, but, briefly, the morning temperature was low, with evening rise. The pulse rate throughout was slow, and was never more than 90.

BACTERIOLOGICAL EXAMINATION

A specimen of blood was examined on November 28th by macroscopical Widal method, using standard agglutination cultures, with the following results: *B. typhosus*, *B. paratyphosus* B, *B. paratyphosus* A, and *B. enteritidis* Gaertner were all negative in dilutions of 1 in 25. *Br. abortus* was positive in 1 in 250 after four hours in water bath at 54° C. On December 10th a second specimen gave a positive Widal reaction up to 1 in 500. Two specimens of blood, one on December 12th and another on December 31st, remained sterile after many days' incubation.

On January 27th, 1932, plate cultures were made from the cream and sediment of two samples of milk, and stroke cultures from a vaginal swab from the cow which the patient had assisted in calving. The medium used was liver infusion agar of Huddleston, Hasley, and Torrey.¹ The plates were incubated anaerobically for twelve hours, and then for several days in an atmosphere containing 10 per cent. carbon dioxide at a temperature of 37° C. No *Br. abortus* developed. The blood of the cow gave a Widal reaction with *Br. abortus* up to 1 in 6,400, and with *Br. melitensis* up to 1 in 1,600. Further specimens of milk and a vaginal swab also gave negative results for *Br. abortus*.

I wish to thank Dr. W. M. Ash for his kindness in allowing me to publish the details of the above examinations.

REFERENCE

¹ *Journ. Infec. Dis.*, February, 1927.

A NOTE ON THE INCIDENCE OF BR. ABORTUS INFECTIONS

BY

A. I. MESSER, M.A., M.B., D.P.H.
NORTHUMBERLAND COUNTY LABORATORY

For some time past an emulsion of *Br. abortus* has been included in the routine agglutination test on serums sent to this laboratory for Widal reaction. Of 186 serums examined sixteen have agglutinated *B. typhosus* "H," one *B. typhosus* "O," thirty-seven *B. paratyphosus* B, and twelve *Br. abortus*. Details of the latter are shown in the accompanying table.

The final column in the table represents "reduced titre," formerly termed "standard agglutinin units"—that is, the figure obtained by dividing the final dilution showing standard agglutination by the suspension factor. The Dreyer technique was followed throughout, and the suspensions used were those issued by the Oxford University pathology department under the aegis of the Medical Research Council. Readings were recorded after

the tubes had stood on the bench overnight, following on four and a half hours in a water bath at 55° C.

No.	Age	Sex	Dilutions: 1 in—								R.T.
			25	50	125	250	500	1,000	1,500	3,000	
I	30	F	—	+	+	+	+	+	+	—	750
II	42	M	—	+	+	+	+	+	+	—	750
III	57	F	—	+	+	+	0	0	0	0	125*
IV	15	F	—	—	+	+	+	+	+	—	750
V	56	F	—	+	+	+	0	0	0	0	80*
VI	15	M	—	+	+	+	+	+	+	tr.	500
VII†	40	F	—	+	+	+	+	+	+	tr.	500
VIII	52	M	—	+	+	—	—	—	—	—	40
IX	74	M	—	—	tr.	+	+	+	+	+	1,000
X	43	M	+	+	+	+	tr.	—	—	—	80
XI	17	M	+	+	+	tr.	—	—	—	—	40
XII	34	M	+	+	+	+	+	+	+	+	1,000

0 = Not tested. * At least.

† Repeated three weeks later. Titre 1 in 500.

In two cases the serum also agglutinated *B. typhosus* and *B. paratyphosus* B, each at 1 in 25, but both these were explicable as residual agglutinins following on vaccination some years previously. Apart from these, co-agglutination between the enteric and *abortus* groups has not been encountered. The table shows the frequent occurrence of the zone phenomenon, and it will be noticed that of the twelve cases five were females and seven males, the age incidence ranging from 15 to 74.

SOME CLINICAL CONSIDERATIONS

The clinical records of several of these cases were obtained, but it has not been thought worth while to publish them, as they do not differ materially from those of numerous cases already published. One case presented symptoms suggesting acute phthisis, but without physical signs in the chest. In two cases agglutination versus *Br. abortus* was specifically requested by the practitioner in attendance, while the remaining cases were diagnosed either as an enteric infection or as "P.U.O."

Apart from the 186 serums referred to above, which presumably came from persons suffering from a febrile illness, the serums of four apparently healthy farm workers were sent to the laboratory for Widal reaction in the course of an investigation for enteric carriers. Three of these agglutinated *Br. abortus*, two at a dilution of 1 in 50, one at 1 in 125. On inquiry it was found that (a) the three workers all belonged to the same farm, (b) at the time the inquiry was made a cow was recovering from "picking calf," (c) some years ago there was an epidemic of abortion amongst the herd in which a great number of cows aborted, and (d) all three workers had been employed on the farm at and since that time. None of them were ill at the time of the investigation, nor was there anything in their recent medical history to suggest a condition which might have been undulant fever. It seems reasonable to suppose that these three cases exemplify the now fairly well established group in which the presence of *abortus* agglutinins is to be explained as a result of subclinical infection acquired through living in close contact with an infective environment.

Assuming the validity of the agglutination reaction in diagnosis, the results recorded in this note suggest that *Brucella* infections are relatively common. The numbers concerned are, however, much too small to form the basis of reliable conclusions, and they are recorded simply as a contribution to the data which require to be assembled for an adequate study of the incidence of the disease.