due to the mucous membrane having become adherent to the scar, still occur in our practice. If this is not quickly remedied, hernia of the superior wall of the bladder through the wound subsequently takes place, especially in stout patients suffering from distension and constipation. This trouble is also more likely to be encountered when the surgeon has opened up the cave of Retzius during the operation. The dislodgement of the fat lying within this space encourages the formation of adhesions between the bladder wall and the posterior surface of the os pubis, to be followed in time by adhesions between the skin and the vesical mucosa. Once this has happened, time is only lost by postponing surgical intervention. However much the patient may resent another anaesthetic, it cannot be avoided. Personally, I tell my patients that I can save them many weeks of convalescence by inserting a few stitches into their wound, and for the sake of this advantage they cheerfully consent. Once under the anaesthetic the bladder is dissected away not only from the suprapubic scar but also from the os pubis. After carefully inspecting the interior of the bladder to make sure that there is no obstruction at the outlet, it is completely closed and a catheter tied into the urethra.

OTHER POST-OPERATIVE COMPLAINTS

So far we have considered the factors of sepsis and obstruction only in their relation to persistent suprapubic fistula. It must, however, be remembered that they are responsible for other unfortunate sequelae of prostatectomy, such as painful micturition, frequency, and calculus formation. A patient who has submitted to so grave a proceeding as prostatectomy has the right to expect that he shall be relieved of the discomforts that brought him to the operating table. If he still continues to rise three or four times at night, and if he finds that the passage of urine causes discomfort, he has grounds for complaint. The residual urine of a patient who has undergone prostatectomy should therefore be tested, and if it is more than two ounces, and some months have elapsed since the operation, he should be cystoscoped. Sometimes the poorness of the operation results will be explained by the existence of some slight obstruction to the passage of the instrument, sometimes by small diverticula that previously had been missed, and sometimes by the fact that the bladder walls have been so damaged by prolonged distension and sepsis prior to operation that they have never recovered.

Treatment of these unsatisfactory cases, if it is to be effective, must be thorough—something more than the oral administration of a urinary antiseptic of doubtful value. Lavage of the bladder is usually indicated, and, since this must be done frequently, it is best whenever possible to teach the patient how to carry this out for himself. If there is much residual urine, the washing is best done through a catheter, but otherwise by the Janet method. I can recall several cases of persistent post-prostatectomy sepsis, some complicated by a tendency to form calculi, that owe their present comfort and freedom from stones to the fact that they have learned to wash out their bladders daily with as little difficulty as most of us experience in cleaning our teeth.

If there is a criticism that may sometimes with justice be made of our work as prostatic surgeons, it is to the effect that, having steered our patients through the "narrows" of the operation, we are over-ready to leave them before they have reached smooth waters. It is not enough that the patient who has previously micturated with difficulty should now do so with ease; we must regard our work as unfinished until he is free from all smarting and frequency, and until the urine contains only a minimum of pus.

MILK-BORNE DISEASES *

BY

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It is needless to point out the importance of milk-borne diseases; their existence is not only recognized by medical and veterinary practitioners, but also by the general public. They may be divided into two classes: (1) those in which the milk becomes contaminated after withdrawal from the cow—for instance, typhoid and the paratyphoid group of fevers, some epidemics of streptococcal and staphylococcal sore throats, and perhaps scarlet fever; (2) those the causative organism of which actually infects the cow and is excreted with the milk; these include bovine tuberculosis, undulant fever, and perhaps certain epidemics of sore throat, scarlet fever, and diphtheria.

The diseases in the first category are usually associated with cases in man or carriers of the specific microbe in individuals, such as milkers or others who are concerned with handling milk. Occasionally the contamination is less direct, and outbreaks have been described in which water fouled by excreta of infected people has been used to clean vessels employed in the distribution of milk. Whatever the source of the contamination the milk acts simply as a suitable medium for the multiplication and conveyance of the specific micro-organism to the consumer; the cow is unaffected and perfectly healthy. Investigation of such epidemics shows that all cases of the disease can be connected with a particular source of milk supply, and further research usually results in the discovery of individuals who are infected or are carriers of the causative micro-organism. Such a history can be obtained in many epidemics caused by the typhoid bacillus or members of the *Salmonella* group of bacteria. In the case of outbreaks of sore throat and scarlet fever, however, although the usual method of milk contamination is from infected human beings after withdrawal from the cow, there is some evidence that the cow's udder can be infected occasionally by milkers or others. They will be discussed in a later section.

In the second category the most completely studied disease is bovine tuberculosis, and even to outline the mass of facts known of this disease and its transmission to man is impossible in the time at my disposal, and my remarks will therefore be limited to a few selected points.

TUBERCULOSIS OF THE COW AND TUBERCLE BACILLI IN MILK

Forty per cent. of the milch cows of England and Wales are stated to be tuberculous as estimated by the tuberculin test and post-mortem examination; probably this is an under-estimate, the true figure being considerably higher. The incidence of infection increases with the age of the cow; the disease is frequently fatal and causes serious economic losses. About 0.2 per cent. of cows have clinically recognizable tuberculosis of the udder; there are also a considerable number in which tuberculosis of the udder may escape clinical recognition. Such animals almost certainly secrete tubercle bacilli, either continuously or intermittently in their milk.

Cows with progressive tuberculosis, although apparently in good condition and yielding large quantities of milk, may from time to time secrete tubercle bacilli in the milk, although there is no local lesion in the udder. Frequently such animals excrete large numbers of tubercle bacilli in the faeces, which may constitute another source of milk contamination. Examinations of mixed samples of milk

* Read in opening a discussion in the Section of Bacteriology at the Centenary Meeting of the British Medical Association, London, 1932.

supplied to some of the larger towns show considerable variations as regards the presence of tubercle bacilli; the extreme figures are from 2 to 13 per cent., the average positive results approximately 7 per cent.

Dissemination from cow to cow by droplet infection is easily understood when one sees the crowded, ill-ventilated, and dirty byres in which the animals remain continuously for many months of the year; but what is more surprising is the almost equal percentage of reactors in animals kept largely in the open fields. Recent research, however, has shown that the tubercle bacilli are extremely resistant to external conditions. For instance, virulent bovine tubercle have been recovered from cow manure after one year, from a lump of cow dung for upwards of two years, and even from the effluent of a drainage system of the septic tank type. It is probable, therefore, that contamination of pastures capable of spreading the infection is widespread and an important factor in the dissemination of bovine tuberculosis among cattle.

INFECTION OF HUMAN BEINGS WITH BOVINE TUBERCLE BACILLUS

Tuberculosis of bovine origin in man is more common in early life, and the majority of infections take place before the age of 5; the number of deaths is also greatest during this period. It occurs, however, at all ages, and the commonest site of infection in adults is the cervical glands.

Bovine tubercle bacilli are found in the following tuberculous lesions; the percentage figures given have been collected from cases of all ages. Lupus, 51 per cent.; cervical glands, 46 per cent.; scrofuloderma, 31 per cent.; tuberculous meningitis, 27 per cent.; bone and joints, 18 per cent.; genito-urinary, 17 per cent.; pulmonary tuberculosis, 1 per cent. These figures are culled from English statistics, and it will be noticed that pulmonary infections are very uncommon. Recent work in Scotland shows that bovine tuberculosis in man is probably more frequent in that country and the lungs more commonly affected. It has been estimated that in England and Wales there are 4,000 fresh cases of infection with the bovine bacilli every year and some 2,000 deaths annually. Many who survive are invalids for long periods, and even when they recover may be severely crippled.

I think that I have said enough concerning bovine tuberculosis to bring home to everyone its extreme importance, from the point of view of both the agriculturist and the medical practitioner, and I shall now proceed to consider another important milk-borne disease due to a bovine infection—namely, undulant fever. Before doing so, although I have purposely refrained from referring to the work of individual authors, I must draw attention to the work of one English author—namely, Dr. A. Stanley Griffith, who has for many years emphasized the importance of bovine tuberculosis in man. He has gained a world-wide reputation, and without his brilliant and persistent work our knowledge on the subject would be very much poorer:

UNDULANT FEVER

Undulant fever may be caused by the *Br. abortus* of Bang, which is the causative organism of infectious abortion in cows. Infectious abortion is a very common disease in cows, and is becoming more widespread. It is of great economic importance as it causes very severe losses to the farmer although not usually a fatal disease. The important fact from our point of view to-day is that the cow after aborting may excrete large numbers of *Br. abortus* in the milk and may continue to do this for years. Some idea of the prevalence of this organism in milk may be ascertained by the fact that at Manchester

5.7 per cent. of "single" milks and 8.8 per cent. of "mixed" milks were found to be infected with *Br. abortus*. Other animals may be infected naturally with *Br. abortus*—for instance, sheep, pigs, horses, and occasionally dogs. *Br. abortus* is closely allied to *Br. melitensis*—in fact, the relationship is even closer than that between the bovine and the human tubercle bacillus. *Br. melitensis* injected into cattle produces abortion with the same pathological manifestations as those produced by *Br. abortus*.

We are all familiar with the disease formerly known as Mediterranean or Malta fever, the causative organism of which was discovered by Bruce in 1886, and which was shown in 1905 to be due to drinking goat's milk. From 1912 onwards cases were reported in which cow's milk was suspected of conveying the disease. From 1921 cases of infection in man with what was considered to be of *Br. abortus* origin were described. Similar cases were reported in 1924 from the United States, where undulant fever had been recognized since 1905. In northern Europe in 1928 Kristensen drew attention to the large number of cases of almost certain bovine origin occurring in Denmark. In 1927 and 1928 numerous cases were reported from Sweden, and cases were noticed about the same time in Holland.

Up to 1929 some 14 cases had been described as contracted in this country. Since then a number have been diagnosed by the agglutination test or by blood culture, and the resulting cultures have shown the characters of bovine strains. There are many points of interest in this disease. The large number of cows infected and secreting bacilli in their milk has already been referred to; why, therefore, should the disease be so uncommon? It must be accepted that the majority of strains of *Br. abortus* of cattle have very little power of infecting man. It is otherwise with strains isolated from pigs, and probably also with strains from sheep. Several laboratory infections in bacteriologists working with porcine strains have been reported from the United States. The incidence of contagious abortion of pigs in this country is unknown, but it is believed that cases occur. With strains of *Br. abortus* isolated from pigs, cattle may be infected, and it is possible that such strains, even after passage through a cow, may remain infective for man.

The symptoms of undulant fever derived from cow's milk are exactly similar to those of Mediterranean fever originating from goat's milk. The mortality is low, but the fever may continue for long periods. Diagnosis can be made by the agglutination test worked out by Wright and his co-workers in 1897, and this can, in some instances, be confirmed by blood cultures. It is advisable in all cases of continued fever of unknown origin to have the blood serum tested for the presence of agglutinin against *Br. abortus* and to make a cultivation from the blood.

MASTITIS IN CATTLE

It remains to discuss the question of mastitis in cattle and its relationship to human epidemics of sore throat. Mastitis in cattle is a very common disease. Many cases are due to streptococci, large numbers of which may be excreted in the milk. Usually the streptococci are of a peculiar type and differ in several of their characters from streptococci of the *pyogenes* group isolated from diseases in man. In a certain proportion of the cases, however, streptococci resembling in every way the *pyogenes* group are found, and it is thought by some workers that the cow's udder has been infected by its attendants. Proof that milk containing such cocci causes epidemics of sore throat, and perhaps scarlet fever, is harder to obtain, but evidence is accumulating in favour of such a hypothesis. Infections of the teats of cows with virulent diphtheria bacilli have been described, and the bacilli have

also been found in the milk; this and other infections conveyed from man to cattle are favoured by the filthy habit of "wet" milking.

The foregoing is a very brief and incomplete account of some of the diseases which may be conveyed by milk. How can these diseases be prevented? The ideal is to have absolutely healthy cattle, well housed, well fed, and well groomed, attended by healthy men who are cleanly in their methods of milking. Such an ideal is hard to obtain, as human carriers of such organisms as typhoid and paratyphoid bacilli may show no symptoms of their infection, and virulent haemolytic streptococci may be carried in the throats of apparently healthy individuals.

Much, however, may be done in eradication of tuberculous animals from herds by efficient tuberculin testing, preferably by means of the double intradermal test. Rapid elimination of tuberculosis is comparatively simple when the herd is only slightly infected and the pastures and premises are not heavily contaminated, but in herds with a high percentage of reactors and a number of cases of clinical tuberculosis leading to extensive contamination of premises and pastures complete eradication is a slow process and may take years. Contagious abortion is even more difficult to get rid of, but something can be done by testing the agglutinating power of the blood serum and eliminating carriers detected by this means.

In the meantime pasteurization is widely used, and when this is carried out efficiently and the milk bottled by machinery and delivered sealed to the consumer all milk-borne disease should disappear. I can say from personal knowledge that some of our great distributing agencies carry out all these processes in a most efficient manner, and I believe that as regards plant, organization, inspection, and laboratory controls, certain firms in this country are unsurpassed anywhere in the world. The objection to pasteurization is that it may affect in some way the food value of the milk, and it is to be hoped that further research and field experiments on a large scale may lead to methods of eradication of bovine tuberculosis and contagious abortion, so that the supply of safe raw milk at a reasonable price will continue to increase.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

PROLONGED POST-ANAESTHETIC UNCONSCIOUSNESS FOLLOWING NEMBUTAL AND CHLOROFORM

In view of the prevailing interest in basal anaesthesia, the following case may prove worthy of publication:

A man aged 69 years came to operation for excision of a papilloma of the floor of the mouth by diathermy. He was a healthy, active man, weighing about 11 st. He was admitted to the Royal Victoria Hospital on February 22nd, 1932, and was operated on at 2.15 p.m. on the following day.

Premedication in the form of 3 grains of nembutal was administered by the mouth one hour before operation, followed by 1/50 grain of atropine hypodermically half an hour later. On reaching the anaesthetic room the patient was practically unconscious, but would answer questions. Chloroform was administered by means of a Junker apparatus, the patient being kept in the second stage of anaesthesia throughout the operation, which lasted about twenty minutes.

Some three hours later, owing to reactionary haemorrhage, a second short chloroform anaesthesia was administered to allow of the control of this haemorrhage. The patient's condition gave rise to little or no anxiety, but return to consciousness was delayed until February 26th, three days later. During this period he would react to stimuli, answer questions, and pass urine into a bottle. His bowels acted

with enemata. The healing of the wound was normal, and recovery was otherwise uneventful.

In view of the fact that serious complications after basal anaesthesia with nembutal have seldom been reported, we feel that this case may be of interest, as the condition of the patient, who had had chloroform in addition to nembutal, was very far from being normal.

I am indebted to Mr. H. W. L. Molesworth, F.R.C.S., for permission to publish this case.

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TETANUS COMPLICATED BY FACIAL PARALYSIS

The following case presents the interesting combination of tetanus and facial paralysis, the rare condition referred to as Kopftetanus by German writers. Four similar cases are described in "Allbutt and Rolleston." Further points of interest are the adoption of the intensive serum therapy, as advocated by Cole in the *British Medical Journal* of April 23rd, and the use of avertin to allay the spasms.

The patient, a man aged 24 years, met with a cycling accident seven days before admission to hospital, receiving three small wounds in the facial region—one in the left frontal region, one in the right infraorbital region, and one over the right mandible. After the accident he proceeded straight to his panel doctor and had the wounds, which were fairly superficial and not especially soiled, cleaned and dressed, the infraorbital and the mandibular wounds being sutured with silk-worm sutures. During the next four days the patient felt quite well, but on the fifth day he complained of stiffness in his jaw. The stiffness gradually grew more severe, and on the same evening he had a numb sensation on the right side of the face. Next day he could open his jaw only with difficulty, and the right side of his face was paralysed. He was admitted to Weymouth and District Hospital next morning.

On examination he was found to have trismus and a paralysis of the right side of the face. The wounds were encrusted with healing granulations. At this stage the muscular spasms were local, and confined to the jaw. Concentrated antitetanus serum (Parke, Davis and Co.), 16,000 units, was given intrathecally just after admission and the wounds were cleaned up. After the injection the patient volunteered to feeling much better, but that evening his temperature and pulse rate rose to 101.2° F. and 132 respectively.

On his second day in hospital he twice vomited small quantities of greenish, frothy fluid. Antitetanus serum, 16,000 units intrathecally and 16,000 intramuscularly, was given, and the spasms remained localized. His temperature and pulse rate fell to normal. Nourishment was taken well through a gap in the teeth. On the third day, however, the spasms began to involve the cervical and dorso-lumbar muscles, and antitetanus serum, 16,000 units intrathecally and 16,000 intramuscularly, brought no relief. On the fourth day opisthotonos was marked; temperature was 102°, pulse rate 130. Avertin per rectum was administered morning and evening for the spasms, and controlled them. The dosage of serum was increased to 30,000 units intrathecally and 30,000 intramuscularly, and, as the fifth day brought no improvement and the temperature and pulse rate remained high, this was further increased to 40,000 units intrathecally, 40,000 intramuscularly, and 40,000 intravenously, this daily dosage being maintained till the patient died. Avertin, given twice as before, failed to control the spasms, and had to be reinforced by chloroform and morphine. The patient was now losing ground steadily, his pulse being very rapid and at times thready, while his temperature remained between 101° and 102°. He was restless and delirious. On the seventh and eighth days the avertin, even with the chloroform, had a very transient effect. The patient had a hyperpyrexia just before death, the temperature rising to 108°. Death occurred from acute dyspnoea on the evening of the eighth day. A post-mortem was suggested, but permission was withheld.

My thanks are due to Drs. Tasker and George Gray for permission to publish this case.

Weymouth.

J. GILLESPIE SLIMON, M.B.