The initial dose in the enormous majority of cases was half a million. The daily weight has been found to be a satisfactory method of controlling the dosage. The interval with small doses has been three to four days; with larger doses a week. Patients do not seem to have been quite so sensitive to the secondary organisms when present, but still great caution had to be exercised; streptococci were given in doses of half a million to 5 million and *B. coli* the same.

Length of Treatment.

It has been difficult to obtain reliable information as to the total length of the treatment in a good many of the cases, where the treatment had been either continued or carried out in full by the patient's own doctor, but taking those known and averaging out the rest, a method which could to some extent be checked by noting the dates of the cessation of correspondence, it works out at five months. Excluded from this are two or three whose treatment extended intermittently over two years or more, and also some where interruptions occurred.

Discussion.

I do not bring forward these cases as proof that the *M. deformans* is the primary cause of rheumatoid arthritis, but as evidence tending in that direction. I do, however, claim that, used as a working hypothesis, better results have been obtained than by any other method of treatment. Among the sixty-two cases of whom the notes are fairly complete, only 21 per cent. failed to respond in some degree. Other 95 per cent. improved but slightly or relapsed early; 70 per cent. may be said to have been cured for the time being as far as cure was possible, and of these it is known that 15, or 25 per cent. of the total, still maintain their position. From recent experience it is suggested that those who have relapsed would have regained their health under further vaccines, and only the war, in the majority of the cases, prevented this.

There is no other method of treatment which can show anything like these results in rheumatoid arthritis. Hitherto the results of vaccine treatment have been unsatisfactory, and in fact the method seems largely to have fallen out of fashion. Professor Stockman does not even mention the possibility in his book on arthritis published this year. S. Boorstein, of the Montefiore Home in America, whose experience must be considerable, made the following statement as recently as last March²¹:

VACCINE TREATMENT: A great deal has been written on, and many patients abused by, vaccine treatment. As shown before, it is very hard to state definitely the bacteria which are the true etiological factors in a given case. Even if the source of entry is exactly found, it is doubtful whether the organism in the joint is the same as in the focus, as the organism changes under different environments. It is, therefore, absolutely worthless to give vaccines, perhaps even harmful. Some have injected non-specific protein antigen with the idea that the proteins of the bacteria are responsible for the cures. Those cases which I have observed following all forms and kinds of vaccine injection have turned out badly, and I have therefore abstained from using them.

One very substantial benefit conferred by the treatment has been that after a course of vaccines, when the active signs of the disease have subsided, joints can be manipulated under an anaesthetic without fear of lighting up further trouble. In three of the recent cases operations have been performed. Tendons have been cut, joints cleaned up and freed, and in several others adhesions have been broken down under gas, so that limbs have been brought into use again after long periods of inactivity.

In conclusion, the author desires to make his best acknowledgements to all those of his medical confrères, too numerous to mention individually, who have so kindly assisted him with notes of their cases, and many of whom have taken great pains in the matter of tracing their patients.

Harrogate.

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A DIPHtheria CARRIER OF UNUSUAL TYPE.

BY

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A CASE of pharyngeal diphtheria occurred on July 26th, 1920, in one of the sons of a family consisting of father, mother, daughter, and three sons. The patient was removed to the Isolation Hospital the same day, and the premises and eating utensils disinfected. Another son developed the disease on July 28th, 1920, and was removed to the Isolation Hospital, and disinfection was again carried out. On August 10th, at 5 p.m., an interval of twelve clear days having elapsed since the last case, the sister complained of sore throat and malaise; no membrane or nasal discharge could be seen, but there was some increased redness of the pharynx and tenderness of the cervical glands. A swab was taken from the throat. On visiting her the next day a patch of membrane the size of a florin was seen on each tonsil, and there was marked narrowing of the space between the tonsils; the swab was reported to show *B. diphtheriae*.

The remaining brother, who slept in the same room, also had a small patch of membrane on one tonsil. After removal of these two cases and disinfecting, swabs were taken from the father and mother. That from the latter was reported to show *B. diphtheriae*, but no clinical signs of diphtheria were present. On admission to hospital she was found to have pediculi capitis, and a small area of impetigo on the scalp; a swab from this was returned showing *B. diphtheriae*; she had therefore *B. diphtheriae* present both in the throat and in the scalp lesion.

It was then found that another son had died from diphtheria in September, 1914. The mother may have been the cause of this case, or she may have become a carrier after contact with it. She herself had never had any marked illness which might have been diphtheria. It appears probable that she was at least the infecting agent in the last two cases, the interval of twelve days being overlong for infection from the first two. As no other source of infection could be traced for the first two cases, it is possible that she was the infecting agent here also.

In view of the possibility that the bacillus found on the head of the mother, though morphologically indistinguishable from *B. diphtheriae*, might be merely a diphtheroid bacillus, this bacillus was isolated, and its pathogenicity proved by animal inoculation. The strain proved to be of medium virulence; 2 c.cm. of a forty-eight hour broth culture killed a guinea-pig weighing 600 grams in less than three days; the post-mortem examination showed hæmorrhagic oedema at the site of inoculation, and marked congestion of the suprarenal glands.

The impetigo of the scalp had been "present for several months." The series of cases indicate very strongly the necessity of swabbing all contacts in the home irrespective of age, and also of searching for and examining any other lesions.

LIFE-HISTORY OF ASCARIS LUMBRICOIDES.

BY

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MAJOR I.M.S.

THE following is a note of work on the life-history of *Ascaris lumbricoides*, in continuation of that published in the BRITISH MEDICAL JOURNAL, July 1st, October 7th, December 2nd, 1916, January 25th, 1919, and in *Parasitology*, February, 1917, January, 1918, October, 1919.

Four sucking-pigs three days old were fed with ripe eggs of *Ascaris suilla*, Dujardin (the round worm of the pig, probably identical with *A. lumbricoides*, the common round worm of man). All four suffered from ascaris pneumonia on the seventh and eighth days after infection, proving that the larvae of the worm were then passing through the lungs. One died during the night of the seventh-eighth. The remaining three pigs were killed on the fifteenth, seventeenth, and nineteenth days, and larvae of ascaris,

measuring from 3 to 7 mm. in length, were found in the small intestine. They still required to undergo a further moult before becoming adult. The small intestine was in a condition of catarrh, the larvae embedded in abundant mucus. In previous experiments I had traced them to the fourteenth day, when they measured 3.8 mm., but had failed to find them on later days. The present positive result replacing the negative result renders it extremely probable that the worm can undergo full development in one host alone—that is, man or the pig.

I hope that a full account of the experiments and of the anatomy of the larvae, together with a summary of recent work on the same subject by Ransom and Foster and Yoshida, will be published shortly in *Parasitology*.

I wish to express my thanks to the governing body of the Lister Institute of Preventive Medicine for their kind permission to work in the institute; to Dr. Martin and Dr. MacConkey for much assistance; and to the Medical Research Council for the grant covering the cost of the animals employed.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

FIBROMA OF THE ILEO-CAECAL VALVE.

A WOMAN, aged 24, was admitted to the Rochdale Infirmary on January 15th as a case of appendicular abscess. She gave a history of three previous attacks of pain in the right iliac fossa during the last six months; they were accompanied by vomiting and constipation, and had each been of only two or three days' duration. The present attack had begun four days before, and had been the worst she had so far experienced. On seeking medical advice she had been immediately sent to the hospital.

On admission she stated that the pain was considerably better and that the attack was passing off. The pulse and temperature were normal, the tongue was slightly furred. The bowels had been moved the previous day. She had vomited last on the morning of admission. There was tenderness but no rigidity in the right iliac fossa. A mass was palpable in the area of the appendix. This mass was tender and fairly movable. The movable mass and the absence of rigidity, fever, and rapid pulse led me to the opinion that this was a case in which the inflamed appendix was wrapped in omentum.

The abdomen was opened through a McBurney's incision; it was at once seen that the appendix was normal, and that the mass was due to a tumour projecting into the caecum from the region of the ileo-caecal valve. It was significant that the terminal portion of the ileum was slightly invaginated into the caecum—that is, there was a very definite sulcus about half an inch in depth at the ileo-caecal junction.

As far as could be gathered from an examination of the outside of the caecum the tumour was smooth, rounded, and incorporated in the bowel wall. In order to determine exactly the origin and limits of the tumour I delivered the caecum entirely—a procedure quite easily carried out through the original incision on account of the caecum being extremely mobile. A clamp was placed upon the terminal portion of the ileum and upon the ascending colon above the caecum, and an incision made through the bowel wall over the growth. It was then seen that the tumour was incorporated in the upper lip of the ileo-caecal valve, and that it projected very considerably into the lumen of the bowel. On its visceral aspect it was smooth, regular, and covered with mucous membrane, except at the most projecting part, where there was an ulcer the size of a sixpence, with a hard, smooth, white floor.

It appeared to me that it would be impossible to excise this tumour thoroughly without removal of the whole caecum and ileo-caecal valve. I therefore removed the terminal three inches of the ileum, the caecum, and part of the ascending colon. It was then necessary to close the original incision, and through a right rectus incision to perform an end-to-side anastomosis of the ileum with the transverse colon. Through this incision I was able to satisfy myself that there were no secondary deposits in either glands or liver. This was as I had expected, because I looked upon this tumour as benign.

The patient made an uninterrupted recovery, though a few days after admission she developed a typical secondary syphilitic rash. The Wassermann reaction was strongly positive, and she received treatment for this condition until her discharge on February 28th.

The tumour was as large as a hen's egg and of similar shape, the more rounded extremity projecting into the lumen of the bowel, the narrower extremity being embedded in the bowel wall in the region of the upper lip of the ileo-caecal valve. It was uniformly hard and fibrous on section and white and glistening in appearance. The

pathological report was that the tumour was composed of fibrous tissue and had the structure of a fibroma.

The attacks of pain were, in my opinion, caused by the attempts of the bowel to expel this tumour. The sulcus at the ileo-caecal junction was significant; it showed that at any rate for the last six months before operation the patient had been in imminent danger of intussusception.

Rochdale, Oct. 29th.

JOHN C. JEFFERSON.

INTRAUTERINE DIAGNOSIS OF CONGENITAL HEART DISEASE.

SOME time ago, in a medical journal, the question was raised as to the possibility of diagnosing *in utero* a condition of congenital heart disease. The details of a case that occurred in my practice this year may be of interest:

Mrs. H., aged 34, a multipara, was expecting her fourth child; about six weeks before the confinement was due I made my usual routine examination. On auscultation the fetal heart was easily audible, the point of maximum intensity being about 2 in. below and 1½ in. to the right of the umbilicus. The ordinary fetal heart sounds were largely, though not entirely, replaced by a loud blowing bruit, systolic in time, the rate being 128 per minute. The mother's pulse rate was 60. The uterine souffle was hardly audible on the right side, but easily heard on the left. It will be understood that in saying a loud bruit was heard one is speaking relatively. But the sound was loud enough to be heard over a larger area than is usually the case with a fetal heart, and of sufficient intensity to make the fetal heart sounds more easily detected than I can recall in any of some hundreds of cases previously examined. About a month later—that is, a fortnight before the confinement was due—I again auscultated the case; although the fetal heart was not audible to the right, it could be heard at the corresponding spot to the left of the umbilicus, the child having made, roughly, a quarter-turn in a vertical axis. On this occasion, as regards quality and intensity, the sounds were similar to what I had heard four weeks previously, but the rate was now 132 per minute and the mother's pulse 66. The degree of pressure of the stethoscope on the abdominal wall made little or no difference to the sounds. On my calling the attention of the nurse to what I had heard, she informed me that one child had died, when about 6 months of age, quite suddenly and unexpectedly. A fortnight later the child was born and the heart was normal in every respect, with no evidence whatever of any congenital imperfection.

The points of interest appear to be the presence of this marked systolic murmur, and its definite, persistent, and unvarying nature over several weeks, even when the fetus had altered considerably in position. The bruit is difficult of explanation. If due to circulation through the foramen ovale, or ductus arteriosus, why should the presence of such a bruit be so rare an occurrence? If the sounds are not of cardiac origin the presence of a funic souffle is a possible explanation. This is stated to be due to cord compression by the stethoscope, or by some position of the cord in relation to the child, which leads to stretching. But in this instance a varying stethoscope pressure made no difference to the sounds, nor had they perceptibly altered when the child had rotated very considerably in the vertical axis. If any inference can be drawn from a single case, it is that auscultation cannot be relied upon in all instances as a means of diagnosing congenital heart disease *in utero*.

Barnet.

B. H. STEWART, M.D., B.Ch.(Cantab.).

THE CHOLECYSTITIC HEART.

THE term "cholecystitic heart" is taken from Sir Berkeley Moynihan, who first drew my attention to the irritability of the heart in cases of cholecystitis. The following is an explanation of this condition: Stimulus material is constantly being built up within the heart muscle. When this stimulus material reaches a certain summit it, as it were, explodes and originates a muscular contraction. The time at which the stimulus material explodes depends upon the degree of irritability of the muscle cells.

In the resting state the lining membrane of the cardiac muscle cells is semipermeable—that is, it is permeable to only one electric ion, the positive or negative. The cell is in a state of physiological polarization, or what is known as a Helmholtz double layer.

In the state of excitation the lining cell membrane becomes permeable to both positive and negative ions, the state of polarization of the Helmholtz double layer undergoing depolarization; and between the active and non-active part of the muscle there is a difference of potential which can be recorded by the galvanometer. Excitation