point of the left shoulder, in the region supplied by the fourth cervical nerve.

For the last two months the temperature was constantly raised, generally reaching 103° at 6 p.m. The pulse was little affected as regards frequency until cardiac weakness appeared in the last few weeks.

Faecal examinations showed an unusual number of microbic elements and an unusual type of coliform bacillus,

In the early period of disease.

In later period when symptoms of cirrhosis of the liver existed.

but the food elements were digested. In the later periods fats were not digested and bile was deficient. Urobilin was in excess in the urine.

Intestinal antiseptics—for example, salol, paraffin, etc.—were administered from the start, but produced no benefit.

Necropsy.

A *post-mortem* examination by Dr. Spilsbury showed the following condition:

External.

There was some oedema of the lower extremities and scrotum. The abdomen was rather distended.

Internal.

Heart. All cavities dilated; muscle showed microscopically marked brown atrophy. Lungs: Partly compressed by diaphragm; they also showed passive congestion and emphysema. The peritoneum contained 3 to 5 pints of clear ascitic fluid. Liver: of about normal size, but increased weight. There was some surface irregularity, but little thickening of capsule. On section, the organ was very firm and dry. The cut surface had a mottled appearance, reddish and grey areas alternating. The organ did not appear greasy. No fibrous network could be detected with certainty. The gall bladder was normal, and contained pale and watery bile; the bile ducts were normal. Microscopically the organ was traversed by numerous broad, and in places interlacing, areas in which the liver cells were undergoing atrophy, and many had disappeared, the wide spaces between the cells being occupied by greatly dilated blood capillaries, which are not easily seen, owing to *post-mortem* changes.

In the meshes of this interlacing network were islands of liver cells which exhibited marked hypertrophic changes, the cells being of large size and staining deeply, and some having two nuclei apiece. These changes were not very regularly disposed, but the atrophic areas appeared to be chiefly in the central, the hypertrophic chiefly in the peripheral, zones of the lobules. All the liver cells contained some excess of pigment. Fatty infiltration was exhibited by some of the hypertrophied cells, but the atrophied cells contained no fat. There was a little recent fibrous thickening of the capsule, but none of the portal areas, except around some of the larger bile ducts; there was, however, some thickening of the

walls of the hepatic vein tributaries. There were no myxomatous degenerations in the organ, practically no round-celled infiltration of it, and nothing to suggest an infective process.

There was no true cirrhosis or biliary cirrhosis, but a widespread atrophy associated with processes of compensatory hypertrophy—a condition of subacute hepatitis, probably of toxic origin.

The spleen was much enlarged—about 20 oz. in weight. Microscopically it showed advanced passive congestion. Smears from the spleen were examined for micro-organisms and malarial parasites, but without success. The blood in the organ showed, however, very marked anaemic changes of the red corpuscles with numerous nucleated red cells. The kidneys were somewhat enlarged but healthy; the other abdominal organs were normal.

The clinical features of a marked rise of temperature, remittent in type, and a definite leucopenia with evidences of gastro-intestinal catarrh, made diagnosis uncertain during the early stages owing to the conspicuous fever present.

The acute destruction of liver cells and the condition of acute cirrhosis makes it of particular interest pathologically. Investigations of a most thorough nature by Dr. Horder and Dr. Matthews failed to reveal any bacterial infection in the blood during the various stages, and possibly we should be right, in view of the slight constitutional disturbance, apart from temperature, in regarding the poison as being of a chemical nature.

THE SIGNIFICANCE OF FREQUENCY AND TENESMUS IN ACUTE CYSTITIS.

By OLIVER HEATH, M.A., M.B., B.C.CANTAB.,

ASSISTANT BACTERIOLOGIST IN THE LABORATORIES OF PATHOLOGY AND PUBLIC HEALTH, LONDON, W.

THE main idea contained in the following may prove of interest, since its application in practice as an aid to vaccine treatment was followed in seven days' time by an absolute and permanent cure of an acute cystitis of just over one month's duration; and, further, since this result was obtained without the use of any drug, urinary antiseptic, or mechanical washings at any time during the course of the infection. The value of the method is not considered proven by the one case described; but since the writer is essentially an analytical pathologist, a series of cases is not easily obtained by him, and it must therefore be left to those who have the material at hand, and who may consider it worthy of serious trial, to put it to the test of experience.

At the outset it may be as well to state definitely that the term "acute cystitis" is used as applicable only to cases with both pus and bacteria in the urine, and does not here include bacteriuria without pus.

The history was as follows: A previously healthy man, a medical man, acquired gonorrhoea. A stained film of the discharge showed that this was caused by a mixed infection with the gonococcus, a *Staphylococcus albus* and a Gram-positive bacillus of the *xerosis* (or pseudo-diphtheria) type. There was no treatment other than care as to cleanliness, and the discharge disappeared in about three weeks. During the two months which followed there were two or three recurrences of a gleet character, which were not examined microscopically, but which cleared up; at the end of that time the patient began to realize that he could not hold his urine for longer than about two hours in the day, and had to get up once or twice in the night to micturate—that is to say, the infection had spread up into the bladder. This condition was allowed to continue untreated, owing to the great faith the patient put in his own unaided opsonic and phagocytic powers. However, these did not prove sufficient, and, after about one month of great discomfort, advice was sought from the writer, with a view to having a vaccine made.

Examination suggested that the condition was one of cystitis, with probably some post-urethral trouble, though no actual urethral discharge could be demonstrated macroscopically or microscopically. The urine contained a

moderate amount of pus, with numerous vesical cells, and both the stained films and the cultivations made from the centrifugalized pus showed staphylococci and bacilli of the *xerosis* type, but no gonococci.

The first point of emphasis is that the gonococci had entirely disappeared at this stage, the infection being kept up by the other bacteria which had been present in the original discharge. If I may judge from the frequency with which requests to search for gonococci accompany material from old urethral discharges, etc., and from the comparatively small percentage in which these can be found, the idea is fairly prevalent that sequelae of gonorrhoea are, at any rate in part, due to the gonococcus. In probably a majority of cases this is not the fact.

TREATMENT.

Acute cystitis is a bacterial infection of the wall of the bladder, in the damaged surface of which the bacteria reside and multiply; from it the damaged epithelium is discarded, and from it pus exudes in greater or less quantity, covering the damaged surface with a film which gets washed into the urine and evacuated, whilst fresh exudation from the lesion keeps up the supply. The whole picture represents an inflammation, and probably in most cases an ulceration, situated in the bladder wall.

When an infection occurs in any animal, certain symptoms and signs become apparent, and these will vary according as the bacteria or the patient's resisting power is the stronger. But in all cases these signs and symptoms are manifestations of the patient's "reaction" to the infecting agent, or of the failure of this reaction. In a typical case of bacterial infection of limited duration the reaction must be considered as good, and it is in such a case that we have sure indications of what may be called Nature's method of cure, the problem before us being to find the true and rational method of cure from observation of a typical case. In other words, we have to translate the signs which we can see into pathological processes the details of which we know from experiment.

In typical acute cystitis the marked symptoms are frequency of micturition, with usually more or less tenesmus after the act, and their appearance should be welcomed as an indication of a strong and healthy reaction to the bacteria. In seeking an explanation we must consider in more detail what this mechanism is. To this question physiology and recent pathology together have provided a clear answer. When the bladder wall contracts it thereby not only expels the urine and discarded pus, but also accelerates and flushes the local circulation of blood and lymph, bringing up a fresh supply of opsonins and phagocytes. Tenesmus, by its spasms, reinforces these efforts, continuing the process over a longer period, probably carrying some bacteria into the blood stream, where they will act by auto-inoculation and eventually increase the power of immunity, and at the same time enabling undiluted fresh pus to act on the bacteria with full effect.

The second point of emphasis, therefore, is that frequency and tenesmus are part and parcel of the process of cure, and should never be treated symptomatically. Drugs which will relieve the pain and irritation, if successful, only put a stop to the natural process of cure, and are positively harmful from a remedial point of view. When cure is effected the symptoms will cease naturally.

The third and main point of emphasis is that the tenesmus can be almost entirely, and the frequency partly, controlled by the simple expedient of controlling the amount of liquid taken by the patient. This is easy to understand if we consider that it is the irritation produced by the bacteria (or their products) contained in the pus which causes the symptoms. Consequently, as the irritant is more or less diluted in the bladder, so are the symptoms ameliorated or increased respectively. A large intake of water is, in fact, the simplest method of washing out the bladder, and can be made to act over an unlimited period by keeping up the supply; but in the treatment of acute cystitis this must be considered only as a temporary and entirely palliative measure. On the other hand, abstinence from drink, if the bacteriotropic power of the blood has been previously raised, can be used to bring practically undiluted fresh pus to act on the bacteria both in and outside the lesion—surely a more efficient *rational* than the use of antiseptics.

In the case under consideration full use was made of the principles enunciated above; the vaccine was used practically to supplant auto-inoculations as being easier to control, and the supply of drink controlled so as to lessen reaction when there was risk of a "negative phase" of immunity, and to increase the reaction when a "positive phase" might be expected.

As a palliative measure, while the bacteria were being isolated and a vaccine prepared from each, a sufficient quantity of water was drunk to keep the bladder contents well diluted both during the day and at night, with the result that the symptoms were considerably ameliorated. As soon as the vaccines were ready active treatment was commenced by the subcutaneous inoculation of a dose of 50 million staphylococci and 25 million bacilli. Twenty-four hours later it was considered that any negative phase probable from this dose would have passed and that the bacteriotropic power of the blood might reasonably be expected to be increased; accordingly drink was withheld entirely from 4 p.m. with a view to increasing the frequency and producing tenesmus. This result was attained, and in about four to five hours the symptoms were marked. After a final unpleasant half-hour, in which the writer sat with the patient, one pint of water was given, followed in about twenty minutes by half a pint; the result was that the previous state of comparative comfort was entirely regained. This procedure was repeated at forty-eight and at seventy-two hours after the inoculation, as much water as was required to relieve the symptoms being allowed between times.

On the fourth day a second dose of vaccine was given containing 100 million staphylococci and 50 million bacilli, and forty-eight hours later drink was withheld for four to five hours, and for the reasons and with the result as noted above. On the following day the symptoms, judged from the patient's feelings, were markedly improved; the urine could be held about three hours; but drink was withheld that evening again, without, however, producing much discomfort. The day after this—the eighth day from the commencement of active treatment—the symptoms had apparently disappeared altogether, the urine being held four or five hours with comfort and passed in the ordinary way.

A third dose, of 150 million staphylococci and 75 million bacilli, was inoculated on the evening of the eighth day in order to make assurance doubly sure. From that day, now over three years ago, there has been no recurrence nor any sign of trouble, and the urine examined on that day was found to be free from pus and bacteria, and has been normal ever since.

A SIMPLE SPLINT FOR FLAIL ELBOW.

BY

RUSHTON PARKER, M.B., B.S., F.R.C.S.,

PROFESSOR OF SURGERY IN THE UNIVERSITY OF LIVERPOOL.

THE recent use of a simple and effectual splint, enabling an otherwise destitute patient to earn a living, impels me to publish the case for the information and benefit of those interested.

The patient, a woman, has been off and on under my care for about forty years. She was born at Deptford about 1856, her father being the captain and owner of a sailing craft on which her parents usually lived, and her mother had gone ashore to be confined at some lodgings while the vessel lay at anchor in the Thames. When 5 years old the child fell down a staircase, her left arm being caught in the banisters and badly broken near the elbow. The vessel put into Liverpool, where she states that on account of deformity re-fracture was performed, and that a Liverpool surgeon was consulted, advising amputation, which her mother would not permit. Hitherto she had been attended in private practice, but the death of her father about this time left her mother without means, and both were admitted into the Liverpool Workhouse Infirmary. Here the elbow was excised, and after a time she was moved to the Kirkdale Industrial Schools, a children's branch of the workhouse, to which my father was surgeon. She came under my notice in September, 1870, the elbow being tender, not extensible