distress than the piles. The latter may be ultimately cured, but the healing process may be unduly prolonged. In my opinion the whole object of the injection method is defeated by using strong solutions.

Recurrence.

There is no doubt that recurrences do take place, and they usually become evident in from three to five years' time. The Martins treated by injection 4,200 cases, and estimated the recurrence rate at 15 per cent. Even if recurrence does take place, patients are quite happy to return for a further course of injections.

In treating a case of piles by the injection method it is advisable to keep a systematic record of the date, site, and amount of injection solution used at each sitting. I have a diagram stamped in my case book and record the injection made in different coloured inks.

II.—By CUTHBERT DUKES.

The pathological changes provoked by carbolic acid injections have been studied microscopically in ten patients, in each of whom one haemorrhoid was injected in the usual way, and this injected haemorrhoid, together with a control not injected, was subsequently removed by operation—in one patient in one day, in the remainder after 2, 3, 4, 5, 6, 7, 12, 14, and 21 days. The pieces of tissue were fixed, embedded in paraffin, and serial sections cut from the injected haemorrhoid and control haemorrhoid of each patient.

The haemorrhoid removed one day after injection showed the vessels dilated and engorged with blood and the surrounding tissues oedematous, containing much extravasated blood, and infiltrated with polymorphonuclear leucocytes. There was clear evidence of active emigration of these through the vessel walls into surrounding tissues. No signs of thrombosis were seen. The chief feature at this stage was the close packing of the oedematous tissues with innumerable polymorphs.

The haemorrhoid removed two days after injection showed no pathological changes to distinguish it from the uninjected control. It is probable that in this case the piece of tissue removed was not reached by the carbolic acid.

The haemorrhoid removed three days after injection did not show any noteworthy change in the vessels themselves, but the surrounding tissues were still oedematous, contained extravasated blood, masses of polymorphonuclear leucocytes, some lymphocytes, and very many large mononuclear cells. The abundance of these large mononuclear macrophages was the characteristic feature at this period. Many were actively phagocytic and had ingested red blood cells or leucocytes. They appeared to be playing the part of scavengers. Proliferation of the fixed connective tissue cells was noticed at the margin. There was no evidence of thrombosis in any of the vessels.

The haemorrhoid removed four days after injection presented much the same appearances as its predecessor, but the leucocyte infiltration was less conspicuous and the macrophages were relatively more numerous. These large mononuclear cells were arranged in clusters round the blood vessels. There was clear evidence of proliferation of fibroblasts. No sign of thrombosis was detected.

The haemorrhoid removed five days after injection showed commencing thrombosis in many vessels. No intravascular clotting was seen in the control injected haemorrhoid from the same patient. The polymorph infiltration of the surrounding tissue had almost disappeared, but large mononuclears and young connective tissue cells were plentiful.

The haemorrhoids removed six and twelve days after injection showed very little change as compared with the control.

In the haemorrhoids removed seven, fourteen, and twenty-one days after injection thrombosis was found in each case, but apart from some increase in fibrous tissue and the budding of new capillaries no other significant change was noted.

Manner of Action of Carbolic Acid.

Carbolic acid, being a powerful irritant to the tissues, initiates an aseptic inflammation, characterized by dilatation of the vessels, emigration of leucocytes, and transuda-

tion of lymph. By these means the alien liquid is diluted and removed; thereafter the inflammation quickly subsides. All the changes observed microscopically represent the effort of the tissues to repair an injury.

The curative effects of injections of carbolic acid do not depend upon any specific action of this chemical substance. The mere introduction of a needle into the haemorrhoid results in damage to many blood vessels, and in these thrombosis is likely to follow. Moreover, the cellular injury which this poison inflicts on the delicate lining cells of the capillaries is also likely to contribute to intravascular clotting. It is possible also that the contraction of newly formed fibrous tissue may constrict blood vessels or even occlude them, but little sign of this was noticed in this histological study. Perhaps, after longer periods, this would have been more evident.

The early inflammatory changes which occur in the first three days do not play any important part in the cure of haemorrhoids; it is the secondary changes, in particular the intravascular clotting, and subsequent fibrosis, to which any beneficial effect must be ascribed.

AN ATTEMPT TO VACCINATE CHILDREN AGAINST TUBERCULOSIS.

(A Preliminary Note.)

BY

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IN the BRITISH MEDICAL JOURNAL of April 23rd, 1921, I described a new tuberculosis immunizing vaccine, which I had prepared from dead cultures of tubercle bacilli that had become attenuated after continuous subculture in my laboratory for a period of fourteen years.

The immediate results of treatment of a large number of cases of all forms of tuberculosis have been very encouraging, but the final results cannot be estimated for another two years.

I am now directing my attention to the even more important problem of protecting children against infection, on much the same lines as the use of an antityphoid vaccine against typhoid fever, which was such a brilliant success during the war.

The problem of tuberculosis resolves itself into the question of immunity. The protection of the community by some safe scientific method of active immunization is the only effective way by which this preventable scourge can be eradicated.

Animal Experiments.

In the attempt to produce some active immunity in animals I have inoculated five series of rabbits and guinea-pigs, extending over a period of fourteen years.

I.

The first series of animals was inoculated with Koch's old tuberculin. Four weekly injections were given, followed in another month by a subcutaneous injection of 1/2 mg. of human tubercle bacilli of virulent culture. All these animals became infected with generalized tuberculosis and were apparently not influenced by tuberculin.

II.

The second series was given large doses subcutaneously of Koch's bovine tuberculin (bacillary emulsion). A weekly injection was given for four weeks, and after an interval of one month they were given 1/2 mg. of living bovine bacilli. All these animals developed acute generalized tuberculosis and died in four months. No protection appears to have been established against the laboratory dose of virulent bacilli.

III.

In the third series I attempted to produce active immunity in the animals by giving them subcutaneously four weekly doses of living bacilli of attenuated cultures of fourteen years' growth. These cultures, although growing luxuriantly, were non-pathogenic to animals. None of these animals developed tuberculosis, and on examination in six months showed no trace of infection.

The animals were then given the usual laboratory dose of virulent bacilli, and carefully watched for six months. The loss of weight was not nearly so pronounced as in the other series; but on being killed all the animals were found to be infected, but to a very much less extent than the preceding ones—in some cases only a few glands, in others a more or less generalized infection.

IV.

In the *fourth series* one half of the animals were given subcutaneously four weekly doses of living human attenuated bacilli, and the other half were given the same doses of living bovine attenuated bacilli. None of these animals showed any signs of infection in six months. The animals which had received the protective doses of human bacilli were then given 1/2 mg. of living virulent bovine bacilli, and the animals which had received bovine attenuated bacilli were given 1/2 mg. of virulent human bacilli. In six months the whole series of animals was most carefully examined, and the results were much more encouraging. Two of the animals showed no infection, but all the others were more or less positive, from a few isolated glands to a mild generalized infection, but to a decidedly less extent than in any of the preceding ones. In all probability these animals would have recovered from this laboratory dose.

V.

Fifth Series.—The object of this experiment was to show if it was possible to protect animals against a virulent infection by giving them two prophylactic injections of a tubercle vaccine prepared from the dead cultures of human tubercle bacilli which had been attenuated by continuous subculture for sixteen years, which represented the 212th generation. Five rabbits were given two injections of 0.01 mg. of vaccine subcutaneously, and were kept under observation for a month. No reaction followed the vaccine; they gained weight and were apparently unaffected. Five control rabbits, and the rabbits which had been vaccinated, were then given 1/10 mg. of a virulent culture of bovine bacilli, supplied to me by Dr. Schutze. Very careful observations were made. The five animals which had not been protected steadily lost weight, and they all died within four months. They all showed generalized tuberculosis in all organs.

The five animals which had received protective vaccine are all alive to-day and in apparently good health, and I propose to keep them alive for another few months before they are examined. These animals have been protected from bovine infection by means of a vaccine prepared from human attenuated bacilli.

In my next series I propose to attempt to immunize guinea-pigs in the same way, but this may be more difficult owing to their great susceptibility to tuberculosis.

Conclusions.

1. It appears to be possible to immunize animals against tuberculosis by means of a protective vaccine prepared from attenuated bacilli.
2. The duration of the immunity is not yet known.
3. It seems to be probable that we may be able to protect children against infection in the household. We must wait for some years before this can be finally established. All children over the age of 1 year who are living in the same house with a tuberculous member of the family ought to be protected against infection, and it is in the early years of life that such infection usually occurs.

Vaccination of Children.

Encouraged by these results, I have treated 412 children, varying in age from 1½ to 14 years, one of whose parents was suffering from pulmonary tuberculosis, with two prophylactic doses of a vaccine prepared from dead cultures of attenuated bovine bacilli. The injections were given at an interval of two weeks. No reactions were observed, and in no case has there been any untoward symptom. All the children were treated at the request of a parent.

Up to the present I know of no child who has developed tuberculosis, but we must wait for at least ten years before a final judgement can be given of its efficacy in all cases.

From a long observation of tuberculosis I am convinced that infection takes place most commonly in early life, and if we can with complete safety give some active immunity to those children who are directly exposed to infection at home, we will have taken a long step in the direction of prevention, which, after all, is the key to the problem.

Memoranda :

MEDICAL, SURGICAL, OBSTETRICAL.

PARTIAL HEART-BLOCK COMPLICATING AORTIC INCOMPETENCE FOLLOWING RHEUMATIC FEVER.

THE case here reported is of interest because the condition is apparently rare, and also because the symptoms were more than usually severe in so small a degree of heart-block. Though, in mitral stenosis, acute inflammatory changes are common in the myocardium, causing heart-block, Heatherley in his recent book states that he has not yet seen the condition complicating aortic incompetence.

A man, aged 28, was admitted to the Royal Mineral Water Hospital, Bath, on May 5th, 1924, complaining of pain and stiffness in the hands, shoulders, knees, and ankles, following an attack of rheumatic fever in February.

He stated that he suffered from palpitation, was breathless on exertion and easily exhausted, and found himself sweating profusely even when at rest. From time to time he felt very giddy and had "fainting turns." The man presented the typical picture of aortic incompetence. There were no signs of accompanying mitral stenosis. Electrocardiographic tracing revealed the P-R interval lengthened, measuring 0.24 sec.; diastolic periods were much shortened, averaging 1/8 sec.; the R-T interval was normal—namely, 0.32 sec. The T waves in all leads were much flattened and corresponded to the height of the P waves, which showed a deflection amplitude of 3.4 millivolts. There were no signs of dropped beats.

Bath.

H. C. NIXON, M.D.

KNOCK-KNEE AND SCOLIOSIS.

MANY causes are contributory to the deformity of scoliosis, but I cannot recollect having read in any textbook a description of the following sequence. The conditions having been noted recently on several occasions in the course of school medical inspection, a brief description may be of interest.

When told to stand up, a knock-kneed child seldom assumes an erect posture with knees together and heels several inches apart; instead, he places his heels together, keeps one leg straight (perhaps the right), and allows the knee of the left to come to rest in front of it. The left leg of necessity remains flexed, and as artificial shortening results scoliosis of a postural nature must follow. Constant repetition of the faulty attitude, aided by the muscular and other defects resulting from the rickets which caused the knock-knee, will soon make the deformity permanent.

It is important to remember this point in the etiology of lateral curvature, for the most painstaking remedial measures will hardly be successful if it is ignored.

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DISCHARGE OF ASCARIS LUMBRICOIDES THROUGH A HERNIOTOMY WOUND.

A NATIVE of Nigeria, said to be 79 years of age, was admitted to the Colonial Hospital, Lagos, in October, 1922, suffering from a strangulated inguinal hernia on the right side.

I operated immediately and reduced a loop of small intestine 6 inches in length from the hernial sac; this intestine was deeply congested but had nowhere obviously lost its vitality, although it was evident that in a very short time it would have become gangrenous. The operation was completed in the usual way.

The old man recovered well, but on the fourth day complained of some "tightness" in his wound; the removal of the dressing disclosed a small swelling in the region of the wound without redness or pain; no fluctuation could be elicited, but the "feel" of the swelling was peculiar and unusual. A pair of dressing forceps was inserted through the healthy-looking incision; the expected discharge not having appeared, the opening was enlarged, a finger introduced, and three full-sized *Ascaris lumbricoides* pulled out. These worms had been lying between the skin and muscle; no communication could be found with peritoneal cavity or bowel, and there was only a trace of sero-sanguineous fluid in the pocket in which the worms lay. The general condition of the patient was quite unaltered by this local occurrence. Santonin was now administered, and many more ascarides were passed by the anus. The wound healed quickly without further complication. Six weeks later the patient, who had been kept in hospital on account of his debilitated condition, contracted pneumonia and died.

At the *post-mortem* examination the ileum was found to be attached to the peritoneal aspect of the herniotomy scar by a single fine adhesion, otherwise the bowel was normal and the peritoneal cavity intact.