anaemia and a slight cough. The blood contained 15,000 white blood cells per c.mm., and on making a differential count of the white blood cells I found that the lymphocytes formed nearly 60 per cent. of the total white cells. The next week the child was brought back to the out-patient department, having started with whooping-cough two days previously, or five days after the blood examination was made. The lymphocytes in this case, therefore, formed an unusual percentage of white blood cells five days before the whooping began. Thus, if a child who has been known to have been exposed to the infection of whooping-cough starts with a cough, a blood examination will very likely show whether it is going to begin whooping-cough, and then isolation can be undertaken early.

On examining the blood of the cases after the whooping stage had been passed it was found that the lymphocytosis persisted for a short time and then gradually diminished, so that by the end of two months after the whooping had stopped the white blood cells had returned to normal proportions.

Blood changes in infants and children develop more easily and more quickly than in adults, so that the leucocytosis with a relatively large proportion of lymphocytes helps in making an early diagnosis of the disease, especially in doubtful cases without a definite whoop; as whooping-cough is a very infectious and serious disease, the early diagnosis is most important. Thus, in the Report on the Health of the City of Manchester for 1909, Dr. Niven² says: "This is not only a fatal but a most

Diagram showing the rise and fall in the number of lymphocytes in a typical case of whooping cough. C, Cough; W, whooping.

distressing disease, and the figures are most disquieting;" in fact, the number of deaths from whooping-cough and its sequelae far exceed the deaths from any other infectious disease except measles.

In infants, however, the lymphocytes normally form between 40 and 50 per cent. of the total white cells in the blood; but even here, if the lymphocytes form nearly 60 per cent. of the white cells and there is a larger proportion of large lymphocytes than normal, it is confirmatory evidence of the existence of the disease. The blood from children suffering from some septic trouble was examined, and here the excess of white blood cells was found to be made up by the polymorphonuclear cells and not by the lymphocytes as in whooping-cough.

If the total number of polymorphonuclear cells and lymphocytes in normal blood and then in the blood of a case of whooping-cough be estimated, it is found that the excess of white cells in the blood of whooping-cough is almost entirely made up of the lymphocytes; the total number of polymorphonuclear cells remaining but slightly increased. Thus, if there are 10,000 white blood cells per c.mm. containing 60 per cent. polymorphonuclear cells and 35 per cent. lymphocytes, there will be 6,000 polymorphonuclear cells and 3,500 lymphocytes per c.mm. Comparing this with the blood of a whooping-cough case containing 25,000 white cells per c.mm. with 40 per cent. polymorphonuclear cells and 60 per cent. lymphocytes, there will be 10,000 polymorphonuclear cells and 15,000 lymphocytes per c.mm. The lymphocytes have thus increased by nearly 12,000 per c.mm., while the polymorphonuclear cells have only increased by 4,000 per c.mm. In septic conditions the total number of polymorphonuclears are increased and the lymphocytes are but slightly increased. Whooping-

cough without serious complications is not often fatal, so that the exact state of the blood-forming organs is difficult to study. It is also difficult to say how far there is an excess of lymphoid tissue or hypertrophy of the lymphatic glands, but there is no marked enlargement of the glands to be made out on clinical examination.

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CELLULITIS OF THE ARM, COMPLICATED WITH PNEUMONIA, TREATED BY VACCINE.

By W. OWEN EVANS, L.R.C.S., L.R.C.P., L.M. EDIN.,
L.F.P.S., L.M. GLAS.,
PONTARDAWE.

THE following is a report of the first case in which I have had occasion to use vaccine treatment (staphylococci and streptococci). The result was sufficiently striking to make it worthy of record.

H. J., a farmer, aged 35, who had enjoyed excellent health, accidentally cut his hand whilst sharpening a cross-cut saw. The wound was very small and was situated over the fourth metacarpal bone of the left hand. He paid no attention to it and continued his work all day without feeling any inconvenience. The following day (February 9th), as he was killing a pig, he began to feel ill, shivering and getting very weak, in fact to use his own words, "I was getting worse and worse every five minutes." He returned to the house and had a foot-bath (hot water and mustard), and went to bed. The shivering continued, and he felt desperately ill. The next day (February 10th) I was urgently summoned to his house, a distance of 6½ miles. He was then complaining of pains in his left side, slight hacking cough, and difficulty of breathing, the temperature was 101.5°. His hand, which was very red and swollen, had become extremely painful. There was, in my opinion, pus in the back of the hand, and I proposed to let it out, but as this suggestion was declined I advised it to be kept in a warm bath constantly; a purgative was given. On my next visit (February 12th) the arm had swollen up to the elbow and the inflammatory process extended. The pain was excruciating and the man had had no sleep from the first day of his illness. I now got his consent to make two incisions on the back and side of the hand, with the result that a good amount of pus came out, and through the opening on the back of the hand the rusty piece of a tooth of the cross-cut saw was extruded. The temperature was 103°, pulse 98, respirations 36. I saw the patient again the following day and found him very weak; the inflammatory process was still extending up the arm, which had swollen to an enormous size. The skin was very red and the whole limb was indurated and most tender. I made another incision near the elbow, but no pus was obtained. I recommended them to carry on the hot baths continuously, night and day. Temperature was 103.5°, pulse 98, respirations 40. On February 14th the temperature fell to 101.5°, pulse 84, and respirations 32, but there was no improvement in the condition of his arm.

I suggested getting another opinion, fearing that it would be necessary to amputate at the shoulder. At the same time I thought of trying what vaccine therapy might do, and to this the patient consented. I asked my friend Dr. Lloyd Smith to see the case with me. We decided that it would be an excellent case to treat by vaccine. On February 16th some stock vaccines were obtained (Wright's, from Parke, Davis and Co.). After taking the necessary preliminary precautions I inoculated the patient with 250 million staphylococcus and 20 million streptococcus in the flank. On my next visit, February 18th, I was told that he became very ill about four hours after the inoculation, and that for some time he was quite delirious. After about ten hours pus oozed out freely, in fact most profusely, through all the three incisions. The arm had considerably diminished in size and there was less pain. The temperature was 100.4°, the pulse 84, and the respirations 18.

I saw the patient on February 21st, and decided to cleanse all the pus pouches with a solution of lysol and give a thorough irrigation. On February 23rd, however, I received a note that the arm was getting much worse, and I found the temperature 99.5°, pulse 84, arm swollen and very painful. I decided to give him a further inoculation of vaccines (150 million of staphylococcus and 5 million streptococcus); this was thirteen days after the first inoculation. After eight hours there was profuse perspiration, free discharge of pus, and a feeling of intense weakness and thirst.

On March 3rd the temperature was normal for the first time, and he began to feel himself improving; the pulse was 72 and the respirations 18.

On March 5th he got up for an hour, but was too feeble to stand and had to be put back to bed.

On March 10th his condition showed marked improvement, and he was downstairs.

The signs and symptoms of the pneumonia were ordinary in character and were treated on general lines

Notwithstanding the fact that rigors took place and that the temperature fell by crisis from 103.5° to 101.5° and the respirations from 40 to 32, and also that in the course of twelve hours he coughed up two large basins-full of expectoration which cleared the lung in a short time, it is noteworthy that with the crisis the temperature did not come down to normal. The great amount of septic mischief in the arm no doubt accounted for this.

I regret that the patient lived in an outlandish district and a most inaccessible place, so that more details cannot be given. I believe, however, that my thorough irrigation with lysol of all the wounds and pus pouches would have been better omitted, for there is no doubt in my mind that the subsequent exacerbation was due to this.

The patient consulted me twice during April. His arm is in a weak condition, so weak that there was no response to slight electrical current, but with a fairly strong current the condition of the arm has greatly improved.

A CASE OF ACUTE ABDOMINAL INFECTION IN A TYPHOID CARRIER.

By T. H. GARDNER, M.B.LOND.,

STREATHAM HILL.

The following case, which has recently occurred in my practice, may be of interest in connexion with the question of typhoid carriers—a matter of considerable importance:

J. B. B., aged 56, a prematurely-aged looking man with sallow complexion, recently had a severe illness, presently to be described.

Past History.

He had enjoyed good health, and had no serious illness until 1900, when he had severe peripheral neuritis, with almost complete loss of power in arms and legs. He was at that time residing in Manchester, and the condition was put down to arsenic or lead in beer, of which he drank a good deal at that time. The arms recovered in three months, but the legs not for ten months, and during that time he was confined to bed. During this illness he had no vomiting or diarrhoea, no hæmorrhages, no colic, no mental change. In 1906 he had an attack of typhoid fever, and was in bed ten weeks. He states that this illness began with diarrhoea, and his temperature rose to 103° and 104°. There was no hæmorrhage. His wife, who nursed him, states that his motions were always very green.

History of Present Illness.

He states that he felt perfectly well when he left home, and went to his office on the morning of January 26th. During the day he began to feel pain in the abdomen and nausea. He thought something he had eaten had disagreed with him, and being of a bilious nature, he put it down to some pea soup he had partaken of at dinner the previous evening. Others of the family, however, had partaken of it, and were in no way ill. The pain in the abdomen gradually got worse during the day, and became very severe, so that on leaving business in the afternoon he paid a visit to his medical adviser, Dr. Norman Sinclair, before returning home. Dr. Sinclair informs me that the patient was obviously in very acute pain and looked "ghastly"; he thought he might possibly be passing a gall stone. On account of his condition, and the fact that he had some distance to return home, he withheld morphine, prescribed a stomachic mixture, and applied a very hot fomentation to the epigastric region, which gave considerable relief. The patient returned home feeling very cold, and vomited once on the way. He shivered violently when put to bed, and again vomited. Next day he appeared to be very ill, the vomiting continued, and the bowels were not relieved.

Owing to his medical adviser being at too great a distance the patient was not seen on this day, and I was called in on the following day, January 28th. He was then in a semi-comatose condition, but could be roused when spoken to loudly, and answered some questions in monosyllables. He was not in any acute pain. The temperature was 102°; the pulse 120, very small and feeble. The abdomen was somewhat distended and generally tender, more so in the epigastric region, where there was also a good blister from the hot fomentation, and in the right hypochondriac region, where the liver was felt slightly enlarged and tender. The tongue was coated with a thick brown fur and the breath was very offensive. There was a slight icteric tinge of the conjunctiva, but at no time during the illness was there any marked jaundice. No urine had been passed since he returned home on January 26th, and the bowels had not been relieved. On January 28th $\frac{1}{2}$ oz. only of urine was passed; this was very dark in colour, containing much bile, a large quantity of albumen (half on boiling), and reduced Fehling's solution considerably, but not fully.

Treatment was symptomatic, being directed to the re-establishment of the excretions. Calomel gr. v produced

a large, semi-solid, homogeneous, slaty-grey, very offensive motion. Hypodermic injections of pilocarpin nitrate gr. $\frac{1}{2}$, and hot wet packs, with copious drinks of barley water and cream of tartar water, produced slight diaphoresis at first, which gradually increased on the following days. Slow but gradual improvement in all the symptoms ensued. The temperature fell to 101° on January 29th, and was normal by the end of the first week. The urine passed on January 29th was $2\frac{1}{2}$ oz.; by February 1st it had reached 10 $\frac{1}{2}$ oz.; on February 2nd it had increased to 23 $\frac{1}{2}$ oz., was much lighter in colour, giving no reaction for bile nor reducing Fehling's, but still containing a fair amount of albumen, which persisted till the end of the second week. The amount of urine on February 8th had increased to 74 oz., after which it decreased somewhat, till finally it remained between 50 oz. and 60 oz. The bowels were kept regular by means of aperients; those used being chiefly calomel and magnesium sulphate and pil. rhei co. During the febrile stage quinine sulph. gr. ij was given every four hours.

So far the case was one of extreme interest from the point of view of diagnosis, but in the light of subsequent illnesses of other members of the household, its interest was increased.

The patient was nursed during his illness by his wife (herself an invalid with disseminated sclerosis), a son, and the housekeeper.

Mrs. E. P., aged 40 years, a widow, with three children, acted as daily housekeeper and nurse, and had been with the family five years, and had helped to nurse J. B. B. in the attack of typhoid four years ago. She came daily, returning to her own home each night to sleep. She was not considered a healthy woman, and suffered a good deal from dyspepsia. On February 26th she came as usual, but complained of feeling unwell, and was sick, but did not return home until the evening. Next day she sent word that she had a bad bilious attack, and would not be able to come. She was subsequently seen by her medical adviser, who diagnosed typhoid fever and had her removed to the Stockwell Fever Hospital on March 9th, where she had very severe hæmorrhage, and died on March 15th.

J. T. B., aged 30 years, the son of J. B. B., who also assisted very largely in nursing his father, first complained of not feeling well on March 6th, on which day he had been to see Mrs. E. P. He was first seen by me on March 10th, and typhoid spots appeared on March 14th. He also was transferred to the Stockwell Hospital, where he now is recovering from a moderate attack of typhoid fever.

Under these circumstances it seemed advisable to ascertain whether J. B. B. was a typhoid carrier, especially as the medical officer of health informed me that the source of infection of the two cases could not be traced in either of the boroughs in which they were notified. A specimen of the blood of J. B. B. was therefore sent to the Lister Institute, and a positive Widal reaction obtained. Through the instrumentality of the medical officer of health also, specimens of the urine and faeces were also sent to the same institution, and the report given was that the faeces contained *B. typhosus*, but that the urine was sterile. No cathartic had been given before the specimens were obtained.

In conclusion, with reference to the diagnosis of the primary case, I have described it as one of acute abdominal infection. It seems probable that a gall stone was passed, and an infective condition akin to cholecystitis acuta referred to by Osler, set up by the *B. typhosus*.

THE KNIFE AND ITS POINT.*

By

A. Z. C. CRESSY, M.R.C.S., L.S.A.,

HONORARY SURGEON, CARSHALTON AND DISTRICT COTTAGE HOSPITAL.

WHY has a scalpel a point? It always has had one, and in times gone by the larger knives had one for a purpose—for instance, the transfixing amputation knife; it has been perpetuated to the present time when the need has disappeared, simply from habit.

It is very usual when opening an abscess to plunge the knife rather than cut, and if the pus is near the surface no harm will result; but if the pus is $\frac{1}{2}$ in. deep or more, a vessel may very easily be cut on the way. Lister saw the danger of this long ago when he advocated his well known method of opening an abscess. In making an incision the point of the knife is pressed through the skin and the blade drawn in the direction the incision is to be made;

* Read before the Croydon Division of the British Medical Association.