We have been frequently struck, both at Codford and at Tidworth, by the unusual preponderance of streptococcal, as contrasted with pneumococcal, infections in all types of pulmonary disease occurring amongst Australians and New Zealand troops on Salisbury Plain, and this has been especially noticeable in the cases of lobar pneumonia we have examined.

In many cases *Staphylococcus aureus*, although not one of the constant pathogens, must have contributed much to the acuteness of the pulmonary attack. As regards the pathology of the condition, two points are of special interest. In the first place the very varying gravity of the lung lesions found at autopsies shows that these lesions in themselves could not be held responsible for the fatality of the outbreak, which must without doubt be traced to the general toxic condition. In the second place, the exhaustion of all protective measures on the part of the body is typified by the feebleness of the leucocytosis and the absence of splenic and hepatic enlargement. Indeed it is almost to be wondered at that vaccine treatment elicited from the jaded patients the response which our charts exemplify, and it is unfortunate that time did not permit of opsonic comparisons being made.

We are indebted to Lieut.-Colonel G. H. Goddard, D.S.O., R.A.M.C., O.C. Tidworth Military Hospital, for permission to publish this article.

Postscriptum.—In a recent epidemic (October, 1918) of malignant influenza we find that respiratory symptoms are prominent, but only in a few cases is the sputum purulent. Moreover, several non-purulent cases present the features of profound toxæmia, collapse, and heliotrope cyanosis, which seems to suggest that purulent bronchitis is only one incident in a virulent mixed infection by Pfeiffer's bacillus and other organisms.

THE DIFFERENTIAL DIAGNOSIS OF SCARLET FEVER, MEASLES, AND RUBELLA.

BY

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It is of the greatest importance that these diseases should be distinguished from each other and from non-infectious diseases in the army, because (1) the quarantine periods vary, (2) the infectivity varies, and (3) the severity varies in different cases.

A definite method should be employed in the examination of cases so that nothing is missed, and the result of the examination should be accurately recorded for the benefit of subsequent observers. It is necessary that a good light be available, and that the throat, mouth, and skin be examined from above downwards. The temperature should be taken. Koplik's spots require a good light to be seen, and the mucous membrane opposite the lower molars should be turned out to the light by means of the forefinger of the hand outside, and the mouth should be open. The patient should be asked when he felt ill first, not when he reported sick; particulars of the onset should be obtained, especially where and when the rash appeared first. The incubation periods are useful to keep in mind.

The Onset.

Scarlet Fever.—Sore throat, shivering, sometimes vomiting, and the rash out within forty-eight hours, missing the face, and being seen on the neck, arms, and upper part of the body. Circumoral pallor is indefinite in adults, and I do not attach much importance to it.

Measles.—Headache, malaise, coryza the first day; Koplik's spots the second day, remaining the third, fourth, and fifth days. They should be seen two days before the rash comes out on the forehead, and still be seen the first two days of the rash; after this period they fade away. The rash comes out late on the third day or early on the fourth.

Rubella.—Little or no malaise, headache, slight fever, slight sore throat, the rash out from the second to the third day, but in a number of cases the appearance of the rash is the first indication that anything is wrong.

The Position of the Rash.

This is most important. These rashes have a definite distribution, a definite way of appearing, and a definite way of fading.

Scarlet Fever.—This rash does not usually appear on the face; it avoids the face as a rule. It is seen first on the neck, and spreads from above downwards. The feet are the last to show it. In the same way it fades, and the dorsum of the feet will show the rash distinctly when it is fading or has faded higher up. This is specially important when the rash is not a very heavy one. On the flexures of the joints the rash is likely to be more pronounced, or even haemorrhagic.

Measles.—The rash begins upon the forehead as a blotchy, livid discoloration, and spreads downwards. In twenty-four hours it is out on the legs, and is beginning to fade on the face by the time it is fully out on the feet and legs. It affects the whole body when it is fully out. It disappears from above downwards, and can be distinguished last on the feet.

Rubella.—This rash may be seen on the face first, but is evanescent. It also spreads from above downwards. It is necessary to look at the dorsum of the feet in all cases, because the rash may be seen there when it has faded from the body. This is essential to remember.

The Character of the Rash.

Scarlet Fever.—This rash is composed of fine red points on the background of an erythema; it may be discrete or confluent. When the latter, there is a bright general redness, and the skin may be swollen. The flexures may show in addition a haemorrhagic staining of the skin, not necessarily petechial. This is never found in rubella; the rash is more lasting, and may take several days to fade.

Measles.—This rash comes out as a papular rash, small red papules which can be felt projecting by the examining finger. Round a papule is a livid dark blotch. There may be several papules together, with one blotch around them. The rash is discrete at first, but rapidly the blotches become larger, more come out, and the general appearance becomes what is described as measly, or morbilliform, hence the name measles. These papules may be petechial, but the surrounding blotch is always there.

Rubella.—There are two types of rash—the scarlatini-form and the coarsely punctate with macules. It must be distinguished from scarlet fever, and the tests are: the evanescent character, the colour, and the fact that on some part of the body the rash will be found to be coarsely punctate and macular. In the scarlatini-form type the rash is not red but pink in colour, composed of pink points closely set together. This rash is usually found on the trunk, but if the feet are looked at, the rash will be found to be coarsely punctate and macular. In the ordinary type the rash is composed of large points, pink in colour, and mixed up with pink macules. The rash is discrete, but sometimes it is petechial as well. In all cases it is evanescent, and begins to fade in twenty-four hours, so it should be seen as soon as possible. It is last seen on the feet. The rash does not become deeper on the flexures. When associated with glandular enlargements and pink eye, there should be no difficulty in distinguishing it.

Early Symptoms.

Sore throat is a prominent feature in scarlet fever; coryza in measles; and slight headache, and slight watering of the eyes in rubella. Vomiting is not uncommon in measles and scarlet fever, and shivering in scarlet fever, while in rubella there may be no symptoms at all and the first thing noticeable is the rash.

Glandular Enlargements.

Enlarged glands below the ear are common in scarlet fever, and are associated with the sore throat. In measles, where there is a catarrhal throat and a measles rash on the mucous membranes, there are enlarged glands. In rubella the suboccipitals should always be examined; they are sometimes tender, and always easily palpable, but in some cases they are not enlarged, but the posterior cervical instead. The epitrochlear groin and axillary glands may be found enlarged. In other cases no glandular enlargements can be found, so that their absence does not exclude rubella, but when they are found it is valuable corroboration of other symptoms and physical signs.

State of the Throat.

In all three diseases the involvement of the throat is the exanthem of the disease.

In scarlet fever the throat is bright red, and red pin-points are to be seen; there may be purulent matter on the fauces and coming down from the nasopharynx. If there is any suggestion that there is membrane, a swab should be taken for bacteriological examination.

In measles the throat is livid and catarrhal, also swollen; Koplik's spots are part of the rash here, and should invariably be looked for. These are small raised spots, whitish in colour, lying on a red blotchy background. I find them in all early cases, and I find them either singly or stippled together in clumps, and I have seen the mucous membrane of the cheeks and palate covered with them. They appear two days before the rash comes out, and last four days. After this time the rash on the mucous membrane has faded, and the spots as well.

In rubella the throat is neither so bright red nor so livid. The soft palate only is reddish-pink. The fauces are only a little engorged, and there are never Koplik's spots.

The Tongue.

In scarlet fever the strawberry tongue is described. There the papillae project through the fur, and if there is no fur the tongue is bright red and rough, but in time the tongue becomes quite smooth. This condition is part of the exanthem, but cases occur where this condition is absent. The mild case is a likely example of this.

In measles the tongue is livid and flabby, it is furred, and not so red as in scarlet fever. In both cases if there is much pyrexia the tongue may be dry and cracked. In a late case the smooth tongue will give an indication of what has been the matter.

In rubella the tongue may be furred and flabby.

The Eyes.

In scarlet fever the eyes are not catarrhal; they are either red or white. In measles they are catarrhal, suffused, and running. In rubella they are slightly catarrhal, and look pink. In some cases this feature is absent.

The Significance of Peeling.

Measles does not peel usually, and when it does so the peeling is branny, and on the body only. Rubella does not peel as a rule, but I have seen slight temporary peeling on the hands only of a pinhole character on the tenth day. In scarlet fever peeling is the final thing which clinches the diagnosis.

Scarlatiniform rashes as I have described them are seen with little or no constitutional disturbance, with only slight sore throat, slight erythema, and no strawberry tongue. If the disease is a mild form of scarlet fever peeling will occur. It may occur on the neck or body in the first week, on the hands about the fourteenth day, on the feet about the twenty-first day, having missed the body. If it appears as pinhole points, with scales or casts coming off the fingers or toes, then the case is one of scarlet fever, and if infection is considered to last until peeling is finished, then the case should be isolated. It is this class of missed case which is often responsible for the sporadic cases which occur from time to time, and the origin of which is uncertain.

The Temperature.

This is raised in all these cases. In the first two it is high, and remains high. In the mild case of scarlet fever there may be little rise of temperature. In rubella also the rise of temperature may be slight or not at all, and only temporary. A typical rubella rash may be found with a normal temperature. This class of case is responsible for the disease becoming established in units, and the only thing to do is to have routine inspections and round up all cases showing the rash.

The Possibility of Diagnosis before the Rash comes out.

This can be made in all cases of fever and coryza, if the mouth is examined for Koplik's spots, and they are found. Fever and sore throat only suggest scarlet fever, if there have been previous cases, but the rash coming out will soon settle the diagnosis. Malaise and backache with slight fever and slight coryza suggest rubella, and such

cases, where there have been previous cases, should be segregated. The rash will be out in two or three days and settle the matter.

The Possibility of Diagnosis with the Rash Faded or Fading.

The distribution will be seen, and in scarlet fever there will be staining of the skin, and the bends of the elbows and the shoulders will show dark punctate discoloration. Moreover, peeling will be starting. In measles there will be a blotchy mottling on the parts where the rash has been. This may be in evidence for a few days, but there will be little seen after a week. In rubella there will be a punctate and macular mottling, corresponding to the rash, but this will not last long, and if one sees the case after the third day it may be impossible from the rash alone to say what has been wrong.

Differentiation from Non-infectious Rashes and Skin Eruptions.

By following the character and distribution of the eruption or rash there should be no difficulty. A dirty and sweaty skin, and a parasitic condition associated with a chill, may imitate an exanthem, but these do not show the proper distribution. The eruption is indifferently distributed. The parasitic condition will show scratch and bite marks. Ordinary skin lesions have their characteristic appearance and distribution, but an exanthem may be present also. An exanthem may complicate a gas dermatitis, but on looking at a piece of skin which is free from the irritative condition, and at the throat, and remembering the points about the distribution and character, there should be no difficulty. Scarlatiniform and other rashes, erythematous or blotchy, are described in influenza and in other forms of pyrexia of uncertain origin. Where scarlatiniform, the distribution is wrong; where urticarial or blotchy, the distribution on the body and limbs is indifferent, and the rash is evanescent. It tends to come out on repeated rises of the temperature, and where blotchy there are no Koplik's spots nor papules. The throat will not be characteristic.

Mixed Infections.

Diphtheria may complicate scarlet fever and measles. Where there is membrane or sloughing a throat swab should be taken and serum used without delay.

NOTES ON SURGICAL SCARLET FEVER.

The subject of surgical scarlet fever is one which is of some importance in view of the large number of surgical casualties now under treatment. It is thought that this condition is identical with the ordinary scarlet fever of civil life.

There are three classes of cases: (1) Where the infection is through the wound; (2) where the infection is through the wound after an operation for the removal of a foreign body or other proceeding of a cutting nature; (3) where the infection is through the throat.

In the first class the wound may be recent or not. It is septic. The patient develops fever, vomiting, shivering, and sore throat. The rash appears from twenty-four to thirty-six hours after, commences on the face, and rapidly spreads to the body, and finally to the feet. It is a red punctate erythema, in severe cases confluent, and the distribution is on the body, back and front, the neck, shoulders, flexures of joints, and inside of thighs. The wound is much inflamed, and the redness is more marked around the wound, the skin being swollen. The redness gradually lessens the further it gets from the wound. The temperature remains high for three or four days, and peeling begins from the face and neck as early as the fifth day, spreads to the body, the hands are affected about the fourteenth day, and the feet subsequently, sometimes as late as the twenty-first day. Peeling may take longer to finish than six weeks. It has been noticed that any surgical procedure after the rash has gone does not produce a recurrence.

The second class of case is one in which, after removal to a hospital, an operation is performed to remove a foreign body. The wound, which is already septic, and which has been opened up, becomes very inflamed, and in about twenty-four hours or less there is shivering, vomiting, and rise of temperature. Sore throat is present, and

the attention of those concerned is attracted by the appearance of a rash on the body. The wound is very inflamed, even sloughing, and round the wound the skin is bright red and swollen. The swelling of the skin becomes less the further it is from the wound. The rash on the skin is bright red and confluent in some cases, and where it is not confluent it is a punctate erythema. There is a red and congested throat and a red and swollen tongue. In three or four days peeling begins on the neck and rapidly spreads to the body and limbs. It is prolonged, often over six weeks. It commences from above downwards and finishes in the same order. This class of case closely resembles the first class, but is more severe. Obviously, a greater and more virulent amount of infective matter has found an entrance through the cut surface of the operation wound.

The third class of case is where there is a wound, or lesion of the skin, but there is no local erythema. In this class of case there are the early symptoms—the sore and dirty throat with exudation, the shivering, fever, and malaise, but the rash and tongue are not such prominent features. The rash may be confluent on the back and elbows, but is a discrete and punctate erythema on the body and limbs. It is often evanescent, lasting only a day or two, and in times of stress may be missed, and attention be subsequently drawn to the condition by the discovery of desquamation. In this class of case desquamation follows in the same order as in the first two, but may be later in commencing. Cases occur with little rash where desquamation starts as late as the eleventh or fourteenth day, misses the body, and is found only on the hands and feet.

Operation in this class of case did not produce any recurrence of the symptoms.

All these cases seem to belong to the group of streptococcal infections. They vary in their intensity with the facilities for the admission of the coccus or its toxin into the circulation. I cannot distinguish them from ordinary scarlet fever, and am of opinion that the diseases are identical. These diseases have been treated in the same ward with ordinary scarlet fever cases, and there have been no cases of secondary infections. It is impossible to say that it is safe to keep them in the same ward with general surgical cases, whether clean or infected, but where missed cases have been found late in the disease, it does not appear that they have left a track of infection behind them.

The period of observation has been eighteen months, and the number of cases sixty, and the wounds in most parts of the body.

INCUBATION PERIOD OF INFLUENZA.

BY

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THE incubation period of influenza is not yet definitely settled, and although the number of the cases we describe below is small, the opportunities for their observation were so close that we give an account of them, as they go some way towards fixing it within small limits of error.

We travelled from London together on Thursday, October 3rd, by train leaving King's Cross at 5.30 p.m., arriving at York 9.30, and as we were leaving the carriage a young flying officer who had come the whole way with us, and was coughing and sneezing at intervals, informed us that he was ill, and had had "influenza" for several days. On Saturday, October 5th, we both became ill, and both developed typical attacks of influenza. With both of us the illness developed suddenly with laryngitis; in both the first signs were a severe attack of coughing; and in both the time was noted fairly accurately as being between 2 and 2.30 p.m. One case was quite mild, the temperature was never over 101°. The other was more severe; the temperature rose to 104.5°, and the catarrh extended to the bronchi. His wife and two children also developed influenza, and in their cases the first symptoms showed suddenly about 2 p.m. on Monday, October 7th.

Now we are convinced that we became infected from our travelling companion during our train journey, more likely towards the end of the journey; and if we take the time of infection as 9.30 this fixes the incubation period

for both of us at a minimum of forty-one hours, with a maximum margin of error of four hours. But as we may presume that the bacterial content of the railway carriage increased with the time of our journey, we incline to regard our infection as dating from the end of our journey rather than the beginning; so that we take the incubation period to have been nearer forty-one than forty-five hours.

The three cases developing in the family of one of us point to a similar incubation period, as their illness started almost exactly forty-eight hours after his, and as it is likely that infection would not take place until a few hours after the first symptoms, the incubation period in these three cases must have been very nearly the same as in our own two.

It can readily be understood that we were in no condition to conduct extensive bacteriological examinations, but a culture taken from the posterior nares of one of us on October 10th, with a guarded swab to prevent soiling from the flora of the mouth, showed colonies of Pfeiffer's bacillus and of *Micrococcus catarrhalis*.

Reports of Societies.

DISCUSSION ON ENCEPHALITIS LETHARGICA.

At a meeting of the Sections of Medicine, Epidemiology, and Pathology of the Royal Society of Medicine held on October 22nd, Surgeon Rear Admiral Sir HUMPHRY ROLLESTON, K.C.B., R.N., in the chair, a discussion took place on encephalitis lethargica.

Lieut.-Colonel F. W. MOTT gave a summary of the results of the examination of two brains, by M. Marinesco, Professor of Neurology at Bucharest, who had been working for some time past in the pathological laboratory of the Maudsley Neurological Clearing Hospital. Disseminated miliary or punctiform haemorrhages visible to the naked eye existed in the grey matter in the neighbourhood of the floor of the fourth ventricle, the aqueduct of Sylvius, and even the third ventricle, and were also found in the posterior part of the pons and the peduncles. The cerebral cortex, except for congestion of some of the vessels of the leptomeninges, had shown in these two cases neither macroscopic nor microscopic lesions. On the contrary, the first segment of the spinal cord, which was the portion of the cord available, had presented the same histological lesions as the pons, bulb, and peduncles. Microscopical study of the above mentioned regions had demonstrated the existence of four kinds of lesions:

1. Infiltration of the walls of the small vessels and especially the veins, consisting of lymphocytes and plasma cells in the adventitia, disposed in several layers. The endothelium and fibroblasts might also take part in the inflammatory process.

2. Foci of interstitial inflammation consisting of neuroglia cells of several kinds, including large cells with voluminous eccentric nucleus, and many fibrillar prolongations, lymphocytes, and polynuclears. The foci of interstitial inflammation appeared sometimes to be altogether independent of vascular infiltrations, and might occur in the roots of the nerves—for example, hypoglossal, pneumogastric, etc.

3. Lesions of the nerve cells which did not correspond with those usually seen in infantile paralysis. There was dissolution of the "soi-disant" Nissl bodies, relative achromatosis, reduction in volume of the cellular body and of the number of prolongations and multiplications of the satellite cells, but only exceptionally was there evidence of neuronophagia, as was described by Economo.

4. The foci of haemorrhage, the most obvious macroscopic change, were seen to be much more numerous when microscopic examination was made. These haemorrhagic foci remained circumscribed around the walls of the small vessels, and red corpuscles were mingled with the cells of inflammatory infiltration, or they constituted a kind of covering, and floated about around the vessels. In spite of the very great number of haemorrhages the vessel wall did not appear to be necrosed, but sometimes a solution of continuity of the vessel wall could be seen.

From microscopic investigation of these two cases M. Marinesco drew some conclusions upon the nature of the disease. He regards lethargic encephalitis as a disease entirely different from botulism, from the haemorrhagic poliomyelitis of Wernicke, from the poliomyelitis of Heine-Medin, and from sleeping sickness. Like these two last diseases, it was an infectious inflammatory disease, but the nature of the infectious germ had not yet been determined. It was distinguished from botulism by its