the staff themselves. The result is that these posts are only open to men who have private means, or to those who have to make a living by private practice or coaching. We lose, therefore, many good men, and those we get become quickly absorbed in earning their living and cannot devote themselves to academic work.

The central hospital board would also have under its direction a group of ancillary hospitals—for example, those for infectious diseases, venereal disease and mental disease, and chronic or incurable disease for which only palliative treatment is possible; chronic crippling disease for which an open-air school hospital is needed. Such hospitals, of course, already exist, but they are controlled now by independent bodies without any definite relation to one another. Further, there would have to be a group of treatment stations for casualties and out-patients. These would be in close administrative association with the central hospital and would be staffed by the junior members of that institution.

Finally, no scheme would be complete which did not make some provision for the co-ordination of outlying country hospitals. I am quite aware that this opens up a very big subject and one which might well occupy the whole of an evening's address. But it is evident that if my main contention is correct—namely, that the treatment of disease should be organized on scientific lines—then there is no more justification for leaving the problem to be solved by haphazard philanthropy in the country than in the towns.

The need for, and the size, scope, and staff of a hospital in any country town or village should be much more a matter for Government control than the similar problems in relation to public-houses, music-halls, or schools. Every country hospital should be linked up with the university hospital in such a way that cases requiring special observation or treatment can be drafted from one to the other, and there should be an arrangement by which specialists from the university hospital could be available for consultation at the country hospitals. Further, the junior men, trained at the university hospital, all of whom cannot be absorbed by its staff, should have the opportunity of taking positions in the country hospitals, where they would work in amicable relations with their former chiefs.

This, in broad outline, is the ideal towards which we, in my opinion, ought to strive; the great obstacle in the way of the first step towards its attainment is the false notion as to the excellence and sanctity of the voluntary system.

It is generally assumed that lack of money is the main difficulty. I do not believe this for one moment. If the profession stood four-square and told the country that our hospital system of independent competing units was essentially bad and that there was urgent need for reform, then the money would be forthcoming just as readily as it was for education or the national insurance scheme.

As a striking comment upon the idea that a lack of money prevents adequate hospital provision and equipment, let me draw your attention to the fact that recently the city council has passed a scheme for spending one-quarter of a million pounds for the provision of accommodation for feeble-minded children!

During the last five years a voluntary committee has been trying to make provision for an open-air school-hospital for crippled children suffering from curable complaints, and has at last succeeded in getting the miserably inadequate sum of £20,000, with which, and with splendid optimism, it proposes to begin the work. The quarter of a million scheme for mental defectives was arranged by a gentleman who is also chairman of our largest voluntary hospital committee, a committee which is trying to pay its debts by selling half-crown lottery tickets for motor cars.

In this city there appears to be no financial difficulty in providing for the sick if these are criminals, lunatics, feeble-minded, or the subjects of venereal disease. But if the sick are intelligent, respectable people, suffering from cancer, appendicitis, or the results of street accidents, then they must be dependent upon a weary and flagging charity, supplemented by money-making methods which for any other purpose would be considered illegal.

In fact, State-aided insurance would seem to be the obvious solution of the financial difficulty.

Capital outlay on building new hospitals would not be as great as might be supposed. When unnecessary hospitals had been disposed of and sites sold there would be money enough to do a great deal of reconstruction, and this would have to be supplemented by a municipal rate and county rate, to which the State would contribute an equal amount.

THE VIRULENCE OF PNEUMOCOCCI IN PNEUMONIA.*

BY

C. H. WHITTLE, M.D., M.R.C.P.,

ERNEST HART MEMORIAL SCHOLAR OF THE BRITISH MEDICAL ASSOCIATION.

It is generally agreed that, though pneumococci are the commonest bacterial cause of pneumonia, these organisms also occur in the throats of a large proportion of healthy persons, who may never contract pneumonia. Why the pneumococcus should in the one case set up a highly dangerous condition, and in the other give rise to no ill effect, is unknown. The phenomenon is explained in such general terms as "variations in the resistance of different hosts" and "variations in pathogenic power of the micro-organism." Little is known of either of these factors, but investigations on the virulence of pneumococci obtained from all kinds of lesions, including many cases of pneumonia, offer certain clues for the solution of the problem. I have found that there are wide variations in pathogenic power among different strains of pneumococci, which I think explain some of the facts.

A measure of pathogenicity was first obtained, in terms of the minimal lethal dose for mice. The virulence measured thus was determined for each of sixty strains of pneumococci, collected at random, forty of which were isolated from pulmonary lesions, and the rest from lesions in other parts of the body chiefly secondary to pulmonary lesions. The series exhibits a very wide range of virulence, and the strains are conveniently classified into groups according to their grade of virulence.

These grades correspond quite constantly to different forms of disease in the lung. The highest grade is associated with the most acute, the most clearly defined, and the most fatal form of pneumococcal infection of the lung—namely, lobar pneumonia. The next grade, only slightly lower, is associated with bronchopneumonia, a less acute, less regular, and less fatal type. Empyema, which may arise from the extension of either a lobar or bronchopneumonic type of lesion to the pleura, corresponds to a range of virulence covered by both types. A sharp and unexpected fall in the virulence occurs before the next class is reached. This class is represented by terminal pneumonia, post-operative pneumonia, and such lung conditions as frequently arise in patients suffering from advanced disease or shock.

Pneumococci may therefore be divided into at least two groups by virtue of their pathogenic power; those of high virulence setting up well recognized clinical entities like lobar and bronchopneumonia; and those of low virulence which are associated with minor illnesses, or disease occurring in persons already debilitated.

The organisms of the first group are probably spread by contact, much as cerebro-spinal meningitis is spread, with only a small percentage of "contacts" contracting the disease. An outbreak of epidemic proportions at Cottenham, a village in Cambridgeshire, resulting in twenty-six cases of typical lobar pneumonia, affords convincing evidence of this method of spread. From every case examined a highly virulent Type I pneumococcus was isolated, and the spread of infection was traced from house to house and person to person. A similar outbreak on a smaller scale occurred at Cavendish in Suffolk, and no doubt other similar outbreaks could be traced if a search were made.

The second group, consisting of pneumococci of low

* Report to the Science Committee of the British Medical Association, June, 1927.

virulence, cause illness only under exceptional circumstances, and their effect is less specific and less typical. They are more akin in their behaviour to such relatively harmless organisms as the *Streptococcus salivarius*, which they closely resemble; either may give rise to similar lesions under similar conditions, and without tendency to virulent epidemic spread.

The American classification of pneumococci into four types, according to their serum reactions, has been found of no value for determining the pathogenicity of a strain. The idea that the three specific types—I, II, and III—might represent the virulent, disease-producing strains, and Group IV the avirulent, has not been borne out as the result of these experiments, though Group IV certainly contains a bigger proportion of avirulent strains than any of the other groups. The typing classification may be useful, in conjunction with virulence tests, for tracing a definite strain through an epidemic, but the virulence test furnishes the only reliable means of ascertaining the power of the strain to produce infectious disease of the lung.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

DERMATITIS EXFOLIATIVA.

THE following case presents several features of interest, and is thought worthy of publication.

On December 12th, 1926, a motor mechanic, aged 19, was admitted to West Lane Hospital, Middlesbrough, with the diagnosis of scarlet fever. There was a history of generalized pains, shivering, and sore throat beginning on December 7th, the onset being gradual. He vomited on December 10th.

The patient's condition was one for anxiety. He looked ill; the temperature was 103° F., pulse 120, respirations 24. A coarse scarlatiniform punctate rash involved the face, neck, trunk, and upper and lower extremities. The circumoral area was also invaded. The fauces were very congested. The tonsils had been removed some years previously. There was no discharge from the eyes, ears, or nose. The tongue was covered with a thick white fur. The epitrochlear glands were enlarged, but not those in the cervical region. He was constipated. The urine, of amber colour, was cloudy, with a specific gravity of 1029; it contained urates in quantity, but there was no evidence of albumin or sugar. He had a slight cough, but physical examination of the chest was negative.

On December 14th jaundice was observed, and the skin had a peculiar greenish hue. Scaling had already begun. The abdomen was prominent and tympanitic, but there was no evidence of enlargement of the liver or spleen. No tenderness could be elicited in any area.

On December 17th both ears began to discharge, and on the following day a purulent exudate from the eyes was seen. The conjunctivae were lemon yellow. A bright yellow purulent discharge exuded from the skin of the face, and small pustules appeared on the buttocks and legs. During this period heavy desquamation of the skin continued, but the jaundice gradually disappeared.

Some of the septic spots, which by December 25th had spread over the whole body, now became larger, and an abscess appeared over the lower dorsal region. This was opened, and on January 12th, 1927, a large abscess in the left inguinal region was incised, and on the following day another was evacuated on the outer aspect of the left knee. Twenty-four hours later pus was drained from two abscesses, one on the face, the other on the right arm.

On January 17th a coarse punctate rash appeared on the face, neck, chest, and upper extremities. It was septic in character, but disappeared in thirty-six hours.

A week later the temperature, which had shown marked irregularities, returned to normal, and the patient's convalescence commenced. Pus continued to exude from hundreds of small openings in the skin of both lower extremities, but the discharge gradually ceased, a dusky macule remaining to show where a skin lesion had previously existed. There was now no discharge from eyes or ears.

The patient left hospital on February 15th, well, and comparatively strong, except for slight arthritic changes in the interphalangeal joints of the toes, and marked alopecia.

Examination of the discharges from the skin showed the *Staphylococcus aureus* in abundance. An autogenous vaccine was prepared, and vaccine therapy resorted to on December 30th with an initial dose of 30 millions. Stannoxyl tablets, nine each day, were administered at the same time. Tonic treatment with quinine and iron was commenced at an early stage of the illness, and mild antiseptics were applied to the skin. Fluid diet was given for the first three weeks; it was then gradually suppl-

mented until after a further three weeks the patient was on normal diet.

In this case there was no question of the malady being a sequel to psoriasis or seborrhoea corporis. Dermatitis herpetiformis, erythema multiforme, or lichen had no place in the patient's antecedent history. Tuberculosis, rheumatism, and gout were excluded so far as the etiology was concerned. Leukaemia and mycosis fungoides could both be differentiated, and there was no evidence of the administration of salvarsan. The Wassermann reaction was negative. The cause, in short, appeared unknown.

The outstanding points of difference from the usual case were the presence of exudate from skin and mucous membranes, and the appearance of jaundice. Undoubtedly a toxic influence was at work, most probably of intestinal origin.

WILLIAM L. TULLIS, M.D., D.P.H.,
Assistant Medical Officer of Health,
Middlesbrough.

ACUTE APPENDICITIS COMPLICATING TUBERCULOUS ASCITES.

THE following case presented problems in regard to diagnosis and to pathology which I think make it worthy of record.

A girl, aged 15, had been in poor health for some months, and for several weeks had suffered from vague abdominal pains. She was taken suddenly ill on May 4th, 1927. In the afternoon she vomited, and soon afterwards experienced intense pain in the abdomen. It was not localized, but was accompanied by vomiting, which continued throughout the night. On the following day she was admitted to the North Lonsdale Hospital, Barrow-in-Furness.

On admission the patient looked extremely ill; temperature 103°, pulse 140, respirations 20. The tongue was furred, and no motion or flatus had been passed for twenty-four hours. The acute abdominal pain had suddenly subsided two hours previous to admission. The abdomen did not move on respiration, and was uniformly distended. The umbilicus was slightly protuberant. On palpation the whole abdomen was tense, and a fluid thrill was easily elicited. The left side was not rigidly guarded, but the right side, particularly the lower area, was more definitely rigid. The patient had passed urine, and the catheter drew off only a small quantity.

In seeking a diagnosis the following conditions came under consideration: (1) ovarian cyst, with torsion of pedicle; (2) tuberculous peritonitis, with acute exacerbation; (3) perforation of the appendix, or of an intestinal ulcer, with diffuse peritonitis.

Operation.

On May 5th, under ether anaesthesia, the abdomen was opened through the right rectus sheath, and on excising the thickened peritoneum a large amount (about 180 oz.) of straw-coloured clear fluid escaped. The peritoneum and intestine showed typical tuberculous nodules studded in large number. The caecum was intensely injected, and thick lymph exudate covered its surface. On freeing this area a gangrenous appendix was found, retrocaecal in position, and perforated about its middle. The appendix was removed, and with some difficulty the stump was invaginated. The abdomen was closed, and drainage to the caecal region and pelvis provided.

For several days pus was discharged from the tube, and later a part of the wound gave way and pus escaped. The discharge gradually cleared up, and the further progress was uneventful.

From the pathological point of view it is submitted that the two conditions found were coincidental, the suppurative appendix lesion being added to the well established tuberculous ascites. An alternative theory is that possibly a tuberculous lesion of the appendix may have interfered with the emptying of the lumen, and thus caused acute empyema or necrosis. Further investigation was impossible as the appendix was too much altered to permit of microscopical examination.

A point of added interest is in regard to the manner in which the peritoneum, altered by tuberculous changes, becomes highly resistant to pyogenic infections. The effect of the peritonitis, with its intense reaction, and of the laparotomy has been most marked, and the ascites has completely disappeared. This may be regarded as an illustration of the conclusions of Hildebrandt, who has described the occurrence of post-operative hyperaemia, even in cases of uncomplicated tuberculous ascites, and who considers that a plastic outpouring around the tuberculous nodules results in their cure by encapsulation with fibrous tissue.

I have to thank Dr. W. S. Shearer and Dr. Dorothy Stewart, house-surgeons, for their valuable assistance.

HERBERT F. BLACKLIE, M.B., Ch.B.,
F.R.F.P.S.,
Honorary Assistant Surgeon, North Lonsdale
Hospital, Barrow-in-Furness.