This question is raised by the fact that one of the patient's brothers had previously died abroad with oedema of the lower part of the body, which had been attributed to the pressure of a supposed sarcoma upon the inferior vena cava, and that another brother had died from embolism of the pulmonary artery following thrombosis of the femoral vein.

That there may be a familial condition which is the converse of the haemophilic, one of exalted coagulability, is quite credible, but I cannot find that such has as yet been observed in healthy individuals—that is, a constant abnormal rapidity of coagulation in the shed blood as distinguished from the variations which occur under well-recognized conditions in the same individual.

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VACCINE-THERAPY IN CHRONIC BRONCHITIS.

BY

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It seems probable that a large proportion of cases of bronchitis are caused by an invasion of the bronchial mucosa by pathogenic organisms.

Ritchie¹ made a number of *post-mortem* examinations of children who died of acute bronchitis, and showed that the bronchitis was caused by micro-organisms, chiefly the *Diplococcus pneumoniae*, streptococcus, *B. influenzae*, and *M. catarrhalis*. Berkart² believes that some forms of bronchial asthma are due to a specific inflammatory condition of the bronchial mucous membrane caused by microbic influences.

If the micro-organisms are responsible for causing attacks of bronchitis, we should expect that relief and cure would follow the injection of a suitable vaccine in suitable doses. Clinical experience has already borne this out. Latham³ recorded 5 cases which he successfully treated by vaccines. H. R. Smith⁴ recorded 3 cases treated by vaccines, with favourable results, the duration of these cases before treatment being sixteen years, eight years, and six years respectively. Shivdas⁵ has recorded 39 cases, of which 21 were completely satisfactory.

I have treated bronchitis—both acute and chronic—by this method, but I propose to record here only the first 8 chronic cases in the order in which I attempted to benefit them. I used only autogenous vaccines with one exception. Stock vaccines may be sometimes effective, but a stock vaccine of similar morphology to the causal organism does not necessarily correspond to it in every respect. So that it seems safer to use only autogenous vaccines.

The sputum was collected as far as possible aseptically—boiled water was used for brushing the teeth and rinsing the mouth; a little was also gargled and swallowed. The next phlegm was expectorated into a bottle that had been boiled. Smears of the sputum were made and stained for tubercle bacilli and other micro-organisms. A little of the sputum was then washed and shaken up with sterile saline and one or two loopfuls sown on one or more of the following media: Agar, Pfeiffer's agar, and nasagar. From the growth of fifteen to thirty six hours the vaccine was made up. The dilution with sterile saline was made with a view to avoid the necessity of subculturing, as it has been said that subculturing reduces the efficiency of the vaccine. By this means it is impossible to obtain pure cultures, but it is easy to judge what is the important micro-organism, and to regulate the doses accordingly. The frequent accompanying forms of *M. catarrhalis* can do no harm, and possibly are often requisite to make the treatment successful.

There can be no doubt that a number of Gram-negative organisms are classed together under the term *M. catarrhalis*, and it is difficult at present to know which to exclude and which to include in the vaccine.

CASE I.

Female, aged 75, had suffered with a cough for forty years, with occasional attacks of acute bronchitis. When she began this treatment in November, 1911, she had just recovered from an acute attack. The sputum was nummular; there were no tubercle bacilli, but smears showed that it was full of pneumo-

coccus. By the dilution method I obtained a practically pure growth of pneumococcus. The vaccine was given about once a week in increasing doses, starting at 25 million. After three months' treatment she had lost her cough, had improved in general health, and gained 3 lb. in weight. Treatment was continued for five months altogether. There has been no recurrence of the cough up to the present.

CASE II.

Female, aged 65, had had a bad attack of influenza seventeen years earlier. Ever since that attack she had had a chronic cough, bringing up about 2 oz. of phlegm daily. The vaccine of streptococcus and *Micrococcus catarrhalis* was given in doses of 1 to 20 million, beginning treatment on February 12th, 1912. She was at that time unable to lie down flat at night, but after four injections she was able to do so. The cough and sputum ceased at the end of five weeks, and her appetite and general condition improved. However, in July she began again to bring up a little sputum, but after three injections of a vaccine similar to the previous one the cough completely disappeared, and she has remained free from it since.

CASE III.

Female, aged 35, had had bronchial "asthma" for fifteen months. In March, 1911, she was an in-patient at the Radcliffe Infirmary for two weeks, where she was treated for "bronchial asthma." She sometimes improved a little, but nothing seemed to give her permanent relief. She was able to get about, but was very short of breath and frequently had dyspnoeal attacks, particularly at night. She used to wake regularly at 2 a.m. and had very little sleep. She was cook in a family, and her mistress valued her and was anxious to keep her on if she could be cured. So I suggested we might try a vaccine. I gave the autogenous vaccine of streptococcus at intervals of about a week in increasing doses, beginning with an injection of 15 million on February 27th, 1912. She was soon able to lie down at night and to sleep through until the morning. Treatment was continued for four months. The amount of sputum at the beginning was 8 oz. daily; at the end of treatment it was scarcely half a drachm. She was better in every way; she could go upstairs without shortness of breath. She gained 9 lb. in weight. The cough and dyspnoeal attacks have entirely ceased and there has been no relapse.

CASE IV.

Female, aged 65. Had suffered for eighteen months from bronchitis and dyspnoea. When I saw her first the cough was almost incessant, the breathing was laboured, and she could not lie down in bed. Her nights were very much disturbed. The daily amount of sputum was 1½ oz. The autogenous vaccine of pneumococcus and *Micrococcus catarrhalis* was given in increasing doses at intervals of about a week, beginning on March 26th, 1912, with an injection of 25 million. She soon began to improve, and within four weeks she was able to get downstairs, and was sleeping through the night instead of waking with the cough between 1 and 3 a.m. The expectoration was easier, and the daily amount of phlegm steadily diminished till at the end of nine weeks there was none at all. Treatment lasted three months. Sixteen injections were given altogether.

In this case there was recurrence in November, and she is at present having treatment with a fresh vaccine.

CASE V.

Female, aged 32; five months before I saw her she had an "influenza" attack, with a "cold on the chest," and loss of voice. From that time she had been suffering from repeated colds and coughs. I examined smears of the sputum, and found the predominating organism was *Micrococcus catarrhalis*. In May, 1912, I gave her two injections of a stock vaccine with an interval of five days. The cough was considerably improved, but as she could not stay longer in Oxford the treatment was not continued. I heard recently that her cough is still troublesome.

CASE VI.

Female, aged 42, had been subject for two winters to recurring attacks of bronchitis. She was generally "wheezy" on waking in the morning, and always got very short of breath on exertion. Treatment was commenced on May 9th, 1912, with the vaccine of pneumococcus and *Micrococcus catarrhalis*. She improved rapidly, and after three weeks' treatment she walked about five miles one day; she had not walked so far for several years.

At the end of two months she had completely lost her morning wheeziness and cough.

There was some recurrence in November, but it cleared up again after a few injections of the same vaccine.

CASE VII.

Female, aged 45, had a "bronchial cold" for three months, which did not clear up with ordinary drug treatment.

The autogenous pneumococcus vaccine was given first on June 19th, 1912—dose 42 million. After this dose she was conscious of more stuffiness on her chest, and there was also more cough, though the phlegm was looser.

The second injection of 84 million was given nine days later; there followed the usual negative phase with more cough and phlegm, but this was soon followed by improvement. She felt much more energetic, and there was hardly any cough.

Ten days later the third injection of 84 million was given. After this the cough completely cleared up.

CASE VIII.

Female, aged 53, had suffered from recurring pharyngitis, laryngitis, and bronchitis. The present attack persisted for over a month in spite of treatment by drugs and inhalations. She complained of difficulty in getting her breath, hoarseness of voice, dryness of throat, and tired feeling. Smears from the sputum showed streptococci; an autogenous vaccine of streptococcus and *Micrococcus catarrhalis* was made up. Treatment by vaccine was begun on June 19th, 1912.

Three injections were given in the course of eleven days—doses of 50 up to 100 million. There was the usual negative phase after each injection, followed by an improvement in the symptoms. The voice was not so husky, the throat was moist, the tightness of the chest was relieved, and there was more energy and feeling of well-being. All the symptoms cleared up after the third injection.

In the foregoing eight cases no drug treatment was given while the vaccines were being administered, except in Case IV, who had an expectorant mixture for a few weeks.

Three of the eight cases recurred. Of these, Cases II and IV soon recovered again after a few injections, and Case IV is at present improving.

The injections were given without opsonic control; this method of control has of late been largely discontinued. The dosage was judged by the effect produced by the first and subsequent injections on the general symptoms as well as by the amount of local reaction at the site of injection. The first injection in each case was well within the recognized dosage. If there followed very little or no negative phase the next dose was often doubled. If the negative phase was marked, the same dose (or a smaller one) was given in about ten days' time. But usually I was able to increase each dose by about one-third to one-half of the former one, and my aim was to try and obtain a reaction during the following twenty-four hours.

It has been recognized that a course of small doses where reactions have not occurred may be ineffective in producing immunity.

CONCLUSIONS.

Where failure occurs in treatment by vaccine-therapy, the question should be considered whether the failure was due to the patient's feeble powers of response, or to the method of preparation and dosage of the vaccine. With this in view one would pay particular attention to the following points:

1. Make sure what micro-organism is the cause of the trouble and whether others are associated with it.
2. Use an autogenous vaccine in preference to heterogenous.
3. Make it up from *fresh* sputum; try different media for its preparation; grow the micro-organism for not more than twenty-four hours if you can get sufficient growth in that time; avoid subculturing as far as possible; sterilize by heating to 60° C. for a quarter of an hour instead of one hour, or in some cases merely by the addition of 0.5 per cent. carbolic.
4. Give doses large enough to produce a reaction but avoid a prolonged negative phase.

Though vaccine-therapy may be said to be still in its infancy, yet it has already achieved a great deal, both in the prevention and cure of various bacterial diseases. And now that serum-therapy can be combined with vaccine-therapy by giving sensitized vaccines, it seems probable that in the future it may accomplish still more, especially in acute cases such as pneumonia and septicaemia, and will eventually largely replace the treatment by drugs in those diseases which are caused by micro-organisms.

REFERENCES.

- ¹ *Journal of Pathology and Bacteriology*, vol. vii, No. 1. ² Berkart, *Bronchial Asthma*. ³ *Practitioner*, December, 1910. ⁴ *Journal of Vaccine Therapy*, March, 1912. ⁵ *Ibid.*, April, 1912.

LAST year the Royal Institute of Public Health held its annual congress in Berlin; this year it is to be held in Paris from May 14th to 18th, in response to an invitation from the Municipal Council. There will be five sections: (a) State Medicine, (b) Bacteriology and Comparative Pathology, (c) Eugenics and Child Study, (d) Naval, Military, and Colonial, (e) Industrial Hygiene. Facilities will also be afforded for visiting the various public health educational institutions in Paris in connexion with the Board of Health, municipality, universities, etc.

SUPRACLAVICULAR ANAESTHETIZATION OF
THE BRACHIAL PLEXUS.

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THIS form of anaesthesia was first brought to notice by Hirschel¹ in 1911, and later in the same year an article was written by Kulenkampf² giving an account of 100 cases. Early in 1912 Borchers³ published the results of 35 cases; since then it has been used extensively on the Continent.⁴ It is convenient, appears to be free from danger, and by its use severe operations on the arm can be performed painlessly and without shock.

The technique of the injection is easy after a little experience. The brachial plexus is injected at a point which roughly corresponds to the middle of the clavicle. Here the plexus lies close under the skin, so that in many cases its position can be defined by pressure over the first rib. It emerges from under the scalenus anticus muscle, and lies in loose tissue which is easily infiltrated. The area into which the solution is injected is bounded internally by the subclavian artery, externally by the clavicle, and below by the first rib.

The patient sits with head turned slightly towards the opposite side. The position of the subclavian artery is defined by palpation, and the puncture made just external to the artery. The site of the puncture is usually just internal to the point at which the continuation of the external jugular vein joins the clavicle; but in some cases, in which the artery lies further out than usual, the puncture must be made external to this point. However, the artery is the chief guide to the position of the plexus, and after a little experience we find that it can be used as the sole landmark. A fine needle 4 to 5 cm. long should be slowly inserted in a direction backwards, downwards, and inwards towards the second or third dorsal spine, so as to strike the upper surface of the first rib. As the plexus lies about 1.5 to 3 cm. from the surface just superficial to the first rib, it should be encountered before the first rib is reached. If the plexus is not struck before the first rib is reached it generally means that in order to avoid the artery the needle has been inserted too far out. The needle must be partially withdrawn and altered in direction, usually towards the artery, until the plexus is struck. When the needle reaches the nerve cords paraesthesia is produced in the arm and hand; when the paraesthesia has been definitely obtained the syringe is carefully attached to the needle and 20 c.cm. of a 2 per cent. solution of novocain with adrenalin injected. No solution should be injected until paraesthesia is definitely obtained, and it is important to remember that when the point of the needle is on the first rib it is too deep for the plexus. Apart from the skin puncture the injection is not painful, the paraesthesia in the arm is not severe, and any necessary alteration in the position of the needle is not accompanied by pain. We do not consider it advisable to make a subcutaneous infiltration, as it tends to obscure the landmarks; besides, with the fine needle, very little pain is caused on puncturing the skin, and only one skin puncture should be necessary.

The anaesthesia comes on gradually, and is usually complete in from five to fifteen minutes, but may require as long as thirty minutes to fully develop. The onset is associated with sensations of heaviness and tingling in the arm, and is usually accompanied by paresis. The extent of the paresis is in direct relation to the depth of the anaesthesia. The anaesthesia does not always develop simultaneously over the whole arm, and one part, usually the back of the forearm, may retain slight sensation for a short time after the anaesthesia has become complete over the rest of the arm. The area of anaesthesia extends up the arm to about 2 or 3 fingerbreadths below the acromion process, but usually a small sensitive area is found on the inner side of the arm, corresponding to the distribution of the intercosto-humeral nerve.