it, here, to say, that the pneumonia appeared to advance in successive attacks. This peculiar progress may account for my finding micrococci, in one of these cases, at a somewhat advanced period (twenty days) of the disease.

Occasionally, too, pneumonia assumes an endemic character, and most of the cases of this kind have occurred in hospitals, or prisons. A most important observation has recently been made by Emmerich of Munich (*Fortschritte der Medicin*, March 1st, 1884). A prison in Amberg was noted for the occurrence of epidemics of pneumonia, and after excluding all other possible sources of contagion, Emmerich examined the material filling up the space between the floor of one room and the ceiling of that below. Here he found numerous diplococci, which showed the same round of life-history as those described by Friedländer. Several of the ten fatal cases, the necropsies of which I have recorded, occurred in an endemic fashion, in the Manchester Royal Infirmary, during the months of April and May of the present year. It is unnecessary to give any details of these cases. Two only, which presented certain peculiarities, I may describe shortly, and the same description will serve for both. Two patients were in the hospital, one under Dr. Simpson, the other under Dr. Dreschfeld, suffering from lymphadenoma of the mediastinum, pressing mainly on the parts to the right of the middle line. In each case the trunk of the sympathetic on the right side was pressed upon, giving rise to the usual pupillary signs. Both patients, while in the hospital, were attacked by pneumonia of the right apex, and died within a short period of each other.¹

At the necropsy the whole of the upper lobe of the right lung was found to be in a state of grey hepatisation. At first sight it was thought that the pneumonia might be due to a trophic lesion, from pressure on the pneumogastric, just as, in some cases of aneurysm of the aorta, gangrene of the lung is supposed to follow from nerve-lesion. The microscopic examination of the lung showed, however, that the pneumonia was croupous in character, whereas the so-called vagus-pneumonia is catarrhal; and, finally, the micrococcus was found in large numbers at the border of the pneumonia. In fact, the section of the lung now before the meeting was taken from one of these cases. In each case, too, the pneumonococcus was found in the kidney.

Time will not permit me to discuss the various questions regarding the finding of the pneumonococcus in the sputum. The sputum, as is well known, may contain large numbers of micro-organisms, even in the normal condition. Fraenkel (Medical Congress at Berlin, 1884) has shown that one species of these organisms may, in very many respects, including the possession of a capsule, resemble the pneumonococcus; differing from it, however, in its power of infecting rabbits after injection. This organism, Fraenkel proposes to call the organism of sputum-septicæmia. It seems probable that this is the same germ found by Dr. Giles in pneumonia. (*BRITISH MEDICAL JOURNAL*, vol. ii, 1883.) Friedländer's warning must, therefore, be repeated, that one or two peculiarities cannot be depended upon for the recognition of the germ; but the whole cycle of its history must be proved for each case. It need hardly be said, then, that at present, however important in pathology, the clinical standing of the pneumonococcus is in abeyance.

Professor GAIRDNER (Glasgow) said that Dr. Maguire's communication was a very valuable one, and went far to establish its point—namely, that pneumonia was related to the infective diseases. Of course, a certain amount of reserve was appropriate, at present, in receiving the statement that such important powers belonged to the micro-organisms met with in the disease. It might be that atmospheric influences played a part; some places more exposed than others to the north-east wind, for example, being oftener visited by pneumonia.

Dr. HADDON (Hawick) thought that pneumonia could not be very infectious. In some cases, it appeared to him that the house was to blame for its propagation.

¹ I may here interpose that, in many others of the cases of pneumonia occurring about this time in the hospital, the apex of the lung was attacked, and more often on the right than the left side. About last November, a similar position of the pneumonia was noticed amongst several cases arising in the hospital.

BEQUESTS AND DONATIONS.—Mr. Chadwick has given £500 (additional) to the Charing Cross Hospital, and £100 (additional) to the Middlesex Hospital.—The Sheffield General Infirmary has received £100 under the will of Mr. Tobias Child, of Hathersage.—The Stratford-upon-Avon Infirmary has received £100 under the will of Mr. F. Cobb.—Messrs. Barclay, Bevan, and Co., have given £50, and Mr. Leatham Barclay £20, to the North-Eastern Hospital for Children.

A CASE OF CHYLURIA CAUSED BY BACILLI, WITH CULTIVATION-EXPERIMENTS.

By ALBERT WILSON, M.D., LEYTONSTONE.

WONDERFUL discoveries having been made within the last two or three years of bacilli in tubercle, phthisis, leprosy, and other diseases, and speculation being rife as to these organisms causing other disorders, I am anxious to support the germ-theory by relating some experiments I made five years ago with a case of chyluria. I especially wish to call attention to the mode of experimenting by which I discovered bacilli and micrococci, which were the cause of the chyluria.

Chyluria is really a symptom, like albuminuria, and exists, apparently, under various conditions. The urine is chylous permanently, or paroxysmally, or only after meals. The urine varies from a mere milkiness to a thick firm white, or pinkish, coagulum. It contains albumen, oil-globules, sometimes blood-corpuscles, and often sugar. Tube-casts do not occur. The first case was described by Dr. Prout; several cases have been described since.

A patient, passing urine of the character described, sent for me on January 29th, 1879, whilst I was resident at the Medical Mission Dispensary in Edinburgh. The patient, W. W., a male, aged 40, went to sea at the age of 14 for seven years, visiting the Mediterranean. The last nineteen years he has been on land. Seven years ago he received a kick on the external genitals, for which he had to undergo hospital treatment, and have catheters passed. Since then, he had enjoyed very good health until two months ago, when he noticed a difficulty in micturition, and that the urine was white and thick. At this time he was very poor and starved. He never had a stricture. The urine continued milky. He became weaker, and had to remain in bed. He had, at different times, four rigors.

I found the urine milky, especially after sitting up. Sometimes there was incontinence. He passed five to eight pints a day. There was great thirst, and marked anæmia.

The urine was neutral when passed. In a few days it became ammoniacal, and the clot broke up. The specimens varied, some milky, with a white clot at the bottom. In others, the whole urine formed a thick white coagulum. On adding nitric acid, a large quantity of albumen was precipitated. It contained a trace of sugar. Microscopically, I found oil-globules, degenerated white corpuscles, entangled in fibrin and *débris*. No bacteria or organisms could be detected. Staining-methods were then undeveloped.

The line of investigation which I pursued was to inoculate sterilised vegetable-infusions with the most minute particles of the coagulum. The urine was procured under the spray, with the most careful antiseptic precautions. The result of these inoculations was a rich growth of micrococci and bacilli. Large active bacilli, in every way larger than the tubercle-bacillus, were easily seen without staining. These organisms were examined by one of the greatest authorities on the germ-theory, who declared them to be not unlike the bacillus anthracis.

It is essential to describe the method of experimenting, but I will do so briefly. On November 13th, 1879, I made a sterilised infusion of carrot, obtaining a clear straw-coloured fluid. I adopted Professor Lister's method. I procured a flask after his pattern. It is an ordinary fifteen-ounce flask, with a spout fixed on the neck, the end of the spout being drawn out to a fine capillary point. The wide mouth has a cotton-wool cap to filter the air that enters. After pouring out of the spout, a minute drop remains, which closes the capillary end, preventing air from regurgitating until its cotton-wool cap can be reapplied.

I purified such a flask with solution of carbolic acid, 1 to 20, and refilled it with boiling water, and boiled it for an hour. Having emptied the flask, I quickly refilled it with well boiled and filtered carrot-infusion, and again boiled for an hour. I thus purified both flask and infusion, and, whilst still boiling, plugged both orifices with caps of cotton-wool, purified with a 1 in 20 ethereal solution of carbolic acid. Filtered air could enter the flask freely. Having made several experiments before with sterilised infusions, I knew that, so long as the infusion remained clear as crystal, it was pure; but, as soon as organisms entered, the infusion became turbid. In this flask, I had kept sterilised infusions eight months.

I next purified a large number of small test-tubes. They were first cleansed in soap and water; then soaked for hours in 1 in 20 carbolic acid solution; and then dried at a temperature of 340° Fahr.; and, whilst still hot, were plugged with carbolised wool. In many cases, the wool was charred. After the fluid had remained clear for a fortnight, I rapidly filled fifty tubes under the carbolic steam-spray. For

about eight hours a day, I exposed them to 90° Fahr. All the tubes remained clear.

As a proof that the precautions were strictly antiseptic, I may quote one instance. On December 12th, I opened an axillary abscess, in a woman living in a small house in the Canongate. Antiseptic treatment, of course, was used. Whilst the pus was flowing, an assistant unplugged a purified empty tube in the spray, and filled it with pus, replugging it at once. This pus remained free from odour and organisms for some weeks, until it dried up. Some tubes of sterilised infusion, inoculated with it, likewise remained clear and free from organisms. This fact upsets the theory that acute abscesses contain micrococci. I have in this way tested many abscesses, and never got organisms. All exposure of the tubes or of the infusion was under the steam carbolic spray.

I employed a German method of examining the infusions. I used a small glass tube drawn out at the ends to a fine point, and sealed. It is made of soft glass tubing, and in the making is purified by the heat, and all air expelled. Being cleansed outside with a carbolic rag, one end is dipped sharply to the bottom of a tube, the point breaks, and the fluid rushes into the bulb. The slides and cover-glasses were soaked in carbolic solution, dried, and then dipped in alcohol, which was burnt off. The infusions remained clear in the tubes for two months before inoculating them.

After some preliminary inoculations, on January 23rd, 1880, I inoculated five tubes with some clot, about three hours after it was passed. They remained clear for forty-eight hours at 55° Fahr.; but, after twenty-four hours at 90° Fahr., they became turbid. On the 27th, I examined the tubes with a $\frac{1}{6}$ immersion-lens. All five tubes alike were teeming with the same kind of organisms, namely, large rod-shaped filaments, with clear or very finely granular contents. Some were jointed. Some short rods contained nuclei or spores at each end. There was also an abundance of small round glittering organisms or micrococci. Most of the rods were moving actively; but, as the cold affected them, the movements ceased. I noticed, 114 hours after inoculation, that the spore-bearing shorter rods were more numerous—about forty or fifty in a field, instead of, as at first, five or six. Also some rods were jointed, and had at first the appearance of one rod with four spores. In a few cases, I watched them divide. The spore-bearing rods were mostly at the bottom of the tube. At the upper part of the tube, there were fewer organisms, and they were clear. There were no bacteria.

As this urine was passed in the ordinary way, and subject to aerial contamination, the experiments were of no special value. I therefore obtained some urine, with antiseptic precautions, on February 1st. I purified a bottle with carbolic solution; then rinsed with rectified spirit; and, having applied a purified cotton-wool cap, subjected it to a high temperature to drive off any carbolic acid or spirit. The glans penis was well rubbed with warm saturated solution of boracic acid, and rinsed with rectified spirit. The steam-spray was applied, and the patient passed first a clot, and then about four ounces of milky urine. The wool cap was applied, and never removed afterwards, except under the spray. A firm clot formed at the bottom; and in twenty-four hours, the fluid above was only turbid. Two days afterwards, with strict antiseptic precautions, I inoculated five tubes with particles of clot. Kept at 80° Fahr., in about three days they were turbid. They contained the same organisms already described. I made careful measurements, and found the rods vary from 3 to 12 eighteen-thousandths of an inch long and one eighteen-thousandth of an inch broad. The micrococci presented the same appearance and

size as the nuclei in the rods. Repeated inoculations gave the same results.

I now extended my experiments to prove the efficacy of boracic acid and rectified spirit as antiseptics. Boracic acid, while it permits the growth of a hyphomycetous fungus special to itself, destroys bacteria. My experiments show that it also destroys bacilli. Under the spray, I put in a purified watch-glass a drop of chylous urine, and about twice the quantity of saturated boric solution, and in about a minute inoculated three tubes. To three other tubes I added about one-fourth of saturated boric solution, the remainder of carrot-infusion, and then inoculated these from the chylous deposit, with a much larger quantity than usual. All six tubes remained clear, though kept in the incubator for about a fortnight. The deposit of clot did not increase. Therefore, boracic acid is a poison to bacilli.

I next tested the antiseptic power of rectified spirits. In some of the Paris hospitals, I have seen a 20 per cent. solution of rectified spirit used with good results as an antiseptic. Everyone knows that, in the acetic ferment, if the quantity of alcohol rise above 10 per cent., the process is arrested.

On February 4th, I treated one drop from a tube containing active bacilli with one drop of rectified spirit, and inoculated three tubes with it. Similarly I treated one drop from a tube which had been inoculated with sour milk, and contained bacteria and torulæ, and spores of a beautiful filamentous fungus which grows on sour cream. From this I inoculated three tubes. All six tubes were kept for some days at 90° Fahr. All remained clear, except one, which in seven days became slightly turbid, and contained sprouting spores, but no bacteria. Searching carefully, I found that the rectified spirit affected these torulæ and spores by drying or shrivelling up the outer membrane, and in most cases the nuclei also. But, in some cases, the nuclei were not affected, and clear, and these apparently had sprouted.

The ordinary urine became ammoniacal, containing small round organisms; but the aseptic urine passed under the spray developed a faint alcoholic odour, like a drunken man's breath. The first time I noticed it was on February 12th. It kept this odour for two months, after which period it was uncovered, and in a few days underwent the putrefactive fermentation. Thus the same urine underwent three fermentations: (a) ammoniacal, infected probably from the glans; (b) alcoholic, probably from the invisible micrococci acting on the sugar; (c) putrefactive, from aerial contamination. Thus three different ferments, with the same pabulum, produce three different fermentations.

I noticed the same fact a year previously, when experimenting with butter. I antiseptically made some pure white butter, the milk of which never curdled. If I planted bacteria on this butter, I got putrefaction of butter; if bacteria lactis (Lister's), from sour milk or common butter, I got rancidity; if a speck of aspergillus glaucus, from Stilton cheese, a different process occurred, giving off an odour just like that of Stilton cheese.

I often wondered why urine did not putrefy. Some experiments I made led to the conclusion that the ammoniacal ferment, first getting into the urine, held its own against the aerial dust. There is no other reason why urine should not putrefy, aerial dust and bacteria being so abundant. I inoculated some tubes with an equal proportion of three solutions, containing, in one, bacilli only; in another, putrefactive bacteria only; and in the remaining one, torulæ from sour milk. In no case did the bacilli develop. In some cases, putrefactive bacteria slightly increased, whilst in all the torulæ were predominating. So, in the struggle for existence, the torulæ gained, and the bacilli were the weakest. I therefore surmised that, if the urinary ferment get a start, it holds its own against the ordinary bacteria.

On February 7th, the patient passed a quantity of very fetid pus by the urethra. As there was previously some tenderness of the prostate I diagnosed prostatic abscess. Inoculations from the fetid pus gave bacteria, but no bacilli nor micrococci.

On January 29th, I inoculated several tubes with the patient's blood, with antiseptic precautions. The blood showed micrococci in small numbers. They developed freely in the tubes, and a few bacilli were also seen.

So far, I had treated the patient with Parrish's food and dialysed iron; but, as he was growing worse and having rigors, I gave him quinine, with apparent benefit. I also gave one minim of carbolic acid thrice daily for two or three days. After this treatment, the urine became less milky. The urine never became fetid after the septic abscess.

On February 12th, I again procured urine antiseptically, and repeated the experiments. To my surprise, no organisms developed. This doubtless was due to the quinine and carbolic acid. At the same time, I procured some more blood, and inoculated eight tubes. Of these, four became turbid, but contained micrococci only.

The patient became worse; incontinence increased. On February 14th, therefore, I gave two minims of carbolic acid thrice a day in water. In four days, the urine was quite clear for the first time during the last three months. The incontinence ceased; but, the urine being smoky, and pains in the stomach occurring, I stopped the carbolic acid, and gave quinine and iron.

March 4th. The urine was again milky.

March 14th. There was an inflammatory redness and swelling in the right parotid region; no fluctuation. Antiseptically, I procured about twenty minims of blood from the inflamed part, and inoculated six tubes. The fresh blood contained micrococci. In two days, the tubes were teeming with active micrococci; there were no bacilli nor bacteria. A few days later, the abscess, evidently pyæmic, burst into the external auditory meatus. It was treated antiseptically from the beginning, and remained sweet. A gauze dressing was applied before it burst. The pus showed micrococci from the commencement to the end, but no bacilli or bacteria were present.

The patient died on March 25th, and I made a *post mortem* examination seven hours after death. The bladder was congested and hypertrophied; it contained about two ounces of milky urine. The prostate was enlarged; it contained two abscess-cavities, which communicated with the rectum, but not with the bladder. The right kidney weighed 9½ ounces; it was enlarged, and covered with much fat. On section, it was pale; and the cortex was not defined from the medulla. There were a few yellow spots, like minute abscesses. The pelvis of the kidney and the ureter were congested, and contained a few drops of milky urine. The left kidney weighed 7½ ounces. The calyces were much dilated, and contained a small abscess or cheesy matter of the size of a pin's head, as in the right kidney. The ureter was dilated. Milky urine was found in the dilated kidney.

Such are the facts of this curious case. I withheld the publishing of them four years ago, on account of its novelty.

REMARKS.—Years ago, Sir Joseph Lister insisted on the theory, or principle, that healthy tissues are capable of resisting organisms. As an instance, one sees how the healthy urethra resists the passage of organisms, so abundant at its orifice, into the bladder. Conversely, unhealthy or weakened tissues yield their substance as a soil for germs. What the power of resistance is, has not yet been fully explained.

The secret of all germ-diseases, however, rests on this grand principle. It explains this particular case. The patient, while in good health, had a wound on the genital organs, and a catheter was kept in the bladder for two or three days. What a grand opportunity for ærial germs to enter the bladder. If he had been an old man, or weak, he would have had "catheter-fever," so-called; but, being strong and in health, he resisted the organisms, and they found no favourable soil in his body. Undoubtedly, the spores of this bacillus had been lodging in the urinary organs for years. When he was starved and his health failed, then the spores developed in his weakened body.

This is not all imagination, for we see it in every-day life. Take a person with decayed teeth, the canals in the fangs diseased, permitting organisms to pass up to the roots. Whilst in good health, they cause no trouble; but, if such an individual go out in a bitter wind, or become chilled, the result may be toothache and gumboil. Thus, only a temporary lowering of the vitality and circulation of the jaws was sufficient to permit the active development of organisms which, during health, were dormant.

In this case, the mischief occurred in the kidney, which presented no special lesion. The spores only existed in the urine. It is worth while noting that the early stage of the bacillus was a clear rod, filled with very finely granular matter. As development progressed, jointed rods, with a spore at each end, appeared.

My experiments show that the bacillus is a feeble organism than the bacterium, and that an active growth of the latter prevented a development of bacilli. Quinine checked the bacillus, as in ague. Carbolic acid did so more effectually. I was struck with the fact that the prostatic abscess did not contaminate the bladder, though, through it, the patient fell a victim to pyæmia.

During the pyæmic state, the blood and the abscess contained micrococci, and no bacteria. The inoculations yielded only micrococci, and no bacteria. These experiments were carried out most accurately, with antiseptic precautions.

I have had little or no experience of pyæmia, having been a disciple of the illustrious Lister since my first days at Edinburgh. Undoubtedly, there are micrococci and micrococci; for some observers allege that they have found them on antiseptic dressings, and declare them to be innocuous.

I would quote another case in which I discovered bacilli. In the spring of 1879, I was asked to assist in tapping a young gentle-

man, suffering from ascites. He had travelled in South America for four or five years, and came home a wreck. The cause of the ascites was unknown. He had no ague, no jaundice, no spleen-cake. I assisted at the fifth tapping, each time done antiseptically. This time thirty-three pints of fluid were removed. As I wanted some pure serum for some experiments, I now saw my opportunity. I collected some in a glass-stoppered quart bottle. The bottle and stopper were soaked in carbolic acid solution (1 in 20) for twenty-four hours. After the spray was turned on, the lotion was poured out, the bottle filled with clear ascitic fluid, rinsed, emptied, and refilled. All was done under the spray. A wet carbolic rag was put outside the stopper, and carbolic gauze outside that.

The bottle was kept in a cool place for some days. To my surprise, it gradually became flaky and turbid. Under the spray, I opened the bottle, and examined its contents microscopically. I found the flakes and turbid material composed of large active bacilli; some clear, some with spores and jointed; also micrococci. The original fluid was perfectly clear.

NOTES OF A CASE OF HEPATIC ABSCESS.

By JOHN COCHRANE, L.R.C.P. and L.R.C.S.Ed.

Medical Officer for the Parish of Assynt, Lochinver.

THE rarity of the occurrence of single large abscess of the liver in this country is so well known, that I am desirous of narrating a case which lately came under my observation.

The patient was a middle-aged man, who had never been abroad, but had resided in Scotland for the greater term of his life. For several years past, he had suffered more or less from symptoms referable more particularly to some derangement of the digestive organs; in fact, such as might be termed "biliousness." Last year, he had a serious attack of severe vomiting, with violent pain in the right side, furred tongue, feverishness, inability to lie on either side, yellowness of the conjunctive and skin, anxious expression of the countenance, clay-coloured stools, and very dark urine, symptoms which showed that the attack was dependent on congestion of the liver.

The bowels were kept regularly open by means of purgatives and enemata. Chloride of ammonium was prescribed, and linseed-meal poultices applied to the sides. Vapour-baths were given every night; these caused very free diaphoresis. The patient took milk and other liquid nourishment. The acute symptoms gradually abated, and the patient, although weak for a long time, at length improved so much that there seemed to be every prospect that the liver had once more regained its normal functions. During this attack, there had been well marked hypertrophy of that organ; but, on recovery, it seemed to be about the natural dimensions.

Taking advantage of his seemingly robust condition, the patient unfortunately, during very cold weather, with easterly winds, exposed himself incautiously to the air, and, in consequence, caught a severe chill. From this I date the commencement of the illness, which culminated in the formation of an abscess. During this attack, I at first did not attend the patient, as the family had called in a former old medical attendant, who treated the case by applying leeches to the right side, and afterwards continuous poulticing. On consultation with this gentleman, we found that the patient was confined to bed, and was in a very emaciated condition. There was the usual very anxious expression of countenance, and free perspiration. The eyes were dull, and the conjunctivæ yellow. The bowels were kept open by laxatives, etc., and there was great general weakness. There was now very little pain; but, on examining the patient, I found a considerable bulging of the right side, which approached to the front of the chest. On palpation, there was manifest fluctuation of a well defined tumour. I diagnosed the case to be abscess of the liver, and my opinion was that the cavity was of considerable size. We considered the case fully, and, after discussing the propriety of aspiration, we came to the conclusion that it would be advisable to leave the matters to nature's course. The result fully justified our decision. Poulticing with linseed-meal was assiduously continued, and the bowels were kept open by laxatives, and, when necessary, by enemata. The patient remained in a very weak state, owing to the small quantity of light nourishment which he could swallow. Shortly afterwards, I was hastily summoned to see the patient, and I found him extremely weak; he told me that, a few minutes before sending for me, he felt a sudden feeling of extreme weakness coming over him, "like as if he were going to die," as he expressed it, and he thought that he then felt something trickling into his bowels. I at once looked at the swelling, and found that there was evidently a diminution in its size. I advised the poultices to be continued, and