

(1941) opinion that electrical fits may be given to selected patients in an out-patient department of a general teaching hospital met with considerable criticism, but we have found his views substantially correct. The patients should be carefully chosen and be accompanied by sensible relatives who are prepared to have them admitted to hospital if necessary. In deciding whether to give in-patient or out-patient treatment, the question of risk of suicide, temporary confusional states, and the type of supervision the patient can have at home should be considered. The social consequences of admission to a mental hospital can still be disastrous in certain occupations; therefore E.M.S. neurological units have been found ideal, unless the patient is very agitated, is suicidal, or is refusing treatment. The atmosphere approximates more to that of a general hospital, patients are willing to come for treatment very much earlier, and supervision is adequate. If the problem is to be solved satisfactorily, facilities for treatment away from certified patients will have to be widely extended through the country and clinicians allowed greater latitude inside mental hospitals.

Conclusion

Our results amply confirm the findings of American workers that convulsion therapy is at present the most effective treatment available for depression in later life. Very high percentages of remissions in good previous personalities may be expected. Complications do not outweigh benefits to be obtained in any large group of cases, if reasonable clinical skill is exercised and every possible measure is used to avoid them. The full application of this treatment all over Britain would result in very large numbers, amounting to thousands, of patients being able to leave mental hospitals or resume a reasonable degree of working efficiency without prolonged invalidism. It seems urgently demanded in the present emergency, since a physician, using electrical methods and working only 2 hours a day, can treat over 50 uncomplicated cases in a week.

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HEALTH SERVICES IN CARDIFF

Cardiff's death rate from pulmonary tuberculosis has fallen from 5.3 per 1,000 to 0.78; the typhoid fever death rate from 1.8 to an insignificant figure; and the death rate from small-pox from 2.0 to zero. These figures are given in the report for 1940 of Dr. Greenwood Wilson, medical officer of health. The death rate from tuberculosis in 1940 was the lowest on record, coinciding with the setting up of the council's care scheme whereby the social welfare of tuberculous patients and their family units is maintained. Infectious disease was not troublesome during the year, except for influenza (in the first quarter) and diphtheria. Cerebrospinal fever caused 29 deaths, and 322 cases were admitted to the isolation hospital—by far the largest number in any one year. A fall in the case mortality from 60% to under 10% is attributed to the use of the new chemotherapeutic methods. The city's death rate was 14.2 per 1,000 (lower than that of most of the other large British seaport towns), and the infant mortality was 59 per 1,000 births. Almost half the notified births and stillbirths in the city were attended by municipal midwives or in the maternity wards of a municipal hospital; the maternal mortality rate for 1940 (2.91 per 1,000 births) was the lowest on record. Cardiff has a new nursery school with accommodation for 120 children. One conclusion of a special nutrition survey undertaken during the year was that there was marked deficiency of protein in the food of the majority of malnourished children. Carbohydrates abound and fats are widely used, but protein is limited, partly because of the greater cost, but partly also because of the strong belief among many mothers that protein in the form of meat is injurious to children. The impression received from this survey of over 22,000 children was that a higher percentage of cases of malnutrition occurred in the age group 7-11 than in the 5-7 or 11-14 age groups. Girls showed less evidence of malnutrition than boys. In the port of Cardiff 55 cases of notifiable infectious disease (30 of them malaria) were landed from vessels during the year.

UNDULANT FEVER

A SMALL OUTBREAK IN A GIRLS' SCHOOL*

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Although a number of outbreaks of undulant fever have been reported, mostly from Canada and the United States, it is more usual in this country to encounter the isolated case in which the occurrence of pyrexia with indefinite physical signs has caused the disease to be suspected and later confirmed by the agglutination reaction or blood culture. Elkington, Wilson, Taylor, and Fulton (1940) described an outbreak in a boys' school in England. In this epidemic, believed to be the first to be recorded in Britain, 2 definite clinical cases occurred a few weeks after the school, which had previously used milk from a certain tuberculin-tested herd, changed to another raw supply. The subsequent investigation revealed that there were 26 mild infections and that latent infection had probably occurred in about a third of the 400 boys. The purpose of the present report is to put on record the occurrence of a similar small outbreak, mostly of mild infection, in a girls' boarding-school, due to the consumption of unheated milk from a herd infected with *Br. abortus*.

Two boarding-schools for girls, normally situated in a large town on the South Coast, were combined and evacuated in May, 1941, to a country house on an estate in Devonshire. The total number of girls was 54, between the ages of 9 and 17, with a staff of 14 teachers and maids.

Clinical History of Cases

Case 1.—On Nov. 8, 1941, a girl aged 12 had a rigor. During the next three days she complained of headache and general malaise, but had no other marked symptoms, and her appetite remained good. For the first 10 days of her illness her temperature rose to 100°-101° F. in the evenings, then settled slowly to normal during the next 7 days. Epistaxis was frequent throughout this period. The spleen was not palpable; there was no rash or other physical sign. On Nov. 22 her serum agglutinated *Br. abortus* to a titre of 1 in 640 and the organism was cultured from the blood. Six c.cm. of blood had been inoculated direct into 50 c.cm. of broth and incubated in 10% CO₂.

Case 2.—On Nov. 10, 1941, another girl, aged 9, complained of headache, and was found to have a temperature of 101° F. Her illness ran a similar course with few symptoms except sweating, which was pronounced during the first few days. An evening temperature of 101° F. persisted for 10 days, and for a further fortnight there was a rise to 99° F. each evening. In her case also there were no physical signs. On Nov. 22 this girl's serum agglutinated *Br. abortus* to a titre of 1 in 320, and the organism was isolated from her blood on that date.

These two girls were given symptomatic treatment only.

Case 3.—On Nov. 18, 1941, a third girl, aged 16, had a mild attack of diarrhoea and vomiting. For the next 6 days her evening temperature rose to 103° F. On Nov. 21 a short course of sulphanilamide was started: 1 g. 4-hourly for 9 doses—9 g. in all. On Nov. 22 her serum agglutinated *Br. abortus* to a titre of 1 in 320, but blood cultures taken the same day remained sterile during 6 weeks' incubation in CO₂. On Nov. 24 the temperature dropped to normal and did not rise again. The slight headache and sweating which had been the only symptoms disappeared and appetite returned.

All three girls made a good recovery, and at the end of Feb., 1942, there had been no relapse.

Case 4.—This patient, a girl aged 14, came under treatment in Hertfordshire. We are grateful to Dr. A. W. Franklin, physician to the Children's Department, St. Bartholomew's Hospital, for giving us the full details of this case. The patient, who had a history of periodic nose-bleeding in earlier childhood, had a febrile attack associated with epistaxis and a boil on the face in May, 1941, while at school. In August, while on holiday, she became ill with fever lasting 9 days, and as recovery was not complete she was admitted to hospital on Sept. 18. Undulant fever was suspected, but, apart from indicating

* Report to the Medical Research Council from the Emergency Public Health Laboratory, Exeter, and Devon County Laboratory.

anaemia and leucopenia, full laboratory investigations, which included agglutination tests for *Br. abortus* and the enteric group, and aerobic blood culture, gave negative results. On Sept. 22 another febrile attack began, with epistaxis, increasing lassitude, and nausea. On Oct. 12 the patient was seen by Dr. Franklin, who found the eyelids puffy, conjunctivae pale, gums inflamed, and pharynx red. There was an erythematous rash on the wrists and front of the chest. Liver and spleen were both enlarged. On Oct. 18 blood culture in CO₂ gave a growth of *Br. abortus*, and the serum agglutinated that organism up to a dilution of 1 in 3,125. The course of the temperature consisted of two biphasic undulations of remittent fever lasting 28 and 25 days, with an interval of 21 days, followed after 9 days by two months of intermittent fever with peaks of 103° to 104° F. Other symptoms were sweats, cough, loss of voice, and pink watery nasal discharge when fever was high. There was no observable response to sulphapyridine or sulphanilamide by mouth.

The organisms isolated from the blood in each case were typical *Brucella* strains in morphology and cultural characters. They were CO₂-sensitive. The strains from Cases 1 and 2 were further examined by Prof. G. S. Wilson, who reported that both behaved, as regards H₂S production and growth in the presence of dyes, like typical *Br. abortus* strains. The strain from Case 1 agglutinated with a monospecific *Br. abortus* but not with a monospecific *Br. melitensis* serum. The strain from Case 2 proved to be thermo-agglutinable, so that a monospecific serum test was not possible.

The isolation of *Br. abortus* from the blood of 3 of these 4 cases must be considered fortunate, as it is generally stated that blood culture is positive in only 10 to 20% of cases, though it is more frequent in *Br. melitensis* and *Br. suis* infections.

Source of Infection

Milk was clearly the most likely source of infection. The 3 girls in whom the date of onset is definitely known had not been away from the school for 7 weeks before the onset of illness. The milk supply to the school was obtained from the home farm on the estate, and one pint daily was the allowance for each girl, including that used for cooking. Unheated milk was drunk at breakfast and supper. It is to be noted that the girls had been accustomed to a pasteurized supply in the town before evacuation to the country.

The herd on the home farm consisted of 9 pedigree Guernsey cows and a bull. A veterinary surgeon had been called in on May 5, 1941, because of the occurrence of abortions. He obtained a history of slip-calving during 1940, and, while this had been attributed by the owners to fright from low-flying aeroplanes, he considered that this marks the beginning of contagious abortion in the herd. In April, 1941, there was a record of one premature calf which did not survive, one still-birth, and one living calf. In Sept., 1941, there was one live calf, in Oct. one abortion, and in Nov. one live calf. Blood samples taken from two of the cows were submitted to a tube agglutination test at 56° C. against a suspension consisting of three strains of *Br. abortus*. One was positive at 1 in 640, the other at 1 in 320. All the cows in the herd have now been inoculated with a *Br. abortus* vaccine.

As soon as the diagnosis of the girls' illness was made instructions were given that the milk should be boiled. The girls, however, objected strongly to the taste, and subsequently the milk was held at a temperature of 150° F. for 20 minutes. No further cases had been reported up to the end of Feb., 1942.

It seems clear that these girls, who had been accustomed to drink pasteurized milk and were thus free from exposure to continued mild infection with *Br. abortus*, succumbed to the raw supply, which was probably heavily infected and was not diluted by mixture with milk from other farms. Elkington and his colleagues confirmed the observations of previous workers that in such a community a few frank clinical cases usually occur along with a much larger number of subclinical or latent infections, and it is likely that if blood samples could have been taken from the rest of the girls this would have proved to be so in the present outbreak.

In this connexion it is of interest to record the findings of one of us (J. C. C.) in a boys' school in an adjacent county. It had been necessary, as part of another investigation, to take samples of blood from 160 boys in this boarding-school. Since it was ascertained that these boys had consumed raw milk in

their dining-hall over a period of years it was thought worth while, in view of the fact that 20 to 30% of herd samples in Great Britain are infected, to test their sera for agglutinins to *Br. abortus* (Oxford Standards Suspension). The results were as follows: Total number of sera, 160. Negative at 1 in 20, 153. Positive at 1/20, 7 (4.4%); 1/40, 4 (2.5%); 1/80, 3 (1.9%); 1/160, 2 (1.3%); 1/320, 0.

Topley and Wilson (1936) state that about 1.5% of sera sent to laboratories for Wassermann reaction in this country agglutinate *Br. abortus* at 1/40 or over, but that antibodies are rare, even at 1/20, in persons who do not drink raw milk or cream and who are not exposed to contact with infected animals. There was no history of diagnosed clinical cases among these boys, but it seems clear that the regular consumption of raw milk had produced enough latent infection to raise the frequency of antibodies to *Br. abortus* to a level considerably above that found in the population at large. It is not unlikely that certain obscure ailments in the past were in fact mild *Brucella* infections.

Conclusion

The present report thus confirms that, with the existing prevalence of *Brucella* infection in the dairy herds of this country, the consumption of raw milk in schools is apt to give rise to a considerable amount of subclinical or latent infection, and that, under circumstances such as the drinking of heavily infected milk by children accustomed to milk rendered safe by heat treatment, clinical cases may occur in the form of a small outbreak. Further, it will be noted that one of the children in the present series had a severe and protracted illness, and that the period of incapacity even in the milder cases was by no means trivial, amounting usually to several weeks. Preventive measures consist in pasteurization or other effective heat treatment of the milk.

Summary

An account is given of the occurrence of 4 cases of undulant fever in girls in a school evacuated from a large town to the country. The source of infection was unheated milk from a herd in which contagious abortion was present.

We are indebted to Dr. Meredith Davies, County Medical Officer for Devon, for permission to publish this report and for obtaining the sickness history of the herd.

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SCOTTISH ORTHOPAEDIC COUNCIL

On March 3 the inaugural meeting was held in Edinburgh of the Scottish Orthopaedic Council, whose purpose is to co-ordinate the work of the recently formed regional orthopaedic councils or cripple welfare associations and to secure a national scheme for prevention, treatment, training, and welfare of cripples. The formation of the Council has been brought about by the Lord Nuffield Fund for Cripples, working through the Central Council for the Care of Cripples. The chief guest at the meeting was Dame Agnes Hunt, honorary superintendent of the Shropshire Orthopaedic Hospital, now known as the Robert Jones and Agnes Hunt Orthopaedic Hospital. It was announced that the Queen had consented to become Patroness of the Scottish Council, of which Sir John Fraser was appointed chairman, Prof. J. M. Mackintosh of Glasgow vice-chairman, and the Lord Provost of Glasgow treasurer. Sir John Fraser in a statement published before the meeting said that for a long period Scotland tended to lag behind other countries in orthopaedic development, though the need in Scotland for orthopaedics was relatively high. The first to appreciate the significance of the situation were certain voluntary organizations. Gradually Scotland came to realize its deficiencies, and twelve years ago the first regional orthopaedic scheme for crippled children was inaugurated for South-East Scotland at Fairmilehead, outside Edinburgh. In 1937 the movement was further stimulated by the Nuffield gift for orthopaedic work, of which £70,000 was allocated to Scotland. Mr. W. R. Fraser, Secretary of the Department of Health for Scotland, spoke of the endeavour, through the emergency hospital services, to establish special units of all types, including orthopaedic units, and said there were now seven units in Scotland, each staffed and equipped for specialized and surgical treatment.