A Clinical Lecture

ON

SOME POINTS IN THE DIFFERENTIAL DIAGNOSIS OF SCARLET FEVER, GERMAN MEASLES, AND MEASLES.

Delivered at the Hospital for Sick Children, Great Ormond Street.

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A DEMONSTRATION on the subject of infectious diseases is by no means easy to undertake in a children's hospital. It is not possible to show you examples of them brought here for the purpose, and it is at best a very difficult problem, and one in no way suited to dogmatic assertion. This lecture must for these reasons lack definition, and, further, it makes no pretensions to throw new light upon the diseases with which it deals. On the other hand, it is very necessary to be continually refreshing our memories of even the common ailments, and the infectious diseases are not so often undertaken by the general physician as are some of the other ailments of childhood.

The group that I have chosen comprises scarlet fever; rubella, or German measles; and measles. It is the diagnosis of these diseases with which I shall be principally occupied, although, without hesitation, I shall touch upon some other points which will help to keep in prominence the practical importance of our subject. Indeed, the Easter term at the innumerable schools perennially reminds us of their importance.

These are diseases which force us from that great refuge of the doctor—a maze of words—and pin us down to an opinion, as a butterfly is impaled upon a piece of cork.

A mistake, nevertheless, in either direction may be a cause of considerable damage to the patients, the institutions, and ourselves, and yet it is difficult to keep a clear head. Personal reputation and outside pressure from parents or authorities are, we know well enough, real difficulties which are not emphasized in the textbooks. It is, in fact far more pleasant to allow someone else to put the name on the label, than to put it on oneself.

We all see clearly enough why the subject is so difficult. It is chiefly because we are ignorant of the actual causes of these infectious fevers, and so we are driven back upon clinical symptoms, and upon standard types which are based upon a study of these symptoms. Unfortunately for us, like castles built upon the sand, these standard types are liable to be swept away by some wave of epidemic unusual either in its severity or nature, and then with the loss of our standard type we get into difficulties.

Let us, for example, take scarlet fever. From 1799 to 1822 Bretonneau, a teacher of the illustrious Trousseau, had never met with a single fatal case of the disease, and, naturally enough, he taught that it was not a serious malady. In 1824, two years later, he looked upon it as a rival of typhus or cholera. What a change in a standard this must have meant!

Now in England to-day how does the matter stand? In every direction we hear that scarlet fever has altered its type, and is now almost a trivial ailment. Thirty years ago, however, the story was a different one.

Although the causation of these diseases is so obscure, it is a subject which has been steadily looked at in recent years. All honour to those who have struggled with a subject so difficult. It appears to me that in any such research one point must be kept well in mind, and that is the contagiousness of these diseases. Personally, I should not be content until, in addition to producing the cardinal lesions, I was also able to produce an epidemic in the susceptible animals—one which had spread from an inoculated animal.

Doubtless you are aware of the particular researches upon the etiology of scarlet fever, and of the investigations both in this country and on the Continent upon a diplo-streptococcus, which has been repeatedly isolated from the throat and elsewhere in this disease.

Among the investigators of this micro-organism Class, of Chicago, stated in the *Lancet* on September 29th, 1900, that he had produced by this micrococcus a condition resembling scarlet fever in white pigs. These animals within twenty-four hours became ill, a red eruption appeared upon the third day,

and desquamation after two or three weeks. He also remarked that both he and another investigator, Jaques, had observed cases arise in these pigs by contagion. Such a remarkable phenomenon as this I should have liked to have seen described in more detail. It deserves most accurate record, for the contagious nature of these diseases is a very puzzling and remarkable fact.

My reason for thus turning aside to speak of the etiology is to impress the importance of the recognition of the fact that we are so much in the dark on this question. With this gloom there comes necessarily great uncertainty as to the limitation of the diseases. What are we to take as evidence, sure and acceptable, of scarlet fever, measles, or rubella? We have no sure test. Accordingly we find ourselves in this state of mind: Sometimes we are convinced they are specific diseases, at other times we think there may be all sorts of scarlet fever, and that it is only a name for a particular phase of many diseases, in which phase they are, among other things, highly infectious.

We have these thoughts when we see mysterious and sporadic cases; or when in an outbreak of influenza we note the frequent appearance of a scarlatiniform eruption with desquamation; or when in a surgical ward mysterious rashes, at first unlike scarlet fever in distribution, become later indistinguishable from it; or lastly, when we find rubella drifting into a scarlatiniform type. We cannot help noting also, with interest, that the curious antitoxin rashes which follow the injections for diphtheria are scarlatiniform, especially when they come early, and morbilliform when they appear later. Yet on the other hand, when we see a large and characteristic outbreak of any of these three diseases we feel convinced that they must each be specific.

THE VARIABILITY OF SCARLET FEVER.

All writers upon scarlet fever have directed attention to the great variability of its epidemics. Whenever we approach the problem of diagnosis we ought to remember this: that unusual and mysterious cases of scarlet fever are no new discovery; they have not originated, for example, since this recent wave of influenza. Trousseau, in fact, makes a very clear allusion to it in his lectures.

As a result of experience in all such diseases as these we recognize three types: the classical one—that is the most usual, the most easily diagnosed, and most accurately described form of the disease—the malignant type, and the mild type. In scarlet fever the malignancy may be terrible. Thus, for example, Dr. Hilton Fagge, in 1883, described the case of a boy who was taken ill in the morning with headache, vomiting, and prostration, who was comatose in the afternoon and dead in the evening. There was no exanthem, but his nurse sickened with scarlet fever. It will be clear to you that the diagnosis of some of the most malignant cases can only be a rational surmise from the knowledge of a prevailing epidemic.

At the present time, however, our great difficulty lies with the mild type of scarlet fever. Yet, in order to prevent confusion, it will be, perhaps, best to give first some of the cardinal features of the classical case of scarlet fever.

The incubation is short—usually less than seven days, often only two or three. The onset is abrupt, with vomiting, headache, and sore throat, and not infrequently delirium. The temperature runs up quickly to 103° to 105°. The pulse is strangely rapid and excited, the skin curiously burning. The rash appears on the second day, starting on the front of the neck and chest, and spreading in the next two or three days downward over the trunk and extremities, upward to the face, where it gives that bright colour to the cheek which is sometimes called the stage blush, but leaves a pale circle around the mouth. There are two elements in the rash—a vivid blush and punctiform macules. The tongue is at first coated with a creamy fur, and then it begins to peel. When the red-topped papillae emerge from the white surface the appearance is that of an unripe strawberry. Later, when the tongue becomes red and succulent, it resembles, we are told, a ripe strawberry. Much importance is attached by some to this peculiar tongue, for you may see in scarlet fever a rare combination—a clean, desquamated tongue and a very unhealthy throat. The early sore throat is really very characteristic in its vivid redness.

Lastly, the desquamation, which will probably begin about a week after the first appearance of the rash, is not proportionate to the severity of the rash. It is a lamellar desquamation, and often gives a worm-eaten appearance to the skin as the process begins to make headway. The duration of

desquamation is variable, but not infrequently it lasts six weeks, and sometimes on the hands and feet much longer than this. The sequelae and complications are of first importance. I emphasize here nasal and aural discharges, for they have attracted much attention by reason of the numerous and important statements recently made upon "return cases" of scarlet fever. You need hardly be reminded of nephritis, albuminuria, and rheumatism.

These are the chief features of classical scarlet fever. The malignant cases, even if they are difficult of diagnosis, are so serious that there is no danger of underrating them. When, however, we come to the mild cases, there are great difficulties. It can never be forgotten that among a series of cases, the majority of which are mild, some may be exceedingly severe, and yet, as I have already pointed out, there is much to make one strive to minimize the importance of the disease.

I can give no better illustration of the mild nature of the recent epidemics of scarlet fever than that given by Dr. Bertram Thornton in the *BRITISH MEDICAL JOURNAL* for June 18th 1904: In a school of 300 boarders 96 children were attacked, but only 31 showed a rash. The first case was discovered, as is not uncommon, by the detection of desquamation in an apparently healthy child. Dr. Thornton divided these 96 cases into three classes:

Class No. 1 (31 cases) showed a rash, a sore throat, and pyrexia usually to the extent of 1° or 2° , and desquamation.

Class No. 2 (19 cases) showed no rash, but a slight sore throat, fever, and desquamation.

Class No. 3 (46 cases) showed desquamation only.

In Class 1, the most typical class, few of the children were really ill. This point is noteworthy. Nearly all Class 1 and many of Classes 2 and 3 were sent to the local fever hospital, and only one boy developed scarlet fever. He clearly had a relapse, as you would see on reference to the original paper. There can be no reasonable doubt, I imagine, then, that this was scarlet fever, unless we suppose that the fever hospital had only within its walls cases of a similar nature. An objector might possibly suggest, then, that none of these cases were scarlet fever, but were something else. You see from this account how mild the disease may be, and Dr. Thornton brings out very clearly the grave expense and inconvenience caused by it.

It is in considering this side of the question that the old difficulty crops up, as to how long the patient is infectious and as to what is the danger of the desquamation. If the following be authentic, desquamation may be very dangerous:

In the spring of 1900 a family in Texas suffered from severe scarlet fever, and during desquamation whole casts of fingers and toes came away. The mother collected these and put them in a cardboard box. The family then moved from the neighbourhood, and in February, 1901, was visited by another family, consisting of father, mother, and a little boy of 3. The mothers fell a-talking, and the hostess produced the box of scales as a trophy. Four days after this the little boy sickened with scarlet fever and died. His aunt and her three children came to see him when he was ill, and also an uncle with his little boy. All these children died from scarlet fever. There was no other case of scarlet fever and none in the neighbourhood. I cannot vouch for this, but it was reported by Dr. Fowler, of Pottsville, Texas, and attention drawn to it by Dr. Gresham, in the *Lancet*, June 11th, 1904. Its importance is clear, for whenever nowadays an attempt is made to show that peeling in the late stages is a source of danger, it must be shown also that there are no nasal or aural discharges. The cardboard box had neither nose nor ears.

Again, Dr. Rotch, in the last edition of his treatise on children, gives the following case:

A boy of 6 and a girl of 4 slept with their beds touching. On May 1st the boy was taken ill, but remained in the same room with his sister during the next twenty-four hours. The girl—as the boy was found to have scarlet fever—was then sent away into the country, and all lines of communication were cut. Until June 1st all went well, and at that time the boy was desquamating freely. On June 1st the little girl sickened with scarlet fever, and Dr. Rotch found that the little boy had written to her, and that she had put his letter under her pillow. Dr. Rotch adds: "A careful study of this case led to but one conclusion—that the boy during the period of his desquamation had infected his sister at a distance of twenty miles by enclosing the contagion of scarlet fever in an envelope." An unromantic comment upon such a touching tale.

These are two interesting cases, for it is a most difficult matter to get any evidence for or against the danger of the desquamation in scarlet fever.

Dr. Millard, who is not a believer in the danger of the condition—at least, in its later stages—has made a determined attempt to obtain reliable evidence to support him. His important paper is published in the *Transactions of the Epidemiological Society for 1902*. Yet I do not feel myself quite convinced. I admit that in his paper—which is a most valuable contribution to our knowledge—some well-known

authorities answered certain of his questions and supported his attitude, but the majority gave general answers and general expressions of opinion. Now that this subject of desquamation has been raised, I should prefer to wait some years for particular instances which exemplify the danger or innocuousness of the peeling of scarlet fever, and such instances are most likely to be supplied by those in charge of large schools or in general practice.

In settling this question we must beware of our reasoning and keep it logical. Thus, for example, there are cases on record in which the presence of a child desquamating from scarlet fever has given to other children the disease; and again, there are other cases when a child who has had scarlet fever and is not desquamating has given scarlet fever to others. We must not conclude from those two facts that desquamation is not a source of danger. We can only say that a child need not of necessity be desquamating to be a source of danger.

Many cases in which desquamation was thought to be the danger have now been clearly shown to be cases with aural and nasal discharges, and these discharges are allowed to be infectious. Yet we cannot deny that in any particular case the desquamation also may have been a source of danger. If scarlet fever is the result of an infection with a micro-organism, until we are quite certain as to the nature of the microbe, it is as possible to believe it might be present in the scales of the peeling skin as in a nasal discharge.

Nor does it seem to me that, until either the cause of scarlet fever is known or chance cases have proved the harmlessness of desquamation, we are justified in experimenting upon this point. Suppose, however confident we may feel to the contrary, desquamation does prove to be real danger even late in the illness, and we infect other children by our over-confidence, we cannot be sure that some of these infected children will not get nephritis, a grievous thing at any age—in a child most lamentable.

I have digressed for a while on to the subject of desquamation, and I did so purposely, for desquamation is an occurrence which always comes to the front whenever there are mild or doubtful cases of scarlet fever abroad. Moreover, I speak about its significance with great caution, although I am aware that some of our leading authorities believe us to be at present over-cautious in dealing with it. Yet one feels that as we do not know the real cause of scarlet fever, we must abandon this landmark very, very slowly and reluctantly, and let us in any case be guided by sure evidence rather than any general expression of a conviction upon the subject.

To return now to these mild cases described by Dr. Thornton. You will remember how exceedingly difficult the diagnosis must have been in some of these cases had there not been an epidemic to guide him. That is the point I want to make. Mild scarlet fever is most difficult of diagnosis, and in some cases it resolves itself into a matter of opinion. These cases make a good introduction to the further difficulties into which I shall now proceed to plunge.

Let me next quote you verbatim from a memorandum in the *BRITISH MEDICAL JOURNAL*, March 12, 1904, p. 603, by Dr. James Hamilton upon another type of epidemic. The heading of the memorandum is "Erythema Scarlatiniforme (Influenzal)."

I have recently had a number of cases characterized by slight fever, sore throat, and painful glands in neck, and accompanied by a scarlatiniform rash, both in children and adults, during the influenza epidemic which has lately visited this district. Some of these cases caused me much anxiety as to whether I should notify them as scarlet fever or not, and I can conceive that a young practitioner might have had his future career very much damaged by forthwith notifying such cases as scarlet fever, etc.

He proceeds to give a very interesting example in a child (who had suffered from scarlet fever seven months before) of such a rash followed by a branny desquamation; the mother developed influenza without any rash. Dr. Hamilton expressed himself very definitely upon this outbreak as influenzal. In various books also there are passing allusions to a scarlatiniform eruption with influenza, although this allusion is often exceedingly vague.

In 1901 I saw at a large school some very mysterious rashes which had appeared independently of one another. They appeared, that is to say, among boys who had not been in contact with one another. Six of these boys came to my notice. The symptoms were remarkably slight. A little sore throat, a coated tongue, such as one meets with in influenza, and a temperature rising to about 101.5° . Their pulses were not excited, and they none of them really seemed to be ill. In spite of this a most profuse scarlatiniform rash appeared on the first or second day, followed by a rapid and profuse

desquamation. The outlines of these rashes were more clearly defined than is usual in scarlet fever, and the rash in some ways reminded me of an antitoxin rash. The posterior cervical glands were not enlarged. These rashes were breaking out not only in the school among the boys but among adults, including sober matrons who should have risen far superior to scarlet fever.

Now for the point of this. Influenza was raging in school and town, and the question that arose was whether influenza was responsible for the condition or whether it was in reality scarlet fever. At that time, too, German measles was very prevalent in London, but this school was many miles away from this city.

I have also heard that elsewhere the same difficulty arose over the occurrence of scarlatiniform rashes at a time when a town was under the scourge of influenza.

To Dr. J. B. Maurice, of Marlborough, I am indebted for a very interesting note. One of his patients who developed influenza remarked that it reminded him exactly of the dengue fever. I have never seen dengue fever, but we know that it is a disease which resembles influenza in the intensity of the pains in the limbs and eyes. In this disease there may be an eruption in appearance something between scarlet fever and measles, which is followed by a branny and sometimes profuse desquamation.

The second point, then, upon which I want to lay stress is this: That there is an opinion among some physicians that an outbreak of influenza may be associated with rashes resembling closely those of scarlet fever, and it may possibly be comparable to the rash of dengue fever. The question is an important one in practical medicine, for the old difficulty at once arises as to how long the desquamation in such cases as these should be regarded as a danger. Six weeks is a long time to give as an average, if one is not dealing with scarlet fever at all, but with influenza.

RUBELLA.

Let me introduce my next point with a few words upon rubella, or German measles. Unless one happens to meet with rubella or German measles in an epidemic, it is not easy to recognize it; in epidemics, however, it becomes very characteristic. The incubation period is longer than that of scarlet fever (two to three weeks). As a rule the stage of invasion is mild, although it was apparently severe in the earlier days of its history. The early symptoms are slight fever, catarrh, and sore throat. The eruption is frequently the first warning. It is a disease which is highly infectious, especially about the age of puberty. The lymphatic glands in the posterior triangles and over the mastoid are often enlarged, and when there is an epidemic in a school it frequently happens that for a day or two before there is any exanthem, boys may be walking about with these enlarged glands. Another symptom is suffusion of the eyes.

There are two types of exanthem: the morbilliform, which appears to me the more common and characteristic, and the scarlatiniform.

The morbilliform rash when fully developed is seldom so discrete and raised as that of measles, and some of the areas may resemble an artificial eruption; in the early stage, however, the papules are more discrete than in measles. It frequently itches. The distribution naturally differs in detail in different outbreaks, but spreading from above down, is generally very distinct on the neck, and under the chin, less so on the forehead, more again on the cheeks. Favourite spots for a profuse eruption are the external aspects of the thighs and the buttocks. The colour is a rose pink, and this colour is also noticeable in the scarlatiniform type of eruption.

The scarlatiniform eruption may be very extensive, but just as the morbilliform, if not as frequently, has areas which resemble an urticarial eruption. It, too, may itch.

These eruptions last two or three days, and in some cases are followed by a fine desquamation. The desquamation is, as a rule, slight and mealy, and often only the face shows some slight powdery desquamation.

The most constant sequelae—and they are very few—is the occurrence of a secondary sore throat which appears about the fifth day. This was first emphasized by Dr. Eustace Smith.

The puzzling feature about rubella is the occurrence of the two forms of eruption. They may both occur in the same patient:

In 1891, for example, at one of the large public schools 91 cases of rubella occurred in the spring term, and in 8 of these cases a morbilliform rash was followed in one to three days by a scarlatiniform one. In five others there was no previous morbilliform eruption, and all these 13 boys desquamated.

Dr. Fyffe recorded these in the *Bristol Medico-Chirurgical Transactions*, January, 1892, and at the same time alluded to another outbreak in a public school in 1884 in which the same events occurred. In this case five of the boys who suffered from the scarlatiniform rash had previously passed through an attack of scarlet fever, and two years later another outbreak of rubella occurred in the same school, and none of the boys who had suffered from the two rashes in 1884 were infected in 1886.

This evidence of protection from rubella has clearly very close bearing on the reality of the two types of eruption in rubella.

More recently still, in the *BRITISH MEDICAL JOURNAL* for December, 1901, there is a valuable paper by Dr. Watson Williams on rubella, scarlatina and fourth disease. In this he mentions an outbreak at a public school in which both eruptions occurred. Thirty-two boys were attacked, and in some instances the diagnosis between rubella and mild scarlatina was all but impossible. In these cases there was a mealy desquamation.

In the spring of 1904 I had an opportunity of testing these observations. There was a considerable outbreak of rubella in a large school, but no scarlet fever either there or in the neighbourhood. The great majority of the boys who were attacked showed the more usual morbilliform eruption, but some of them three days after the first attack developed fresh headache and sore throat, and then a profuse scarlatiniform rash. The eruption appeared in large rosy patches, the tongue coated but did not peel; the cervical glands were enlarged, and the throats were red and sticky. As a rule the temperature was only slightly raised, though on some occasions 103° was noted. The pulse was not excited but feeble and rapid. In one case there was vomiting at the outset, and in one a trace of albumen in the urine. The number of cases slightly increased but never reached a large number. Several of them desquamated, the desquamations being furfuraceous; the skin was irritable.

To the Medical Officer of Marlborough College, Dr. Penny, a most acute observer, I am indebted for this brief account of a case in which the interval between the two rashes was a longer one. I will quote sufficient to show you how such cases are suddenly thrust upon you.

"A convalescent from German measles—by this Dr. Penny meant the ordinary morbilliform type running through the school—had been out for a walk in the afternoon. In answer to a leading question from me he said his throat was sore. I lifted his shirt and found his body covered with a red punctiform rash, rather coarse, inclining to leave white patches of skin here and there, and evidently irritable, for he had scratched himself where the rash seemed coarsest. His temperature was normal." His temperature, I may add, remained normal during the three days the rash remained out.

This is an excellent illustration of the difficult nature of these cases. Let me add that the converse may also occur and the morbilliform rash follow the scarlatiniform, as happened in two of Dr. Penny's cases.

Lastly, the abortive rashes in rubella are worth a passing mention. A boy comes to you in a scare because he has rubella and a faint tinge of red; a budding eruption is detected, the boy is isolated, and in a few hours this rash has entirely disappeared, and he is apparently quite well. A few days later the true eruption of German measles comes out. It naturally occurs to one to compare the rash to the prodromal rashes of other infections.

A very natural question when dealing with these mysterious infections is the nature of the sequelae. The sequelae of scarlet fever I have touched upon; but we must not lose sight of the fact that pains in joints have been recorded after German measles. Dr. Douglas, in 1883, noted two cases of arthritis, and Sir Thomas Barlow and Dr. Penny have also met with pains in the joints. As to albuminuria, it must be recognized that in schoolboys who are not suffering from an infectious illness some albuminuria, presumably orthostatic, is very frequent.

There is on the whole a general agreement that two types of exanthem in German measles should be recognized; yet I hardly think it is sufficiently insisted upon in teaching the student. Certainly this fact makes German measles a very perplexing disease, and no better illustration of that can be given than the example furnished by Dr. Watson Williams in the paper to which I have already alluded. Among a number of boys there broke out a contagious disease, characterized by the presence of a scarlatiniform rash and enlarged posterior cervical glands and the absence of constitutional disturbance. It was without high fever and the pulse-rate was low.

This clearly resembled the scarlatiniform type of German measles. Dr. Williams, however, expressly stated that the desquamation resembled that of scarlet fever, as being lamellar and not mealy, and scarlet fever they proved to be, the infection being traced to an infected milk supply.

It is conflicting evidences such as these which have led some careful physicians to hold that German measles is a hybrid disease between measles and scarlet fever, and it does no harm if, without accepting this, we recognize how difficult the distinction may be. This is, at any rate, certain: no medical man lightly makes mistakes over the disease I am dealing with, and the opinions and evidence put forward on every side of the subject are always interesting.

SECOND ATTACKS OF SCARLET FEVER.

Recent literature has also produced numerous instances to prove that one attack of scarlet fever does not necessarily protect the patient from another. Several attacks, indeed, have been recorded as occurring in one individual—attacks which must be sharply distinguished from relapses which occur before desquamation from the first illness is finished.

These occurrences are so important because they weaken one of our strongest fortresses, which protects us by the assertion that one attack of these infectious diseases protects against another. All experienced doctors, however, know how measles fails to obey this rule.

THE FOURTH DISEASE.

It is difficult enough to distinguish sometimes between rubella and scarlet fever, and yet there is a belief among some physicians that there is even another infectious disease to be reckoned with in addition to scarlet fever, rubella, and measles. We have, that is to say, somehow or other to fit in among them another special infectious disease—an epidemic roseola which breeds true.

This belief was crystallized by Dr. Clement Dukes in a paper published in the *Lancet*, July, 1900, under the title "On the confusion of two different diseases under the name of rubella." His experience had led him to suspect its existence for some years, but an outbreak of an epidemic in a public school in April, 1900, finally convinced him of the existence of this disease, which he has termed provisionally the fourth disease. The disease as outlined by Dr. Dukes has these characters:

It is infectious. The first symptom may be the rash, though in some cases there is decided malaise. It occurs most frequently in the spring and autumn. The probable incubation period is 9 to 21 days (note this in comparing it to scarlet fever).

The eruption is scarlatiniform in type. It is, however, rather more raised from the surface than is the rash in genuine scarlet fever; it may cover the entire body in a few hours. The fauces are red and swollen, the conjunctivae pink and suffused.

The lymphatic glands are universally enlarged, more especially the posterior cervical, axillary, and inguinal. There is usually desquamation, which does not bear any relation to the intensity of infection. This desquamation may be as profuse and prolonged as in scarlet fever. The kidneys are rarely affected, and it is remarkable how often it occurs that the patient does not feel really ill. The tongue is clean or furred, but does not peel as in scarlet fever. The pulse is not greatly quickened. The temperature ranges from 98° to 104°.

The course of the illness is run in a few days, and it is not very infectious, nor is it very probable that the infection lasts beyond two or three weeks after proper disinfection. An attack does not protect against scarlet fever or rubella. Save for some enlargement of the submaxillary glands there are no sequelae and recovery is complete in a fortnight. If we accept this entity, many of the curious cases to which I have already alluded should find their explanation as examples of the disease.

I am not going to discuss the validity of the position of the fourth disease, but bring it to your notice in the same spirit in which it was originally brought to the notice of the profession. We cannot disguise the fact that, as a profession, we have been greatly puzzled by recent scarlatiniform epidemics, and this paper of Dr. Dukes brought the problem before our notice very clearly and very decidedly. Moreover, he has on his side distinguished clinical observers.

The keenest criticism of his paper was that which was made by Dr. Millard in the *Lancet* in December, 1901, in which he distrusts the foundations upon which Dr. Dukes rests his

belief. You will find, on reference to the original paper by Dr. Dukes, that it is based upon three different epidemics: one that he believed on retrospection to be the fourth disease only, another that he believed to be scarlet fever and the fourth disease, and the third which he believed to have been the fourth disease only.

It is not difficult to summarize the views of the opponents to Dr. Dukes. They maintain that some of his cases may have been rubella, and some may have been a mild form of scarlet fever, and, though not prepared to deny the possibility of a fourth disease, they hold that its existence has not yet been proved. I am of that opinion myself.

There is, however, this great and real lesson to be learnt from this problem. We cannot content ourselves with dismissing all cases of desquamation after a scarlatiniform rash as scarlet fever, without a careful consideration of them. However careful we must be in practical life, there is nothing to be lost by a judicial study of all such cases. Then, again, if we decide that an outbreak is not scarlet fever in spite of desquamation, this in no way saves us from the necessity of disinfecting such patients most carefully, not because of a half-expressed fear that we may be wrong in our diagnosis, but because whatever name we give it we are dealing with an infectious disease. However mild this disease may be, it may have, for all we know, the same possibilities of acquiring virulence as have the other infectious diseases.

THE PRODROMAL RASHES OF VARIOLA.

The prodromal rashes of variola are sometimes a cause of confusion, for they may be either scarlatiniform or morbilliform. Small-pox is now an exceptional occurrence, and the differential diagnosis is for this reason one we have rarely to make. These prodromal rashes, as they are termed, are very variable, but they can be divided roughly into the general and the partial rashes, both of which may be either scarlatiniform or morbilliform.

In making a differential diagnosis between small-pox and scarlet fever, much stress is laid upon the sore throat and "strawberry" tongue in scarlet fever, and the absence in that disease of the severe backache of variola. The general erythema of small-pox usually lacks the punctate character of the rash of scarlet fever. Maccombie states in Allbutt's *System of Medicine* that the initial scarlatiniform rashes do not occur in children under 10. The partial rashes are rarely seen on the upper part of the chest and neck in variola. This is the usual starting point of the rash in scarlet fever. Always remember the importance of the throat in the differential diagnosis between scarlet fever and variola.

In making a diagnosis between measles and variola importance is attached to the coryza of measles and to Koplik spots. The morbilliform eruption of variola, if it is general, has covered the body in the time that the true measles eruption takes to appear on the neck and face, and it leaves no stain.

The temperature rises as the eruption of true measles comes out. The temperature falls as the prodromal rash of variola disappears, and the true rash comes out. The papule of the true variola rash is shotty, of measles velvety.

Rötheln, in its absence of severe symptoms and presence of enlarged posterior cervical glands, is hardly to be confused with any form of variola.

MEASLES.

The time is too short to do more than mention measles. The classical case of measles is one of the best known of all diseases. I wish, however, to give you one example of a less common yet very important type of case. In 1895 a little boy, aged 6, came under my notice with dyspnoea and laryngeal stridor, and he had been apparently ailing for some days with headache, fever, and sore throat. The dyspnoea was urgent. I examined the throat and found no sign of membrane, only redness and catarrh of the fauces. We know from experience that such a condition of laryngeal stridor without a trace of diphtheritic membrane in the fauces may be diphtheritic and the membrane entirely confined to the larynx. If the child is urgently ill with such symptoms it is most tempting to send it to a diphtheria ward, where everything is at hand for dealing with laryngeal obstruction. Yet such a course would in this case have meant disaster, for it proved to be a manifestation of measles. There was, however, no trace of a rash until the sixth day, and then it was ill-developed and quickly faded. The child died of broncho pneumonia. These cases of measles, which commence with laryngitis, are highly dangerous. While on the subject of

measles, I cannot help pointing out to you how greatly the measles of the poor differs from the measles of the rich in its severity, and warning you also of the great danger of crowding cases of measles. If you are compelled to do so by circumstances, then pick out from among them the cases with bronchopneumonia, for, like the rot in an apple, this will spread from one to the other. Measles and influenza are an ugly combination, and if you are in charge of a school you will probably need all the accommodation you can possibly get for these cases, and bronchopneumonia is then much to be dreaded.

Finally let me refer you to a very interesting paper by Mr. Balme in the *Practitioner* for October, 1899, in which he gives a valuable contribution to the literature of Koplik spots. In an outbreak of 227 cases he found them present in 209 out of 214 cases in which they were looked for, that is, in 97.77 per cent. Spots were seen in 93 out of 95 patients who were seen before the rash had commenced.

In this country they have to use a colloquialism rather, "hung fire," and the careful observations of Mr. Balme will go far to convince us of their real utility. He reminds us they are very minute, and should be especially looked for upon the buccal mucous membrane opposite the last molar tooth. It is, I imagine, very possible that they are more frequent in some epidemics than in others.

The conclusions to be drawn from this lecture are few; but the most important is, I think, that these common infectious diseases require to be studied in an inquiring frame of mind. So well known, yet so little understood, they are of all diseases particularly likely to be treated with a rigidity of thought which is detrimental to all advance in our knowledge of their causation and to the discovery of the most successful and economical treatment.

THE PRODROMAL RASHES OF MEASLES.

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WHILE prodromal rashes in small-pox* have long been recognized, the existence of similar eruptions in measles is by no means so well known. Reference to them, indeed, is to be found only in isolated articles in literature, no account of them being met with in the ordinary textbooks of medicine. Their frequency and diagnostic value, however, entitle them to a wider recognition than they have at present received.

The specific measles eruption is so characteristic and so little subject to variation—in this respect so unlike scarlet fever—that it needs very little experience to recognize it when it is fully developed. On the other hand, few diseases are so deceitful as measles in its earliest stage. Though the existence of a non-catarrhal measles—rubeola sine catarrhe of Willan—is more than problematical, not a few cases of measles have a distinctly precatarrhal stage, in which pyrexia and Koplik's spots may or may not be present. This is the period of predilection for the appearance of the prodromal rashes.

Frequency.

So few authorities have dealt with the subject that large statistics are not available. Adkins records their occurrence in 25 out of 80 cases—a percentage of 31.25. Comby regards their occurrence as exceptional. My own figures are based on 70 cases of measles that were admitted to hospital suffering from the disease or who developed it subsequently. Prodromal rashes were met with among them in 30 cases—that is, 42.8 per cent. If 10 cases be subtracted, in which the specific eruption had already appeared when the case first came under observation, the percentage rises to 50.0.

Relation to Age.

The average age of 30 patients who showed a prodromal rash was 3.5 years, the youngest being 1 year and the oldest 8½ years. This is sufficient to prove that the eruption was not a mere roseola infantilis, such as is usually attributed to dentition or the presence of worms.

* Prodromal rashes in chicken-pox have also recently been described (v. Guinon, loc. cit.). Probably many cases said to be suffering from concurrent scarlet fever and variella are instances of this kind. Since 1900 an annual average of 16.25 cases of variella has been admitted to the Metropolitan Asylums Board hospitals, which had been certified to be suffering from scarlet fever, probably on account of the prodromal scarlatiniform rash.

Day of Disease of Appearance of Prodromal Rash.

In the great majority of my cases—namely, in 22 out of 30—the prodromal rash appeared on the first day of the disease. In 3 of these the specific eruption followed on the second day, in 4 on the third day, in 9 on the fourth, in 3 on the fifth, in 2 on the sixth, and in 1 it was delayed till the eighth day (Case IV). In 7 cases the prodromal rash appeared on the second day, among which 3 were followed by the specific eruption on the fourth day, 3 on the third, fifth, and sixth respectively, and in 1, which I regarded as a case of morbilli sine morbillis,* no specific eruption appeared. In the remaining cases the prodromal rash was first seen on admission to hospital on the fifth day, and was followed by the specific eruption on the sixth day.

Relation to Catarrhal Symptoms.

In 10 cases the prodromal eruption preceded the catarrhal symptoms by intervals ranging from one to six days. In 18 cases the two phenomena appeared on the same day, but in 11 instances the catarrhal symptoms, although present, were ill-developed for a period of one to three days after the first appearance of the prodromal rash. In only two cases did the prodromal rash appear subsequent to the catarrhal symptoms, in each case the interval being only one day.

Relation in Time of Appearance to Koplik's Spots.

In 12 out of 24 cases in which Koplik's spots were noted the prodromal rashes preceded the buccal enanthem by periods varying from half a day to five days. In the remaining 12 cases the two phenomena were first observed on the same day.

Varieties.

Table I shows the following varieties of prodromal rash met with. From a perusal of the Cases II, III, IV, IX it will be seen that several of these varieties may be found in a single patient.

TABLE I.

Isolated macules	...	...	14
Blotchy erythema	...	...	10
Isolated papules	...	...	9
Urticaria	...	...	9
Scarlatiniform rash	...	...	9
Circinate erythema	...	...	1

In point of time the macules and papules were the first to appear (see Cases II, III, V). Urticaria was the latest, being sometimes coexistent with the specific eruption (see Cases II, III, VII, IX). The isolated papules were frequently of the size and shape, and sometimes of the same distribution, as the rose spots of enteric fever. Sometimes they would suggest the eruption of röteln. Of the prodromal rashes the scarlatiniform are of the greatest interest and importance.

The mistaken diagnosis of scarlet fever results in a removal of a large number of cases of measles annually to a fever hospital, thereby entailing not only considerable discomfort on the household and subsequent discredit on the practitioner, but frequently throwing a considerable strain on the hospital accommodation.†

The frequent appearance of scarlatiniform rashes on the second day of the disease before the development of catarrhal symptoms, the accompanying injection of soft palate and fauces, and occasional deposit on the tonsils (amygdalite pultacée of Comby), with submaxillary adenopathy, add to the difficulties of the diagnosis (see Cases III, VI, VIII). Adkins says that they may be distinguished from the true eruption of scarlet fever by the absence of decided punctation and of a history of vomiting. Neither of these distinctions, however, in my experience, holds good. In some epidemics of measles vomiting may be met with in a large percentage of the cases.‡ The erythema may sometimes be decidedly punctate. The diagnosis is rather to be made by the transient nature of the eruption and the association of Koplik's spots, stomatitis, and catarrhal symptoms.

TABLE II.

Trunk	...	...	28
Behind the ears	...	...	15
Limbs	...	...	14
Face	...	...	4
Neck	...	...	2

* I have reported the case at length in the *Lancet*, December 10th, 1904.

† Since 1884 an annual average of 76.3 cases of measles has been admitted to the Metropolitan Asylums Board hospitals certified to be suffering from scarlet fever.

‡ H. Balme, *Practitioner*, October, 1904, says it occurred in 65.5 per cent. of his cases.