of those tested were pathogenic to these animals. Diphtheroids were present in 30 per cent. of the cases. They were obtained from the superficial surface of 24 per cent. of the tonsils and 9 per cent. of the adenoids, and from the depths of the crypts of 15 per cent. of the tonsils and 11 per cent. of the adenoids.

Streptococci.

Nasgar smeared with human blood was used as the culture medium. The colonies were examined with reference to the following properties: solubility in bile, fermentation of inulin, and haemolysing power. They were all insoluble in bile and did not ferment inulin. The haemolytic property was tested by direct examination of the plate and again by adding a pure broth culture of the streptococcus to the washed red blood cells of the sheep. They were classified according as they gave complete haemolysis, partial haemolysis, or no haemolysis.

Group I was found in 84 per cent. of the cases, and was obtained from the superficial surface of 37 per cent. of the tonsils and 11 per cent. of the adenoids, and from the depths of the crypts of 89 per cent. of the tonsils and 58 per cent. of the adenoids.

Group II was found in 34 per cent. of the cases, and was obtained from the superficial surface of 13 per cent. of the tonsils and 9 per cent. of the adenoids, and from the depths of the crypts of 16 per cent. of the tonsils and 27 per cent. of the adenoids.

Group III was found in 92 per cent. of the cases, and was obtained from the superficial surface of 75 per cent. of the tonsils and 90 per cent. of the adenoids, and from the depths of the crypts of 64 per cent. of the tonsils and 67 per cent. of the adenoids.

The streptococci giving complete haemolysis were more frequently present in the depths of the crypts of the tonsils and adenoids than on the surface. This strain is usually considered to be the most pathogenic, hence the removal of this organism by swabbing alone is difficult, and its appearance on swab culture would be relatively infrequent. Streptococci giving no haemolysis are of frequent occurrence, being present in nearly all the specimens examined.

Pneumococci.

Nasgar smeared with human blood was used as the culture medium. The colonies were examined as regards bile solubility, haemolytic properties, or inulin fermentation. They were found to be bile-soluble and capable of fermenting inulin, and showed no power of haemolysis. They were not classified further. Pneumococci were present in 56 per cent. of the cases, and were obtained from the superficial surface of 46 per cent. of the tonsils and 44 per cent. of the adenoids, and from the depths of the crypts of 40 per cent. of the tonsils and 41 per cent. of the adenoids.

B. influenzae (Pfeiffer's Bacillus).

Nasgar smeared with human blood was used as the culture medium. Small greyish-white colonies were found in some cases. Film examination showed that these consisted of short Gram-negative bacilli. They showed no power of haemolysis, and were considered to be the *B. influenzae*. They were present in 18 per cent. of the cases and were obtained from the superficial surface of 10 per cent. of the tonsils and 13 per cent. of the adenoids, and from the depths of the crypts of 8 per cent. of the tonsils and 9 per cent. of the adenoids. It was further noticed that those colonies present were usually adjacent to the more closely packed colonies of streptococci.

Dr. Shri Kent, working independently in this laboratory, made similar observations. At the time of examination the city was free from an epidemic, hence normally the *B. influenzae* does not frequently inhabit the tonsils and adenoids of children.

Meningococcus.

Nasgar smeared with human blood was used as the culture medium. Minute transparent colonies were obtained in a few cases which, on examination by a Gram-stained film, had the appearance of meningococci. They were further inoculated into sugars, and gave acid in glucose and maltose, but did not ferment galactose and saccharose. Subcultures on nasgar showed no growth. These colonies were considered to be meningococci and were found in 8 per cent. of the cases. They were obtained from the superficial surface of 5 per cent. of the tonsils and 2 per cent. of the adenoids, and from the depths of the crypts of 5 per cent. of the tonsils and 2 per cent. of the adenoids. Hence the meningococcus is rarely present and is a more frequent inhabitant of the tonsils than of the adenoids.

Bacillus coli.

Nasgar was used as the culture medium. The greyish-white colonies were subcultured on to bile salt, neutral red lactose agar, red colonies being formed. They were further examined as regards motility, production of indol, and fermentation of certain sugars. They were found to be motile and produced indol. They gave acid and gas in lactose, saccharose, maltose, glucose, and mannite, and acid and clot in litmus milk. They were considered to be *B. coli communis*, and were present in 8 per cent. of the cases. The bacillus was never obtained from the adenoids. It was obtained from the superficial surface of 10 per cent. of the tonsils and from the depths of the crypts of 6 per cent. of the tonsils.

The remaining organisms found were *Micrococcus catarrhalis*, *Staphylococcus aureus*, *Staphylococcus albus*, *Micrococcus flavus*, *Pharyngus sicus*. They were classified by means of their cultural characteristics, Gram stain, and fermentation of sugars.

Micrococcus catarrhalis was present in 94 per cent. of the cases, and was obtained from the superficial surface of 97 per cent. of the tonsils and 90 per cent. of the adenoids, and from the depths of the crypts of 64 per cent. of the tonsils and 72 per cent. of the adenoids.

Staphylococcus aureus was present in 56 per cent. of the cases, and was obtained from the superficial surface of 54 per cent. of the tonsils and 41 per cent. of the adenoids, and from the depths of the crypts of 27 per cent. of the tonsils and 16 per cent. of the adenoids.

Staphylococcus albus was present in 50 per cent. of the cases, and was obtained from the superficial surface of 35 per cent. of the tonsils and 11 per cent. of the adenoids, and from the depths of the crypts of 16 per cent. of the tonsils and 11 per cent. of the adenoids.

Micrococcus flavus was present in 66 per cent. of the cases, and was obtained from the superficial surface of 43 per cent. of the tonsils and 44 per cent. of the adenoids, and from the depths of the crypts of 24 per cent. of the tonsils and 30 per cent. of the adenoids.

Pharyngus sicus was present in 28 per cent. of the cases, and was obtained from the superficial surface of 10 per cent. of the tonsils and 23 per cent. of the adenoids, and from the depths of the crypts of 11 per cent. of the adenoids.

It was observed that in every case fewer colonies were obtained from the adenoids than from the tonsils, and fewer varieties of organisms.

The observer wishes to express her indebtedness to Professor Beattie, in whose laboratories the work was done, to Mr. Leathart, honorary surgeon to the Children's Royal Infirmary, to Mr. Courtenay Yorke, honorary surgeon to the Northern Hospital, and to Mr. Horace Mather, honorary surgeon to the Birkenhead Children's Hospital, for their kindness in placing specimens at her disposal.

THE CLINICAL THERMOMETER IN THE PREVENTION OF PULMONARY TUBERCULOSIS.

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DISEASE as we see it in great hospitals is, in a majority of the cases, incurable. To go forward we must go back—behind the physical signs which, until recently, have been almost the sole criteria of disease, to the realms of early symptoms, whose importance the pioneer work of Sir James Mackenzie is impressing upon discerning minds. To no disease do these principles apply with greater force than to pulmonary tuberculosis.

Much thought and ingenuity have been expended upon the problem of how to scotch the invader before it has had time and opportunity to pass our defensive systems and entrench itself in the pulmonary tissues. The stethoscope, even in the ears of the expert, has had to go. To realize its impotence to detect the first inroads of the disease we need but to remember that the lung may be the seat of an extensive pneumococcal infiltration without producing physical signs, if the disease be deeply placed.

Unfortunately, efforts in other directions have introduced elements of risk without eliminating uncertainty. My purpose is to urge the claims of the clinical thermometer, understood and properly used.

At the outset let me emphasize two elementary facts: (1) a distinctive characteristic of active tuberculous infiltration is fever of varying degree; (2) the vast majority of civilized persons is infected with the disease at some period, commonly in early life.

It appears reasonable, therefore, to assume that a very large number of cases of anomalous feverish attacks both in children and adults are due to infection by the tubercle bacillus. How often do such cases occur in the experience of every medical man! Fever, headache, nausea, malaise, perhaps some cough; no physical signs: diagnosis, "influenza"—a word probably responsible for more deaths than the disease itself—or "an anomalous feverish attack due to some toxin." The commonest, the universal toxin is that of tubercle. It is argued that the patient recovers in a week, and that tubercle is a chronic, persistent affection. But does the patient recover in a week, and is tuberculosis so obstinate in its first manifestations? If it were the whole population would be in bed. Tubercle is, perhaps, of all diseases the most amenable to treatment in the great majority of cases, if promptly recognized and dealt with. But what it lacks in initial severity it compensates for by subtlety. It can appear in many guises, and may relax its grip sufficiently to convey the impression that the illness is over; but each successive attack is a little more obstinate than its predecessor, each intervening period of comparative health a little more difficult of attainment, until suddenly comes the knock-out blow and the ensuing struggle, either hopeless from the start, or resulting, at best, in comparative restoration of health after a weary fight of months or years. This tragedy the thermometer,

rightly used, would have prevented, by demonstrating the slight persistent fever, and thereby ensuring rest.

In cases of illness the thermometer is in great measure the final court of appeal, but by misusage the instrument is prevented from affording the help of which it would otherwise be capable.

In the first place, ignorance obtains as to what constitutes a normal temperature; and secondly, the means adopted to register the body heat are inadequate. The normal temperature is almost always assumed to be 98.4° F., but a record normal at one period of the twenty-four hours or under one set of conditions would be subnormal or supernormal at another time or in other circumstances.

The late Sir G. Sims Woodhead, in collaboration with Dr. Varrier-Jones, carried out a large number of experiments in continuous rectal readings in both healthy and tuberculous persons. The records are of the first importance, though the technique is too complex for use by the general practitioner. In his report Professor Woodhead referred in several places to the teaching contained in Dr. S. Vere Pearson's paper on "The temperature as a guide to the treatment and prognosis of phthisis," which appeared in the *Lancet* of September 18th, 1909. That paper contains matter of very great value, and a real grasp of the essential points regarding the various types of temperature curve would give the practitioner a good working knowledge of the right use and interpretation of the thermometer.

I reproduce, by permission, Dr. Pearson's diagram illustrating the four principal types of curve that may be met with.

Chart representing Normal (N), Half-Normal (HN), Half-Inverse (HI), and Inverse (I) types of temperature curves respectively.

For the purpose of this paper it is sufficient to draw attention to the N curve, which is that found in the vast majority of normal persons. In the event of his meeting with one of the other three or any variation of them the practitioner should investigate further. It will be noticed that the lowest point of the normal curve is reached at about 3 a.m. and the highest somewhere about 6 p.m. The curve is representative of temperatures taken after rest. Without going into the differences in the normal points obtaining in different persons I think it may be stated that the morning temperature before rising should be below 98° F. and the 6 p.m. reading not above 98.6° after thirty minutes' rest.

One or two variations which may be regarded as normal are as follows: In women during the week or ten days preceding menstruation there is usually a rise of several tenths. This disappears either with the commencement of the flow or a day or two later. Exercise raises the body heat from 1° to 2° F. in proportion to the energy expended. In young children a certain amount of latitude may be allowed, their heat-regulating centres being imperfectly developed. This must not blind us, however, to the fact that, while slight causes will upset a child's temperature, we have no guarantee in a given case, without definite signs to account for the rise, that the cause is slight. Any persistent rise should be noted carefully and appropriate steps taken. Childhood is beyond all other periods that in which tuberculosis makes its first attack.

Lastly, in this connexion, there is no law in medicine, and a few persons with early lung disease have consistently subnormal temperatures.* There are many complexities concerned in accurate temperature readings, but the broad outline given should enable the practitioner to safeguard his patients' health.

Finally, we must deal with the method to be adopted if the actual body temperature is to be accurately determined.

The procedure adopted practically without exception, outside of sanatoriums, is to place a thermometer in a patient's mouth, axilla, or a groin, and after a couple of minutes to

pronounce a result of 98.4° as normal—and this without regard to the time of day. It is true that in a case of marked fever any of these crude methods will give a rough idea of the actual temperature, and the higher the fever the nearer will such readings approximate to the truth. But in such cases strict accuracy is not of vital importance. It is immaterial whether the temperature of a feverish patient be 102° or 103°. What is of paramount importance is that we should know whether it has dropped to within normal limits with the subsidence of the more obvious symptoms of the illness. It is here that the methods in vogue completely fail to enlighten us. In slight rises of temperature it is necessary to keep a mouth thermometer in position for anything from fifteen to thirty minutes in order to obtain the best record the oral method is capable of yielding, especially in a cold room, and even so the actual body temperature is not obtained. In spite of these facts these two-minute records of 98.4° or thereabouts are being accepted as normal temperatures every day by virtually the whole of the medical profession.

Pulmonary tuberculosis is manifested in its earliest inroads by a feeling merely of being below par, together with a slight degree of fever, which, under present conditions, goes unrecognized.

There is one way by which these slight rises may be registered, and that is by rectal readings. Whatever the external temperature, an accurate record is obtained by a three minutes' insertion. All the temperatures given above as falling within the normal variations are records of rectal readings. The objections to the method are entirely negligible, and I have never found them to persist for twenty-four hours, even in the most sensitive and fastidious patients. Until this method is in general use we shall continue to "get upon their feet again" patients who ought to be on their backs, and who, under such conditions, would quickly and permanently restore the balance, with an increased resistance and immunity, but who, under our present illogical system, are having prepared for them a harvest of sorrow, to be reaped in months or years to come.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

ACUTE PROCTITIS CAUSING GENERAL PERITONITIS AND DEATH.

The following unusual case of general peritonitis and death recently came under my care whilst in clinical charge at the Oldham Borough Fever Hospital.

A woman, aged 35, was sent in as a case of scarlet fever as she was said to have had a rash, but on admission no rash was present, nor were there any signs of scarlet fever. She had, however, signs of inflammatory trouble in the left iliac fossa, with a temperature of 100° and a pulse of 100. Next day she was very much worse, and a surgeon and gynaecologist were called in. General peritonitis had developed rapidly, with all the usual signs, and one considered that an infected Fallopian tube was probably the *fons et origo mali*. A vaginal examination failed to reveal any very definite tumour nor any definite tenderness. Rectal examination, however, did reveal a tender area, high up anteriorly, and the original diagnosis was adhered to, on the strength of this, failing a better one.

No operation was performed, as the patient was too ill, and next day she died; a *post-mortem* operation was performed in order to elucidate matters, with the following result.

General sero-purulent peritonitis was present, with much fluid in Douglas's pouch; no specially intense inflammatory focus was observed to guide one to the cause of the trouble, and a careful examination of the hollow viscera, for possible perforation, was undertaken, but with a negative result. No other focus was discovered which might account for the trouble, either in the pelvis, abdomen, or thorax, until, as a last resort, Douglas's pouch was opened and the rectum opened out to inspection. The musculature of the rectum was acutely inflamed throughout its whole length, and was infiltrated with yellow pus. There was no sign of abscess formation, rectal or peri-anal, and the peritonitis was apparently due to contiguity rather than to perforation, of which there was no sign. There was no sign of haemorrhoids, fistula, or diverticulae to account for the condition, and it was strange that the patient never complained of any rectal pain or discomfort of any sort, even upon defaecation, and a rectal examination had entirely failed to suggest a proctitis. The inspection of the rectum left no doubt that the peritonitis was secondary to the proctitis, and not vice versa.

My thanks are due to Dr. Godson, of Oldham, for his help in the elucidation of this case.

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* Since writing this I have had the advantage of Dr. Vere Pearson's criticism. With the exception of this statement he has expressed approval of all I have written. These low temperatures he is inclined to look upon as suggestive of arrested disease, in the same way that one gets subnormal readings temporarily after pneumonia. At any rate they should serve to keep the question of tubercle in the practitioner's mind. For this reason I have not deleted the sentence.