desperately ill, and on the tenth day required another saline injection. The temperature—though this is not indicated in the chart—frequently rose to over 103° , with associated circulatory failure. On the tenth day he began to peel, the peeling being general and extremely free on the palms and soles, and being completed in about fourteen days.

The after-progress was one of tedious convalescence, with alternate constipation and diarrhoea for weeks. The evening temperature did not reach normal till the forty-seventh day, and showed frequent tendencies to rise after that. The mental apathy gave great ground for anxiety for many weeks, but ultimately a good recovery, both physical and mental, was made.

The diagnosis apparently lay between influenza, osteomyelitis or abscess of humerus, typhoid, typhus, scarlet fever, and a septic condition of the alimentary canal.

Scarlet fever seemed improbable, as he had had it two or three years before, the rash did not appear till the fourth day, and was preceded by sudamina, the pulse was not much accelerated, there were no throat symptoms, a trace of albumen was found only on the day after the hyperpyrexia, and the patient had twice, for at least a fortnight, peeled freely and in large flakes after typical influenza. The sudden onset, absence of a definitely enlarged spleen, and of Widal's reaction (eighth and fourteenth days), and of bronchial catarrh, were against typhoid. Influenza of an abdominal type or alimentary sepsis appear to be the most probable diagnoses and will, in conjunction with the patient's neurotic family and history, and his excess of clothing during the earlier part of his illness, in my opinion explain satisfactorily the main features of the case.

CASE II.

A soldier, seen at the Salford Royal Hospital in 1901, had been invalided home from India for abscess of the liver. After drainage he went on uneventfully for some weeks, but there were obviously pockets that did not drain satisfactorily. At 8 p.m. one evening his temperature, taken by the charge nurse, in whose accuracy I had every confidence, was 100.4° . At 8.20 p.m., on approaching his bed, I felt that he was excessively hot, and on taking his temperature found it to be 110° , an observation which I confirmed with a second thermometer. Despite his protests that he felt quite well, and making his acquiescence somewhat of a personal favour to myself, he was put into a cold bath for about fifteen minutes, when his temperature came down to 100° , dropping later to normal. He had no further excessive rise of temperature, and felt no inconvenience either during or after his hyperpyrexia. He died some months afterwards from exhaustion.

Recovery after such temperatures is doubtless unusual, but equally high and still higher ones have been recorded with favourable results. R. F. C. Leith¹ mentions a recovery in pneumonia after a temperature of 113.9° , and one in malaria after 114.8° . Teale² records a temperature of 110° two months after a severe accident involving several ribs and the dorsal spine, in which on four occasions afterwards the mercury in the bulb of the thermometer rose to a point corresponding to 122° . Donkin³ describes the case of a nurse who had had typhoid, and whose temperature was at one time 110° and at another 111.6° without any special constitutional symptoms. Here the pyrexia was very evanescent, and varied from 107.2° to 98.6° in five minutes. Phipps⁴ records a case of hyperpyrexia of 110.4° in rheumatic fever, which was followed by convulsions and recovered, while Fenny⁵ also has a case of recovery after 111° in rheumatic fever.

Apparently the best, and in fact the only, chance for such cases is the prompt abstraction of heat by means of an ice-pack or cold bath, and the exhibition of stimulants, of which a saline injection appears to be the best, in that it acts as a diuretic and diaphoretic as well. It is interesting to notice that in the first case recorded in this paper the patient had more than $\frac{1}{2}$ gr. of strychn. sulph. in eight hours, two doses being combined with digitalin.

REFERENCES.

¹ Quain's Dictionary, 1902. ² Clin. Trans., 1875. ³ BRITISH MEDICAL JOURNAL, 1879. ⁴ BRITISH MEDICAL JOURNAL, February, 1902. ⁵ Lancet, July 4th, 1885—quoted in Fagge's Medicine.

A CASE OF GENERAL PNEUMONIC INFECTION IN A CHILD OF SEVENTEEN MONTHS,

WITH BACTERIOLOGICAL REPORT.

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It is well known that the pneumococcus of Fraenkel is an organism which not only presents extraordinary modifications in its degrees of virulence, but also is frequently associated with various diseases whose clinical aspects differ widely from one another, though from a bacteriological standpoint the causal agent is the same.

The widespread habitat of the pneumococcus and the fact that it is a fairly common parasite of man make the study of the different pathological conditions with which it is associated of more than ordinary interest. Though Fraenkel's coccus can be identified in some 60 per cent. of all cases of lobar pneumonia, yet its study becomes of special interest when the various secondary infections to which it may give rise are considered and identified. These secondary complications are not infrequently met with, and of those which have been recorded from time to time the following are of interest and importance:—Pericarditis, pleurisy and empyema, arthritis, otitis media and meningitis, peritonitis, infective endocarditis, and parotitis. In addition, Foulerton, in a recent communication, has drawn attention to a case of gastric infection undoubtedly due to pneumococcus invasion, and at the same time passes in review the general pathology of pneumococcus infection of mucous membranes.

In the present communication I venture to bring forward a case of great interest which recently occurred in St. George's Hospital. It illustrates in a fairly conclusive fashion some of the varied secondary infections which may arise from a primary lobar pneumonia. The case is a striking one not only on account of its unusual severity, but also because it manifested in quite a sequential fashion a series of multiple infections.

Before recording the details, however, it might be of advantage to pass briefly in review some of the more important secondary infections which are commonly met with in order that the completeness of the present case may be established. From statistics one cannot help concluding that the majority of cases of general secondary pneumococcus infection have a primary pneumonia as their starting point, and that subsequently the organisms spread from thence to the various organs of the body either by the blood or lymph channels.

In Kanthack's analysis of 170 fatal cases of pneumonia which occurred in St. Bartholomew's Hospital during the years 1891-5 he ascertained that in no less than 35.7 per cent. secondary complications had ensued; and that though most deaths actually took place between the ages of 20 and 40, yet the inflammatory complications were most commonly seen in young people, for in 25 cases occurring in patients under 21 years of age, no less than 64 per cent. died of secondary infections, "a percentage almost twice as high as that of all the cases taken together."

Pericarditis.

This, perhaps, is the most common secondary infection met with in ordinary lobar pneumonia, and is, especially in young children, very frequently coincident with pleurisy and empyema.

From statistics published by Still and others there seems no doubt that the pneumococcus is quite one of the commonest causes of pericarditis in young children. The pericardial fluid may be serous or may exhibit varying degrees of purulence. In all probability the affection is not necessarily due to a direct extension of the inflammatory process to the pericardium, because not uncommonly the pericarditis is present without any coincident pleurisy, and, moreover, other remote complications such as meningitis and peritonitis are by no means rare.

Pleurisy and Empyema.

These are also well-known complications of pneumonia. Unlike pericarditis, they are affections almost as common in men as they are in women, statistics showing only a slight balance in the favour of the former. It is difficult to

say whether pleurisy and empyema are caused by a direct extension of inflammatory processes, but it is certain that pleurisy may occur as a secondary complication to pneumonia on the side opposite to that which presents the pulmonary lesion, though undoubtedly in many instances the reverse is the case. It may be of interest to note that in the bacteriological department of St. George's Hospital during the year 1901 the pus from 13 cases of empyemata was examined bacteriologically. In 11 instances the diplococcus pneumoniae was isolated in pure culture, and in 9 of these cases the individuals were either suffering or recovering from attacks of ordinary lobar pneumonia.

Arthritis.

This is a most interesting variety of secondary pneumonic infection, and is said to occur as a complication in about 1 per cent. of all cases of pneumonia. In 31 cases of pneumonic arthritis collected by Cave in his recent review of the condition, a pneumonia preceded the joint affection in no fewer than 27, and in 19 of these one joint only was attacked. The condition may be sero-fibrinous throughout, or ultimately become purulent, or this latter feature may be persistent from beginning to end. In his recent paper on seven cases of pneumonic arthritis Raw clearly shows the close relationship which exists between the primary pneumonia and these joint affections, and, as in the case presently to be described, points out that the arthritis may manifest itself within quite a few days of the primary lung disease.

Meningitis.

Pneumococcus infection of the meninges is another secondary process which is both interesting and important. It is met with both as a secondary infection from primary lung trouble, and also from primary middle-ear disease. In Netter's account of 25 cases of purulent meningitis it is interesting to note that he found Fraenkel's organism in 16, 4 of these cases being complicated with purulent otitis, 6 with pneumonia, and 3 with malignant endocarditis. Reviewing 45 cases from the literature, the pneumococcus was found in 27. In 4 cases of cerebro-spinal meningitis recorded by Monti, the same lanceolate-shaped organism was found in all, and in 3 of these lobar pneumonia was present.

Middle-ear Disease.

The diplococcus pneumoniae has been found associated with this condition both as a primary lesion and as a secondary process to pneumonia in a considerable number of cases, and in many instances in a pure state. Zaufal records 6 cases, and Netter remarks that in 18 cases occurring in children which he had examined, he ascertained the pneumococcus to be present in 6. Not uncommonly—as already mentioned—the middle ear is the primary focus from which the infection of the meninges takes place.

Infective Endocarditis.

There can be no doubt that ulcerative endocarditis is one of those conditions for which the pneumococcus is occasionally responsible. It would appear from actual statistics to be a much more frequent complication in women than in men, the proportion, according to Kanthack, being almost as 4:1. Osler describes the condition as being present in 16 per cent. of his cases; and Kanthack's analyses of those patients who died of infective endocarditis in St. Bartholomew's Hospital during the years 1891-5 show that 14.6 per cent. of these were suffering from pneumonia. It is, however, a most interesting complication, especially when secondary to a primary focus elsewhere, but apparently—as far as the present case determines—a condition which does not *ex necessitate* follow from a general haemic infection, and that almost a septicæmic condition may be present without any sign either clinical or *post mortem* of endocarditis being present.

Peritonitis.

Cases of pneumococcus peritonitis, both serofibrinous and purulent, are on record, but the condition is a rare one. In some instances the organism is present in pure culture, though occasionally the streptococcus pyogenes is coincidentally present with it. Such conditions afford to the bacteriologist no small scope for exercising technical skill

and knowledge in separating two organisms in many respects so closely allied.

Parotitis

as a secondary complication of pneumonia is very rare. Testi notes a case occurring as a secondary infection to an ordinary attack of croupous pneumonia, in which he both isolated and identified Fraenkel's coccus from the inflamed gland.

From a tonsillar abscess Gabbi has also succeeded in obtaining the same organism in a pure state.

It is not often, however, that multiple secondary infections are present in a patient at one and the same time, hence the present case has special interest.

CASE.—A weakly, anaemic child, only 17 months old, was admitted under the care of Dr. Ewart, into St. George's Hospital, on March 12th last, with a temperature of 103° F. It was fully evident that the child was extremely ill; it was painfully short of breath, and suffering from a troublesome cough, which, on the mother's evidence, it had had for some length of time past.

State on Examination.—There were evidences on the right side of the chest—especially posteriorly and inferiorly—of a definite pneumonia, breath sounds were high-pitched, and vocal resonance was diminished. At the right posterior apex high-pitched and harsh breath sounds were obvious, and the vocal resonance was much increased. A few crepitations were also caught over the left scapula. No very obvious clinical signs were defined on the anterior aspect of the chest, save in the right axilla, where the same features and physical characters as at the base predominated. The left elbow-joint appeared to be rather painful, even on the slightest movement, and Dr. Ewart, considering that the condition might possibly be a pneumonic invasion secondary to the primary lung infection, expressed a wish that if the condition progressed the joint should be aspirated and the fluid examined bacteriologically. Macroscopically, however, apart from a slight diffuse tinge of redness over the joint there was no effusion or swelling.

Progress.—The following day (March 13th) Dr. Ewart suggested the presence of an empyema at the right base, and, introducing a sterile needle, withdrew a few cubic centimetres of pus, from which the diplococcus pneumoniae was cultivated in a pure state with ease on blood agar and in blood broth. Two days later—three days after admission—the temperature had fallen almost to normal, and though the physical signs in the chest attracted no immediate attention, the elbow-joint was distinctly more inflamed than when last examined. It was markedly swollen and movement was acutely painful. The most prominent part of the swelling was just below the bend of the elbow and on the outer aspect of the limb. The head of the radius could be dislocated with ease, though creaking could not be obtained.

On March 18th the joint had become extremely tense and shiny; fluctuation could be obtained, too, without difficulty. The temperature overnight registered 102° F. The joint was now aspirated. In some of the turbid fluid, which was withdrawn in a sterile hypodermic syringe, it was easy to demonstrate numerous capsulated haemate Gram-staining cocci; but cultivations were only partially successful on account of the pneumococcus growth being rather obscured by some five or six colonies of the staphylococcus epidermidis. The cultures, however, and the appearances obtained in cover-glass preparations from the original fluid when stained by the method of Gram were quite sufficient to satisfy me as to the identity of the micro-organism.

On March 24th the chest was again aspirated, and some 4 drachms of thick pus was removed, and similar cultures again obtained. No improvement resulting during the week, on the 31st a further opening was made into the empyema, with the result that a fairly copious amount of pus was withdrawn, two tubes being inserted through which the pus continued to discharge in varying quantities from time to time.

In this condition the child remained for nearly three weeks, but, as the flow of pus showed no tendency to diminish, Mr. Allingham, on April 18th, removing a piece of rib, made a thorough exploration, however, without success, for no obvious collection of pus was discovered.

On April 20th, at Dr. Ewart's request, I removed in a sterile syringe 3 c.cm. of the child's blood from the median basilic vein of the right arm, and inoculated three 50 c.cm. flasks of broth with 1 c.cm. of blood each, and incubated them at 37° C. for forty hours. In all the flasks Fraenkel's diplococcus was present in a pure state, and a mouse inoculated therefrom died in twenty-two hours, the organism being again recovered in an uncontaminated state from its heart blood and spleen.

From April 24th until the patient's death on March 28th a new cycle of events manifested themselves. The child began to suffer from frequent attacks of vomiting with marked retraction of the head. Wasting and anaemia were also very marked. Though the abdomen was distended yet it did not appear to be tender or painful. There was no drowsiness. A lumbar puncture removed some 5 or 6 c.cm. of a slightly turbid and blood-tinged fluid. From it, again, pure cultures of the diplococcus pneumoniae were obtained with ease, and stained covers from the original fluid showed in comparative abundance numerous capsulated, Gram-staining, haemate cocci—in every way typical pneumococci. A fair number of pus cells were also present.

The day following the child died. Unfortunately, owing to the parents' refusal to permit a necropsy—save as much as could be conducted through the empyema wound—a complete systematic study of all the internal organs could not be easily made. However, the lungs, spleen, and heart were most minutely examined.

Necropsy.

The Lungs.—Areas of consolidation and marked evidences of bronchopneumonia were very well seen, and squeezings obtained from the solid areas showed, in cover-glass preparations, very large numbers of typical Gram-staining, lanceolate, capsulated cocci. Characteristic cultures were obtained, but B. coli contaminated several of the tubes.

Spleen.—No growth of the pneumococcus was obtained from this organ. Sections also appeared destitute of the characteristic cocci, and, save for

two colonies of *B. coli* on one of the slope agar tubes, no other organism was found.

Pericardium.—There were evidences of a slight plastic pericarditis, a few flakes of fibrin being adherent to the heart muscle. This condition was not diagnosed during life, and it was entirely owing to the restrictions placed on the necropsy by the parents that none of the fluid could be properly collected and examined. It is, however, quite permissible to reason that in all probability the condition was pneumatic in origin.

Heart.—The right cavity was in a state of slight dilatation, and otherwise the whole organ was perfectly healthy. The valves were absolutely sound, and there was no evidence whatever of any existent endocarditis; and it is, further, a significant fact that no infarcts of any kind were met with in any of the internal organs examined.

Elbow-joint.—No sign of inflammation, swelling, or other abnormality was visible. However, I aspirated the joint with a sterile needle, and withdrew a few drops of practically clear fluid containing a small number of floating flocculi. Coverslips made direct from the fluid presented a few capsulated Gram-staining *hastate coccii*, but cultures both in blood broth and on blood agar remained sterile. I have, however, no doubt in my mind that the organisms were no other than genuine pneumococci.

Middle Ear.—During the child's stay in the hospital no discharge or ear trouble ever manifested itself. At the necropsy, however, I introduced in the middle ear on each side a sterile pipette, but entirely failed to withdraw even one drop of fluid.

This is interesting, for on inquiry the mother stated that before the child's admission a discharge from its ears had been noticed for some time. This of course may or may not be true, but for the period during which the child was under treatment in the hospital no ear trouble was ever observed, though on several occasions it was searched for unsuccessfully.

In conclusion it may be interesting to trace out in tabular form the time and nature of the various sequential infections:

Bacteriological Report.			
Original pneumonia	...	March 7-12	...
Left elbow-joint	...	March 17-18	...
Empyema	...	March 24	...
Blood examined	...	April 20	...
Cerebro-spinal fluid examined	...	April 24	...
Death	...	April 28	...
Necropsy	...	April 30	...
Lung squeezing	...	...	Diplococcus pneumoniae
Elbow-joint	...	...	...

I desire to express here my thanks to Dr. Ewart for permitting me to publish this case, and the obligation I owe to Dr. Vere Pearson, the Medical Registrar, who kindly placed his clinical notes at my disposal.

REFERENCE.

¹ *St. Bartholomew's Hospital Reports*, vol. xxxii, 1896.

CONCURRENT SCARLET FEVER AND MEASLES IN CHILDREN.

By ERNEST A. DENT, M.B., C.M.,
Cheltenham.

On February 8th I was sent for to see a child, E. B., aged 10 years. She was suffering from scarlet fever, and I sent her to the hospital for infectious diseases. She was away six weeks. The house, clothing, etc., were thoroughly disinfected by the sanitary authority. Six other children—A. B., a boy at work, aged 16; T. B., a girl, aged 13; C. B., a boy, aged 8; N. B., a girl, aged 7; M. B., a girl, aged 5; and G. B., a girl, aged 1½—remained away from school for fourteen days, according to the routine order of the sanitary authority, and then, being apparently perfectly well, returned to school until the Easter holidays.

M. B. (the youngest but one) became ill on April 1st. I was sent for on April 3rd, and I found her suffering from sore-throat, swollen glands, sickness, general *malaise*, and a slight rash, which commenced on the chest, and was, I thought, that of scarlet fever; the fact of the previous case in the house strengthened this view. I notified the case as a suspicious one, and asked Dr. Garrett, the medical officer of health, to see the child, and he kindly did so on the following day (4th). The rash had disappeared, and he considered the signs then evident hardly sufficient to justify removal of the patient to the hospital, and we agreed that it would be well to keep her at home under observation. On April 6th, when I visited the house, the child was covered with a very distinct and profuse eruption which was unmistakably that of measles; there were also other symptoms of that affection.

I was asked to see her brother C. B., aged 8. This boy had an indefinite rash which was not typical of either scarlet fever

or measles; there was no evidence of sore throat nor of swollen glands, and except for headache at times, he appeared to be pretty well. In five days desquamation had set in, and large scales of epidermis were peeling chiefly from his neck and chest; the appearance was quite unlike the fine branny desquamation which follows the disappearance of the rash in measles, and which is usually most in evidence on the body and lower extremities. The boy felt well and wanted to go out. I was of opinion that this was a case of scarlet fever, and communicated with Dr. Garrett, who again visited the house. We considered it right to send both children to the hospital.

Two of the other children T. B. and N. B., were apparently sickening for something. The house was again disinfected. Four days later T. B., N. B., and the baby were in bed with measles. They all recovered without any further development. A. B., the eldest, was the only member of the family mentioned who was not affected by illness.

Two days after admission to hospital a blotchy, measles-like eruption came out in the face of the boy; there was marked coryza, and desquamation continued for several weeks. He remained in hospital until June 3rd.

The girl had a good deal of desquamation of the neck and face, which continued for a long time; also, there was a persistent rhinorrhoea. On account of these indications she was detained in hospital an unusually long period, and did not leave until July 5th.

The cases mentioned illustrate some of the difficulties met with in making a precise diagnosis in non-typical cases of the eruptive fevers. The boy was without definite signs until desquamation occurred, which itself was more like that of scarlet fever than anything else. In certain indefinite cases, unless they are watched from the outset, and every sign, including even a slight and transient rash, noted it is likely that the presence of scarlet fever may be overlooked. I was fortunate enough to see M. B. while the rash (although indistinct) was present, and this, together with the other symptoms, led me to the belief that the case was one of scarlet fever. The rash, as not infrequently happens in this complaint, quickly disappeared.

These two cases are interesting, also, as affording examples in which the poisons of both scarlet fever and measles were present at the same time, and in which these poisons in combination modified the symptoms of both diseases.

I understand that during an epidemic of measles in Cheltenham, which has now subsided, other cases were admitted to the hospital for infectious diseases as typical of scarlet fever, and in less than a week after admission a distinct rash of measles developed in them, followed by a modification of symptoms similar to that in the cases now cited.

If one disease is coexistent with another (for instance, scarlet fever with measles, or scarlet fever with influenza), it is probable that the general character of the symptoms is so altered that the case is non-typical of either disease, and a definite diagnosis of it may not be possible. So misleading, indeed, may the condition be (especially if not under close observation from the commencement of the illness), as to suggest to the observer that some new disease is present.

A good deal has been written about the "fourth disease," which, as described, appears to have for its symptoms those which bear resemblance to both German measles and mild scarlet fever, and yet to be somewhat unlike either. It is conceivable that such symptoms might be caused by the poisons of both these affections acting together.

DENGUE FEVER IN PENANG.

By F. M. T. SKAE, M.D.,
Penang.

IN THE BRITISH MEDICAL JOURNAL of July 12th, 1902, Dr. F. O. Stedman¹ gives an account of an epidemic of dengue fever in Hong Kong during the last three months of 1901, and Dr. Nightingale² reports its arrival in Bangkok in the beginning of December of the same year. The disease reached Penang from Singapore in the end of November or beginning of December, 1901 (my first case was on December 5th), was