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Having been engaged in clinical work at the Plaistow and Dagenham Fever and Small-pox Hospitals during the last seven years, I paid special attention to the many variations in the types and forms of different infectious diseases. These variations have been impressed upon me by the rule at both hospitals that cases must be diagnosed before they enter the wards. This rule is intended to prevent the entrance of foreign infections into the wards, In carrying it out, I have been able to appreciate the position of the hospital resident who sees in the wrong diagnosis of outside medical men a danger to the patients already under his care, and also that of the general practitioner who is apt to resent the fact that patients he has recommended for removal to hospital should there take other infections.

This has led me to give special attention to the every-day difficulties which arise in diagnosis of fevers, and I have accordingly chosen it as the subject of my thesis.

The great difficulty in the diagnosis of infective diseases is, as just stated, that the typical case of the text-books is not often seen. With experience, typical features lose much of their weight in diagnosis. In fact the clinician cannot depend upon specificity in the way

the pathologist does. For example, a case. A.B., aet. 5 years is admitted to hospital as scarlet fever. There is no history of exposure to the disease or of vomiting and the tongue, although slightly furred, is not red at the edges. Examination of the throat shews some inflammation of the fauces but no bright redness, with a little yellow exudate on the tonsils. There is also a history of a passing rash on the chest. The clinician diagnoses Scarlet fever with reserve. The pathologist on finding the diphtheria bacillus gives a more dogmatic diagnosis of diphtheria. In point of fact, either of the above diagnoses is a clinical possibility, for there is hardly a feature of any disease as observed at the bedside which may not be absent or highly modified. Indeed, the modification may, and often does, include a number of the features through which the disease is usually recognised.

In some part, however, - chiefly through bacteriology - pathological methods have a place in clinical diagnosis This makes it necessary to refer to pathology before passing to the clinical points. An answer must be sought to the question: What is the present position of specificity in its pathological sense?

It may be readily admitted that a disease is infective even where there is no positive bacteriological proof. This is the case with whooping-cough, of which it can only be said that it is transmissible and must often follow a minute and therefore growing dose of virus.

To say that a disease is infective at first seems to

imply that it is specific since the virus as a living entity must breed its own species. There is always the possibility, however, that so long as the cause is unknown, diseases closely resembling each other may be confused. In this connection there is the fact that some pathogenic organisms are found to be members of a closely related group, so that the discovery of the organism leads in a sense to a less rigid idea of the specificity of the disease. This is best seen in typhoid fever and para-typhoid fever. Still, a close examination of the facts makes it plain that the specificity of the infective diseases is in all probability maintained within narrow limits. There is no evidence that closely related diseases grade aetiologically into each other. Typhoid fever, so far as is known, is always transmitted as typhoid fever, para-typhoid fever as para-typhoid fever.

This is a denial that organisms may so vary as to alter their species or in other words so changing their species as to become habitual parasites. Such variation would be convenient. It would account for diseases which might have arisen from habitual saprophytic organisms. It would, for example, solve some difficulties if it could be said that a harmless diphtheroid organism could vary into the virulent diphtheria bacillus. It would also help to do away with some difficulties if it could be said that such change of species occurs in pathogenic organisms as would account for the derivation of one infective disease from another. The sum of our knowledge, however, is that

infective organisms and therefore infective diseases do not change their species but "breed true". How, then, are great clinical variations in infective diseases to be accounted for? Clinical variations with more or less simulation of other diseases depend upon a variety of factors. The disturbance of an infective disease depends, firstly, on the virulence of the organism, subject to variations not so great as to be called specific. Secondly, it depends on local and general resistance on the part of the infected subject.

It is now well known that many infective diseases may occur together. This mixed infection has been written about as if it actually represented a grading between diseases - a changing of species. It is true a grading may occur - as in the case of septic infection accompanying scarlet fever or diphtheria. Either of these infections may stand out in various degrees in different cases. Yet, from what has just been said, it follows that in such a combination each infection remains specific. There is not a changing of species but a mixture of them.

To sum up the existence of specificity in its pathological sense has not been disproved by recent research. Different infections may, however, be present together, and the clinical features of any simgle disease are in themselves also so variable, that specificity hardly exists in a purely clinical sense.

The last mentioned question - that is the variation of clinical features - is the subject of the remainder

of this thesis. It is this variation that causes the main difficulties in diagnosis.

Certain variations are common to infective diseases, and these will be first given.

(a) Diseases as a whole may be so mild that they are clinically almost or quite unrecognisable.

To this class probably belong many vague attacks seen during epidemics. Other examples are some afebrile cases of such diseases as typhoid fever and influenza, abortive forms of the exanthemata, and trivial cases of diphtheria with only traces of membrane or none at all.

(b) A Disease may be so severe as to lose its individuality more or less.

To this class belong the "explosive" form of invasion, followed rapidly by death, longer malignant attacks, haemorrhagic types. Some cases of the last kind are due to secondary septic infection.

(c) One stage of the disease may be exceptionally short or long, exceptionally mild or severe.

A short initial stage may be misleading in typhoid fever and is by no means rare. A long onset in measles may raise doubt owing to the delayed appearance of the rash. This is all the more likely because there may be an improvement in the symptoms before it comes out. A very mild first stage in measles may on the rash coming out suggest the diagnosis of German measles; so also modified small-pox may suggest chicken-pox. On the contrary

a severe first stage of German measles may give rise to a suspicion of measles, and a severe first stage in chicken pox suggest small-pox. A short febrile stage in typhoid fever, especially if the attack is abortive and ends very sharply, may be puzzling. A long febrile stage is an otherwise obscure case of typhus fever with, as is not uncommon in such a case, a slow decline, has led to a diagnosis of typhoid fever.

With regard to a short decline, some diseases have abortive forms which may be severe and yet decline with unusual rapidity. This is sometimes seen in typhoid fever, and in a doubtful case will increase the uncertainty.

(d) A local lesion may show unusual features.

The lesion may be unusually mild or severe. This may be either in comparison with local lesions in other cases, or with the general symptoms in the same case. Idiopathic tetanus illustrates the extreme in this direction. The local lesion is actually not to be found, although the patient may die from the toxic effect. The occurrence of unrecognisable mild local lesion in diphtheria is a better example. The fact that the patient had diphtheria is shown by the paralysis. There are also cases in which a good deal of membrane is not accompanied by the depression and other symptoms that are looked for in diphtheria.

Another variation in the local lesion is its occurrence in an unusual place where its nature may not be easily appreciated. Examples of this are wound diphtheria

and erratic chancre.

(e) Exaggeration of a simgle important feature may lead to the simulation of another disease.

The severe form of faucial inflammation in scarlet-fever sometimes leads to a diagnosis of diphtheria. This is most usual when the rash is slight, so that it is regarded as a septic complication of the diphtheria, a mistake will often be justifiable in the absence of a bacteriological test. But, however, others might be mentioned in which too much weight is given to an exaggerated or even an ordinary symptom. Thus the severe backache of small-pox has been attributed to lumbago.

(f) Some important feature may be subsidiary or absent.

There are no better examples of this than the formso of the eruptive diseases in which the rash does not appear, or is slight.

(g) A disease may show an unusual degree of disturbance of some organ or system.

One sees this in meningo-typhoid, nephro-typhoid, and the early otitis of influenza. The unusual disturbance often suggests another disease.

(h) A disease may be varied by the presence of another infection.

There may then be a mixing of symptoms, or an actual modification of them. The former is seen when scarlet fever and diphtheria are both present. The latter is seen in the effect of mixed infection on the hard chancre.

(i) Some important feature of a disease may be modified by an outside factor.

The effect of the presence of pigment on rashes in dark skinned races is a good example of this. Another instance is the indurative effect of caustics on a soft sore - so that a state suggesting hard chancre results.

It cannot be too strongly insisted upon that the diagnosis of an infective disease should be made with every available fact in mind. This is plainly shown by what has been said about the variation of single features and the simulation which may result from variation. In point of fact, in most instances where the diagnosis of an infective case is wrongly made, it is found that too much weight has been laid upon one or two features. It is necessary to make this point to put in its correct light the statement that prominent features are the clues necessarily followed in diagnosis. They necessarily from the first lead to a suspicion in one direction or another. A decision should, however, be postponed until all other reasonable probabilities have been followed up and set aside. Some of the evidence will be indirect. It will have to do with, for example, the probability of the disease having been acquired from another patient; with the probable length of an incubation period; with the story of a previous attack; with other causes than a previous attack telling for or against the disease.

Passing to the clinical data as guides, it is found when infective diseases are looked at broadly that they fall into a number of main groups. Where they have more

than one prominent feature, they may belong to more than one of these groups.

One of thr most interesting of the groups has attracted a vast amount of attention from epididemologists. It is that including scarlet fever, measles, and röthelr, with the rash as the leading feature.

GROUP I. The Group showing variations as regards the rash between the scarlatinal and the morbilliform type.

At first sight it might seem that diseases such as (a) Measles, with an incubation period of over a week, a gradual onset with coryza, a pro-dromal period of three days, a pre-eruptive remission, respiratory catarrh, a very rapid decline, and branny peeling; (b) Scarlet Fever, with an incubation period of always less than a week and generally only a day or two, rapid onset, a very short prodromal period, often with a special disturbance of digestion and circulation, with an absence of respiratory catarrh, a typical tongue in each stage, a somewhat gradual decline, and a pin-hole or scaly desquamation: and (c) Röthelr, with an average incubation period of about one week, very slight prodromal symptoms, a rather characteristic inflammation of the superficial glands, mild and vague fever and very slight peeling of the skin should be subject to confusion. The reason is that the feature of these diseases which is taken and in some cases can alone be taken as the guide - namely, the rash - is often misleading. The position is, not that measles is likely to be taken for scarlet fever, or the reverse, although

such a possibility is not to be denied. It is the mutual resemblance of the rashes of these two diseases to that of rötheln that makes the difficulty. Given that the indirect evidence tells nothing and that the history of the case is not decidedly that of scarlet fever or measles, it is not surprising that the question may arise in the case of a given rash whether the disease is rötheln or one of the other infections. The facts as to rötheln are that the spots are generally seen early within the circumoral ring, elsewhere on the face, and behind the ears. The trunk and limbs are then involved. A tendency to patchiness may be observed, but not to the same degree as in measles. There are cases in which the spots are minute and separate, and then when the rash fades on the face a condition almost or quite like scarlet fever may result.

The absence of the other features of scarlet fever, the early vomiting, extremely rapid pulse, the high fever, and the strawberry tongue will weigh in favour of rötheln, but since variation to this degree is seen in scarlet fever itself, certainty may be out of the question.

The difficulty of diagnosing the scarlet fever-like form of rötheln explains, I believe, Duke's attempt to give it the position of another specific disease - so-called "fourth disease", which had the rash of mild scarlet fever with roughly speaking the incubation period of rötheln.

Turning to the mutual likeness of rötheln and measles, it will be plain that confusion may easily arise, since a rötheln form of rash is seen in measles.

Moreover, rötheln may have an onset very like that of measles in symptoms, severity and length. Luckily in the case of measles there is a differentiating sign of great value, viz., the presence of Koplik's spots in at least 90% of cases. It is generally now admitted that these spots do not appear in rötheln.

The special affection of the glands at the back of the neck in rötheln has not, unfortunately, as much value against measles, although it is a sign having weight.

As showing the difficulty of judging between scarlet fever and rötheln the following group of cases is instructive.

Case I. J.E., aet. 6, complained of headache and slight sore throat on February 2nd. On the 3rd slight vomiting occurred, and a coarse punctate rash appeared on the face, involving, it is said, the cheeks. The urine was normal - also the heart and the lungs, with the exception of slight bronchial catarrh. In view of the stated well marked involvement of the face, the question of measles arose in the mind of the private medical attendant, and doubt was raised as to scarlet fever on the other hand because of the absence of marked injection of the throat, digestive disturbance and a high pulse rate. Measles, however, was practically put out of court by a history of an undoubted attack three years before, and by the absence of Koplik's spots. This brought the issue to rötheln, and the case was sent into hospital for observation on February 6th. There were then traces of a punctate rash on the body, whereas the limbs showed rather a

patchy faint brown staining. The tongue was rather raw and red, with moderate enlargement of the papillae. The temperature was then 100° F., pulse rate 100 and the respirations 28. The temperature fell to normal within two days. There was no definite involvement of the cervical glands.

Case 2. S.E., aet. 5, complained of headache, with slight sore throat, on February 4th. There was no sickness. A rash appeared on the face, including the cheeks, on the same day, and also on the chest. It was coarsely punctate. The urine, heart and lungs were normal.

The same considerations as to diagnosis arose in this case, except that the absence of vomiting increased the doubt against scarlet fever. The condition of the patient on admission to hospital on February 7th showed the temperature to be 101° F. It fell quickly. The pulse rate was 100, and the respirations were 26. The rash had then disappeared from the face, but it was faintly and finely mottled. A somewhat coarse scarlatiniform rash was present on trunk and limbs. The tongue had the same appearance as in Case I.

Case 3. G.E., aet. 9, admitted on February 6th. Complained for the first time on this day of headache and sore throat. There was no sickness. The urine, heart and lungs were normal.

On admission to hospital, a non-punctate red blush was found on the limbs and trunk. The tonsils were enlarged, showing a thin, muco-purulent secretion on surface. The tongue was practically normal. The temperature 102° F. Pulse rate 128, and the respira-

tions 26. There was also a history of measles three years previous.

The practical interest in the above cases lies in the fact that there was a difference of opinion previous to admission to hospital as to their nature. The diagnosis of the hospital staff was scarlet fever as against the alternative of rötheln. The diagnosis was based on the grouped symptoms of the cases as a whole. It was confirmed by the admission of a fourth child, M.E., with typical scarlet fever on the 10th of the same month, and by the development of nephritis in Case 2 on February 20th The desquamation in all these cases was very slight.

GROUP 2. The Group showing variation in the sore throat between so-called simply Pharyngitis and typical Diphtheria.

Here, again, at first sight confusion does not seem very likely between a disease like (a) Scarlet Fever with the characteristics mentioned; (b) Diphtheria, in which these characteristics are absent in a well marked form while more or less common features of the disease are the formation of a white membrane, pallor, softness of pulse, albumenuria and disturbances due to a late peripheral neuritis, and (c) Tonsillitis and Pharyngitis, having none of the signs of scarlet fever, except it may be well-marked pyrexia and not much in common with diphtheria and its symptoms of depression. In point of fact, however, the test in this group is sore throat, and a definite opinion is frequently very difficult to give:

indeed, it is often impossible to offer one.

In the case of Scarlet Fever the other useful symptoms may be vague or absent. Quite often, on the other hand, there is a yellow and sometimes a white layer on the tonsils. Discovery of the diphtheria bacillus is on the whole a certain method of recognising anomalous cases of the second disease, but as has been lately pointed out the common presence of the diphtheria bacillus or diphtheroid organism in the throats of normal children in some districts takes a good deal from its meaning.

It is well known that in diphtheria a septic rash may appear on the chest, early vomiting is not very rare, and the temperature may be high at the onset, quite as high as in Scarlet Fever at the beginning of the attack. There is also the point of great importance that scarlet fever and diphtheria may be present together, or diphtheria appear after a few days in a scarlet fever case. As to catarrhal sore throats, it is accepted that scarlet fever may occur minus a rash. It is also easy to miss the rash in similar mild cases where it does not last long. These mild cases are the very ones in which the other features of scarlet fever are badly marked, so it is easy to understand why the difference between the Scarlatiniform and catarrhal sore throat may entirely break down. The difference between diphtheria and such sore throats may be lost, owing to the slight development or absence of diphtheritic membrane. This is well seen in families where an outbreak of diphtheria occurs with one or two typical

cases, the others being such as would not have been recognised as single cases. Owing to the recognition by the public of the importance of early treatment by antitoxin, it not rarely happens that the friends of patients in hospital bring children with slight sore throat and seek their admission. The diphtheria bacillus is then often found.

The likeness again may be on the side of the catarrhal sore throat. If allowance is made for the various appearances that may be assumed by diphtheritic membrane, non-diphtheritic sore throats cannot always be distinguished from diphtheria with anything like certainty. I have seen hospital cases of follicular tonsillitis of the most typical kind that proved on bacteriological examination to be diphtheria. I have also seen other cases with fairly thick white patches on the tonsils where the diphtheria bacillus has not been found.

Before leaving the subject of sore throat as the test symptom, reference may be made to those cases in which there is much inflammation of glands. Mumps may be passed over with the statement that it has been mistaken for diphtheria. It is a fact that there may be some congestion of the throat in mumps, but it is probably rare for any throat condition to be present such as would account for the inflammation of the glands. Still the parotid is in some cases of mumps only slightly affected. Other glands about the neck may be attacked instead. Generally speaking a good deal of acute swelling of the neck about the angles of the lower jaw, especially if there is nasal

discharge, is associated with diphtheritic membrane in the throat, given that septic scarlet fever is excluded. Still there is a rare form of sore throat which is neither septic nor scarlatiniform, but in which the glands are much enlarged and a copious watery, blood-stained or muco-purulent discharge escapes from the nose. The following is a case of this kind. Its special interest lies in the fact that it was taken for a case of diphtheria in the wards of a children's hospital and was transferred to a fever hospital.

P.B., aged 1 year, was admitted on February 20th . There was a profuse slightly turbid discharge from the nose. The glands at both angles of the jaw were markedly enlarged, particularly those on the right. There was much congestion of the pharynx. The fauces were rather swollen. No membrane was visible. The patient had slight bronchial catarrh, and the respirations were 32. The heart was normal and the pulse rate 126. The cheeks were rather red, and neither the facial expression nor odour of the breath, which was rather foetid, suggested diphtheria. The tongue was clean. rather more red than usual, and showed slight enlargement of the papillae. There was no sign of a rash, even on the outer sides of the legs, and desquamation was absent. The temperature was 102° F. Cases of diphtheria of this kind are sometimes seen with membrane in the nose alone, but the impression formed was that the case was not diphtheria. This proved correct on making cultivations. The possibility that the case might

be one of septic scarlet fever had to be admitted, and for this reason the patient was kept in an observation ward. The temperature rose to 103° F. on the 21st and touched that level more than once during the next few days. The temperature then slowly fell. On the 23rd and for some days after there was a distinct trace of albumen in the urine. The patient neither developed paralysis nor desquamated.

GROUP 3. The Group in which fever persisting for some time is combined with more or less definite symptoms of the typhoid type.

In cases of indefinite fever lasting over several days, it is natural that typhoid fever should be thought of. If later developments do not confirm this diagnosis, then acute miliary tuberculosis is usually suspected. The group of cases, however, in which such a course may be run is much larger, including for example, para-typhoid fever, typhus fever, influenza, pneumonia, septicaemia, septic embolism, cases of deep suppuration, (especially those situated in the alimentary tract) food poisoning, secondary syphilis, acute rheumatism, malaria and malignant endocarditis.

Vague cases of this type are often a great anxiety to the practitioner. The Widal-Grünbaum reaction has proved of great service. There is, of course, a chance of its leading to an error, but it is a very small one.

A word or two may be said about the chief diseases in the group.

Firstly, as to Typhoid Fever of an indefinite type. Cases of it are sometimes associated with other undoubted cases, or occur during an epidemic. There is something in the dull, immobile face and rather slow speech, suggesting sluggishness of mind that is very characteristic of typhoid fever. The odour is also often such that a suspicion of the disease arises on coming to the bedside. Further, great importance attaches to abdominal distension, even if it is slight. Moreover, one or more of the other signs of typhoid fever, viz. epistaxis, deafness, enlarged spleen, abdominal tenderness, diarrhoea, rose spots, relative slowness and dicrotism of the pulse and bronchial catarrh may be more or less evident and have weight, even though they are not as prominent as usual. A gradual beginning on which so much dependance is properly put has unfortunately many exceptions in some epidemics. Thus in a large group of cases occurring in Canning Town, supposed to be due to ice cream, the onset was often one not unlike that of typhus fever or influenza.

A complete sketch of diagnosis of typhoid fever would take in cases in which simulation depended upon other features beside the fever. For instance, there might be abdominal disturbance or outstanding meningeal or pulmonary symptoms. A reference would also be necessary to so-called nephro-typhoid.

Secondly, as to Typhus Fever. My experience of the difficulties in diagnosing this rare disease is confined to the two cases which recently occurred in London. The

following is a brief report of them: -

Case 1. A male, aet. 15, admitted to the London Hospital on 3rd February of this year. There was a history of vague joint pains going back a month. On January 29th these were worse and the patient felt "feverish". The appetite was lost, but there was no vomiting nor diarrhoea. On January 30th the patient was delirious for first time. At the time of admission the tongue was dry and furred. The pulse was 100, good in tone and regular. Beyond some crepitations at the base the lungs were normal. The spleen could be felt and was tender, and the abdominal wall was slightly rigid. A few doubtful spots were present on chest and back. There was a slightly raised erythematous rash above the right external maleolus; it faded on pressure. The urine was normal. The temperature in the evening reached 104° F., and on the following evening 104°.5 F. The highest points during the next five days were about 104° F. During the following five days the temperature gradually fell to 102o F. On the 14th it suddenly dropped to normal, but then rose again slightly, but did not settle at the normal for some days. Whilst in hospital the patient was delirious for the first five days, especially at night, when he had to be constantly watched: the delirium then steadily declined. On February 5th the spots became more numerous on the chest and not unlike flea-bites. The spots were not definitely petechial. The patient made a good recovery.

It will be seen how widely different this case was from the classical type of the text-book. Standing alone

the definite diagnosis of typhus fever was hardly possible. The diagnosis, however, was made owing to a member of the same family being admitted to a fever hospital suffering from typhus fever.

Case 2. The patient was a medical man, aet. 35, in private practice, admitted to the London Hospital on the 6th February of this year, as an obscure case, possibly of influenza. He sought admission to the hospital on his own suspicion that he was suffering from typhoid fever with influenza as an alternative diagnosis.

The history of the attack covered one week. The symptoms included "feverishness", general pains, sickness, great debility, constipation and headache. At the time of admission the patient was in a state of profound toxaemia. The tongue was foul and the breath offensive. There was a bright scarlatiniform rash all over the body which it was thought might be due to Salicylates. The pulse rate was 108, respirations 44, and the temperature 103° F. The urine contained one-sixth albumen. Its specific gravity was 1032. On the 7th the spleen was felt. The tongue was now dry and cracked. The erythematous rash persisted, and there were also some rose spots on abdomen which faded on pressure. Auscultation of lungs revealed some bronchial rales. There was no consolidation. The patient was delirious and his movements were slightly tremulous. A blood count was made on this day which showed white cells 15,000; red cells 7,450,000, and a differential count showed the former to consist of poly-

morphs 88%, the lymphocytes 11%, and the hyaline 1%. The Widal-Grünbaum test proved negative. The course of the case was such as is seen in fatal septicaemia. On the whole, there was a slight rise of temperature during the first week to a level of 104° F. In the ensuing two days it fell with a failing vitality, and the patient died on the 13th February.

The half drunken look of the typhus patient is by no means always present, and I am informed that at the Linacre Fever Hospital mild cases with very few of the specific symptoms of typhus fever have been admitted from time to time. The spots of the rash may be hardly visible, or even absent. The eruption may (as stated by Goodall) be represented by a faint mottling.

These mild cases and also many severe cases have proved the difficulty in differentiating symptoms from typhoid fever. In the past, patients were frequently sent into Liverpool Hospitals for typhoid fever when they had typhus fever. In the typical forms of the two diseases the symptoms are, of course, characteristic.

The crisis of typhus fever, it may be added, is by no means constant. In a group of four cases whose charts of which I have had the opportunity of studying, admitted to Linacre Hospital in 1903, only one showed a very sharp decline. The other cases might have been typhoid in this respect.

A large outbreak of typhus fever would be interesting at the present time as regards differential diagnosis

owing to the greater certainty of excluding typhoid fever through the agglutination test. Several points in this brief statement are illustrated by the two cases quoted above.

Thirdly, as to Influenza in its typhoid form. The two cases of typhus mentioned above give point to its being placed in the typhus-typhoid group, as they were admitted to a general hospital as possibly influenza. In my own practice, discomfort on pressure on the eyeball is very rarely complained of in typhoid fever, and is common in influenza even when coryza is not evident. Increased rapidity of respiration not accounted for by any particular cause points to influenza. The sticky rales, on which Goodhart lays so much stress, may be heard. They may be present although the catarrhal element is otherwise apparently absent. The wretchedness of the influenza patient is also rarely shown by the typhoid patient, but it may be masked by a drowsiness approaching stupor. The bacteriological examination of the sputum is now accepted as reliable in influenza if the result is positive.

Fourthly as to Pneumonia in its various forms. Under this head it is necessary to refer to the difficulties which may arise in recognising the infective conditions special to the lungs. Further, one must differentiate these conditions from others in which disturbance of respiration is present, but is not the essential element in the case.

Beginning with the diseases of the lungs themselves,

Croupous Pneumonia comes first in importance, not only as a type, but also as regards specificity. Its onset is in the great majority of cases ushered in by signs and symptoms so definite that an error in diagnosis is hardly possible. In some, however, factors are present which may so modify the onset and ~~cause~~ course (this applies to physical signs also since every now and then they are found to be vague) that a definite clinical diagnosis can scarcely be made.

In this connection age has a most important bearing. In old people the infection may show itself only by malaise, weakness, with increase of pulse rate; and the whole course of the disease may, in rare instances, be run without a rise of temperature. In children the onset of convulsions without vomiting, and if acute gastric catarrh can be set aside, then croupous pneumonia may be anticipated. The chill, which is one of the most common initial symptoms, may be slight or even absent. This is most likely to be the case in Summer. A croupous pneumonia may be masked by the presence of an already existing disease. For example, in typhoid fever sometimes a lobar pneumonia is recognised of which there is no record previous to admission to the hospital.

The anatomical position of the diseased part of lung may mask the diagnosis. If the pneumonic infiltration is apical, then there is usually an important positive sign absent, namely, the rusty sputum, and a differential diagnosis from pulmonary tuberculosis may be difficult since

intthat disease the examination for tubercle bacilli may prove negative, The likeness will be increased when the onset of the pneumonia has been more or less a gradual one without the history of a chill.

Again, a croupous pneumonia may take a patchy distribution and run a course so severe as to suggest acute miliary tuberculosis.

The finding of the diplococcus pneumoniae either in the blood or the sputum in some numbers will set aside all doubt as to the nature of the case.

Reverting to other forms of pneumonia.

(a) Influenzal Pneumonia, though belonging to the catarrhal or lobular variety, sometimes presents a sufficient resemblance to the lobar form, due allowance being made for the variations of the latter, as to be indistinguishable clinically. In the absence of other symptoms of influenza it may be only by the finding of the specific bacillus in the sputum that a differential diagnosis can be made from croupous pneumonia.

Owing to the variation on both sides, cases are met with not having that sharp distinction on which some textbooks lay stress.

Recently I attended an old lady who had well-marked lobar pneumonia without bronchialitis. This case illustrates an intermediate condition between the two infections as an expert examination proved the presence of both the pneumococcus and the influenza bacillus in the sputum in large numbers.

(b) Syphilitic Pneumonia. The diagnosis of Syphilitic pneumonia cannot be based on physical examination of the lungs, as they are merely the signs met with in consolidation. Corroborative evidence must be looked for and as luetic pneumonia only occurs in the tertiary stage of syphilis, these evidences can usually be found, on the vocal chords, in the larynx, bones or liver. Justus' test is regarded by some as of importance when tertiary syphilis is suspected. It has recently been subjected to a good deal of criticism.

Fifthly. Cryptogenic Septicaemia or Septicaemia with an indefinite local lesion in its course towards death generally enters the typhoid stage. So far as present evidence goes, leucocytosis weighs in favour of septicaemia in cases which are at the time suffering from an attack which is neither too mild nor too severe.

Under strict conditions the discovery of the septic organisms in the blood will settle the diagnosis. There will be also the weighty fact that Widal's test is negative. In septic embolism the pulmonary lesions when present may occasionally suggest through their physical signs rather than detract from the suspicion of typhoid fever with an unusual amount of pulmonary disturbance.

From time to time cases of septicaemia or pyaemia come under notice that are not due to the ordinary pyogenic organisms. Then, unless a broad view is taken of the bacteriology of septico-pyaemia an error may result. In this connection it may be necessary to mention instances

of general gonococcus infection, of acute mycoses, of anthrax, of pneumococcus infection and of glanders.

Sixthly. Food Poisoning. It need only be said that when the gastro-intestinal disturbance is accompanied by fever - fever which moreover may run rather a long course - the suspicion of typhoid fever may be very strong. The spleen may be enlarged and post-mortem infiltration of Peyers' patches have been observed (Dixon Mann).

GROUP 4. The Group of Cases in which Meningitis is actually present, or is simulated.

There are four chief facts that stand out with regard to this group.

Firstly, there are affections in which meningitis is so constantly or commonly present that it is not an aberrant feature. Here cerebro-spinal fever is the type, but acute miliary tuberculosis can be fairly included.

Secondly, there are affections in which the specific agent occasionally sets up meningitis. The meningitis is generally, but not always, referable in its origin to a focus elsewhere. Thus an aberrant phase of the disease may be developed. The pneumococcus may act in this way; also the gonococcus and the ordinary pyococci, the typhoid bacillus, and more rarely the influenza bacillus and other organisms. The infections which are of most importance owing to their frequency are the diplococcus intra-cellularis, the pyococci, the pneumococcus and the tubercular bacillus.

Thirdly, there are meningitis, usually pyococcal, in

which extension from outside the cerebro-spinal cavity occurs by contiguity and in which the local lesion is not always evident.

Fourthly, there are affections in which the meningeal symptoms appear to be purely toxic, no micro-organism being found in the meningeal tract. Some cases of meningo-typhoid, as is especially pointed out by Osler, are of this type.

Passing to the symptoms of such cases, there are perhaps no conditions in which careful case-taking is of greater importance. The indirect evidence and the physical signs may even then in some cases leave a large margin of doubt. Here bacteriology comes in; lumbar puncture offers a comparatively recent means of clearing up some difficult cases.

In particular cases meningeal symptoms may develop at the beginning of, in the course of, or towards the end of an acute attack of fever. Early meningeal symptoms are especially common in the infective diseases of children. Risien Russell mentions "hydrocephaloid" as a non-meningeal condition, affecting marasmic children, which is likely to be diagnosed as a true meningitis.

It is hardly in keeping with this general survey to go minutely into all these different forms of meningeal affections. It will be sufficient to mention some of the chief conditions.

(1) Points weighing as a whole in favour of cerebro-spinal fever are very marked spinal extension, Kernig's sign, and the epidemic prevalence of the disease. De

Costa refers to the common statement that leucocytosis is a reliable differentiating point from tubercular meningitis as a "myth".

Careful, and if necessary repeated bacteriological examinations by means of lumbar puncture for the diplococcus intra-cellularis has a high value. Considerable importance attaches to a purpuric rash, although it is often absent. Such a rash may, of course, be present in other cases of meningitis.

(2) A diagnosis of tubercular meningitis will be supported if some other tubercular focus as of glands, bones, or lungs can be traced. The ophthalmoscope may reveal tubercles in the choroid. The tubercle bacillus may be found in the lumbar fluid, although in most instances with difficulty. In any case the presence of many lymphocytes in the fluid supports the diagnosis of the tubercular form. If the lumbar fluid points to meningitis but does not show bacteria in films stained with methylene blue, this is regarded as weighing in favour of the tuberculous form. The caution necessary in putting value on leucocytosis as a sign has been already mentioned.

(3) Meningitis caused by pyogenic organisms usually shows a more rapid development than the tuberculous form. It is likely to run a more rapid course. In many cases there will be evidence of an earlier septic focus. The fluid from lumbar puncture may reveal pyococci. Speaking of the apparently toxic form of meningitis, the bacteriological diagnosis of typhoid fever as such may be positive or negative and clear up this point. The same may be said

of influenza.

Typhus fever may sometimes give rise to doubt, but its rarity now gives it a minor place in this connection.

In other cases of apparent meningitis, lumbar puncture will help to do away with the suspicion that it is present.

GROUP 5. The Group in which diagnosis lies between small-pox in one of its various stages on the one hand, and one, or more than one, disease on the other.

Of the difficulties that arise in the diagnosis of infectious diseases by far the most harassing is that in which small-pox in one of its stages is suspected. The importance of this question is constantly shown by the publication of cases in which a practitioner is charged with incompetence or carelessness. The very feeling of responsibility which attaches to diagnosis in a doubtful case of small-pox leads to hesitation and delay where decisive action is called for. The responsibility lies in the fact that on the one side the diagnosis of small-pox may seriously affect the position of the patient or business of the bread-winner, while on the other hand the disease can only be isolated properly when a decided diagnosis is made so that the case goes to hospital. These considerations well justify a detailed review of the diagnosis of small-pox in its every stage.

(A) In the Prodromal stage of small-pox there are no symptoms proper to the disease. If cases are isolated in this stage it will be merely as contacts.

(B) In the Initial stage of small-pox it need hardly be said - indeed, throughout the whole disease the circumstantial evidence, including the prevalence of the disease, actual contact and the history as to vaccination or a previous attack is of enormous importance.

The chief characteristics of the initial stage of small-pox are the suddenness of the onset and the severity of the symptoms, but, very rarely, this stage is quite mild. The most distinctive symptoms are the severe back-ache and quick rise of temperature to a high point. Severe back-ache close upon a febrile attack should raise a suspicion of small-pox in the mind of the diagnostician among the possible diseases. If there is circumstantial evidence in addition, the case should be for the time isolated at home and every member of the household re-vaccinated, including the patient. Influenza stands first amongst the diseases which may be confused with small-pox at this stage, as is borne out by the following case. Nurse M., who had been recently vaccinated and had satisfactory scars, during the last epidemic in London developed febrile symptoms a few days after starting work at Dagenham Hospital. She had severe throbbing headache. She vomited slightly and complained of acute back-ache. The last symptom was so marked that in spite of recent vaccination the case seemed to be one of commencing small-pox. The attack ran the usual short course of typical influenza and the after-condition of the patient plainly showed that this was the nature of the case.

Usually in small-pox the face is flushed and there is often a rather violent action of the heart. Other symptoms, however, may suggest the gastro-intestinal or even the pneumonic type of influenza. As regards the last, small-pox patients sometimes complain in the first stage of an unpleasant sense of suffocation. Goodall and Washbourne mention lumbago, but during the last epidemic in London there was no single case rejected at Dagenham hospital with this condition.

Various other infective diseases which have regularly or at times a sudden onset may suggest small-pox when that disease is prevalent, and in such cases it is better that a practitioner should not mention his suspicion unless it is very strong, but merely advise the temporary isolation of the case as a general principle.

(c) There is one Phase of the Initial Stage, viz. that in which prodromal rashes appear, which raises questions of differential diagnosis between small-pox and various other eruptive diseases which are accompanied by erythema. The prodromal rashes of small-pox are most often first seen some time in the second twenty four hours after onset. The chief one is more or less like scarlet fever in type and has not rarely led to the sending of cases of small-pox to a fever hospital, as the following history illustrates: - J.M., aet . 32, a labourer, was diagnosed at the out-door department of a general hospital as suffering from Scarlet fever. There was a history of rash, dull headache, back-ache and vomiting. The attack was said to be on the second day. As the diagnosis

had been made by a medical man known to the Officer on duty at Plaistow Hospital and the latter was greatly pressed at the moment, he allowed the case to go to the ward minus the usual preliminary examination. A little later on going to see the patient he found him with a rather pale brick-red rash well marked on the abdomen and limbs. It was finely mottled rather than punctate. The tongue told against scarlet fever. There was no circumoral pallor. The forehead showed several pinkish glazed spots which were shotty to the fingers. The patient had not been vaccinated since childhood. The case was at once removed to Dagenham Hospital where the small-pox rash developed in the usual manner.

In one or two instances, scarlet fever occurring in a house where there has been small-pox, has been the cause of a patient being sent to a small-pox hospital. This is unjustifiable since such a diagnosis can never be certain.

Very severe back-ache in an adult, however, with initial symptoms more or less atypical so far as scarlet fever is concerned, should, however, raise strong suspicions of small-pox.

In the small-pox erythema of this form the abdomen is especially affected and punctation on the chest is rarely very definite. The edges of the tongue which are usually bright red quite early in scarlet fever are not specially so in small-pox. Sore throat, however, is quite common in the latter disease.

The prodromal rash of small-pox is occasionally rather like that of measles, ~~but~~ but the longer the prodromal period

which is usual in the latter, the absence of the catarrhal symptoms which specially mark it, and the common history of a past attack of measles are alone, with the absence of Koplik's spots, all valuable points.

The third prodromal rash to be mentioned is of great value in recognising small-pox. After a little experience indeed it is practically diagnostic if typical, this is the so-called triangular rash, the base of the triangle is across the abdomen about its middle, while the apex is towards the pubes, there being also some spots on the thighs. The rash is comprised of minute haemorrhagic spots, usually in two tints, some being very dark.

(D) It is next necessary to deal with an Aberrant Form of small-pox - the Haemorrhagic Form Proper.

The greatest difficulty is experienced in some cases in distinguishing this type from the haemorrhagic forms of other infectious diseases. Thus a child was admitted during the last epidemic in London to Dagenham Hospital, in whose case it was never decided whether the patient had haemorrhagic small-pox or haemorrhagic measles.

Severe vomiting and intense pain in the back point specially to small-pox.

Very often the haemorrhages are preceded by an erythematous eruption. Besides bleeding under the skin and from the mucous surfaces, the conjunctivae are often affected and its bluish purple tint is then a very striking feature. Commonly the patient's mental condition is almost quite normal, and it may be difficult to realise that he will be dead in a few days.

(E) The eruptive stage proper of small-pox in its modified forms, a host of diseases having pustular, papular and vesicular spots as a feature may be suggested. There are varioliform syphilitic rashes in which the resemblance may be very striking, although of course the clinical histories differ. Other diseases may be mentioned such as herpes, impetigo, acne, and lichen.

I have known cases of iodide rash, oyster poisoning, and pemphigus to be sent into hospital as small-pox.

There remains for discussion a most important point in the diagnosis of small-pox - viz., its differentiation from chicken-pox and vice versa. The distinction is not only between typical small pox and typical chicken pox. The fact that in typical chicken-pox the same area of the skin shows spots in every stage of development is in itself sufficient to differentiate typical cases. Unfortunately both diseases, and because of vaccination especially small pox, are subject to aberrance. The fact of recent vaccination is an important point against small-pox.

Taking the diseases in their successive stages, the onset of chicken pox is relatively very mild and the definite prodromal rashes as those of small pox are very rare in it. The papules are relatively superficial and become vesicular within a few hours, if at all.

The vesicles, besides being relatively superficial, are delicate, dome-shaped, and often oval. More papules come out among the vesicles in chicken-pox, and thus all stages of the rash are seen in the same area. The vesicles

reach their height at second day at latest, then shrivel or burst. Only here and there does one become pustular.

The rapid development of the spots is, after their further appearance in crops on the same areas, the most valuable distinguishable point from small-pox.

Lastly, the rash as a whole is usually best developed and fullest in the trunk, whereas in small-pox the parts most severely affected are the face and the extremities.

Many cases could be quoted in which confusion arose during the last epidemic in London between small-pox and chicken-pox, but two only need be given illustrating the mistaking of each disease for the other.

Case 1. A girl, A.G., aet. 7 years, who had been vaccinated in infancy and had three large well-marked scars, was admitted to Dagenham Hospital as suffering from small-pox. The rash was sparse, but at least as abundant on the face as on the body. The spots were at the time of admission vesicular and most of them had rather a papular base. There was a history of indefinite illness for one day before the rash appeared. The vesicles were rather thin walled, not umbilicated and one or two on the body distinctly oval. A few additional spots came out after admission on the trunk and one of them did not go on to vesiculation. After a consultation with the Medical Superintendent the case was discharged as chicken pox much earlier than would have been permissible if the case had been small pox.

It was subsequently stated at a meeting of the Sanitary Committee of the District from which it came that

this action was unjustifiable as the case was undoubtedly small-pox. However, the opinion of chicken-pox was borne out from the fact that no other cases of small-pox arose from it.

Case II. The Medical Superintendent of Plaistow Hospital was asked to see, in consultation, a case of a woman living in a crowded street, who had up to that time been supposed to be suffering from chicken-pox. She was 22 years of age and had not been vaccinated since childhood. but had good scars. She had a fairly abundant but not quite discrete rash on the face, and a good many pocks on body and limbs. The rash was in the vesicular stage, but ill developed. The vesicles were rather thin-walled and superficial. A history was given of mild prodromal disturbance lasting two days, with moderate back ache but no vomiting. There was nothing in the appearance of the rash to suggest it had come out in crops. There was chicken pox in the same street and no small-pox in the immediate neighbourhood, nor any history of contact with a small-pox case. The medical practitioner in attendance stated that previously the rash had been far more typical of chicken pox. The rate of development, however, was in keeping with that of small-pox, and the case was removed as being of that disease.

The woman had been visited by many of her neighbours, the result being that in the course of time about a score of small pox patients were removed from the same street.