

intestinal ulceration and after being taken up by the portal vein causes the hepatic abscess. It is possible that our patient was an instance in point. If so, we must imagine that there has also been pyæmic absorption by means of the portal vein, which has caused the multiple pyæmic abscesses, and that therefore the case closely resembles those cases of dysentery in which, in addition to a large tropical abscess, there are multiple pyæmic abscesses in the liver. The suggestion has been made that when ulceration of the colon has been found with an abscess of the liver the hepatic abscess was primary, and that the pus from the liver, trickling down the bile-duct into the intestine, set up the colitis. There is no evidence to support this view, which is on the face of it unlikely; for we do not usually recognise ulcerative colitis as caused by the discharge of pus into the bowel. Case 82 in the third edition of Murchison's work, in which a hepatic abscess burst into the colon, and ulcerative colitis was found, may be quite as well explained on the supposition that the ulcerative colitis was primary as on that that it was secondary. In criticising the view here taken of our case it may be maintained that the large as well as small hepatic abscesses were pyæmic and due to absorption from the ulcerated colon. The fact that the large abscess had so much gangrenous liver substance around it perhaps supports this view, for it is well known that pyæmic abscesses of the liver are often preceded by gangrene of the liver substance; in fact, you can see this in the smaller abscesses here. The great objections to this view are not only that this would be a very large pyæmic abscess (for Wilks and Moxon state that they have never known a pyæmic abscess to be so large as to become the object of special treatment, and it would be quite as large as the very rare one that Murchison⁶ recorded on account of its size, and which contained nearly a pint of pus), but also that if one of the pyæmic abscesses is very large it is usual for some others to be large, and for there to be all sizes, down to the very small. For instance, in Murchison's case the other abscesses are described as being of the size of hazel-nuts and walnuts. You will notice that in the specimen before you there is one huge abscess, and that all the others are no bigger than small peas, and, further, that these minute ones are clearly, from their size, quite recent; but we know, from its size and from the history, that the large one is probably at least a month old. I am afraid, therefore, that I cannot give a definite opinion as to which of the two views is correct; but, at any rate, the case is one of extreme interest, and must make us all think, and therefore it is more useful to us than one in which the diagnosis is easy.

ON THE FEATURES WHICH DISTINGUISH
EPIDEMIC ROSEOLA (ROSE RASH)
FROM MEASLES AND FROM
SCARLET FEVER.¹

BY CLEMENT DUKES, M.D., B.S., M.R.C.P. LOND.,
PHYSICIAN TO RUGBY SCHOOL; SENIOR PHYSICIAN TO RUGBY HOSPITAL;
HOWARD MEDALLIST OF THE ROYAL STATISTICAL
SOCIETY OF LONDON.

NOMENCLATURE.

THE disease which is to be the chief topic of consideration to-day is said² to have been known to the Arabian physicians under the name of "Hhamikah"; but there is not much record of its existence until the early part of the last century, when it was known by the name of "roseola," subsequently it was termed "epidemic rossalia," and I think I shall produce sufficient evidence to show the expediency of reverting to this nomenclature. Little, however, was heard of it until the middle of the last century (1758), when the Germans described it under the name of "rubeola." In the middle of this century it seems to have started a new life in Germany under the name of r  theln, which we, unfortunately, have translated by the popular name of German measles. Scarcely any word, I think, in medical language has created so much confusion in relation to diseases at

school as the word "measles," for it involves inconceivable difficulty by the confounding of three distinct diseases—rose rash, measles, and scarlet fever—under one name. This confusion has arisen not only from the vagaries of the disease which I have termed "epidemic roseola," and not only from inherent difficulties in diagnosis by reason of its close resemblance to measles as well as to scarlet fever, but largely through an incorrect nomenclature, in consequence of which this disease is commonly termed German measles, or, briefly, measles. The result has been that English measles is confounded with German measles, and German measles with scarlet fever. The defects of the current nomenclature will be readily inferred from the subjoined table :—

Technical term.	English name.	Popular name.
Rubeola. Morbilli.	English measles.	Measles.
Rubeola. R��theln.		
Epidemic roseola.	German measles.	Measles.
Scarlatina. Febris rubra.	Scarlet fever.	Scarlet fever.

It is my earnest desire, through the influence of the Medical Officers of Schools' Association, to induce the medical profession to terminate this confusion, and to adopt for this disease the technical term of "epidemic roseola," and the popular name of "rose rash"; by this alteration, as I shall point out, we shall not only properly diminish the prevalence of these three zymotic diseases, but also ensure our professional credit by greater accuracy in our work. The mistakes produced by this defective nomenclature are both numerous and exasperating in the face of an epidemic at school, where the accommodation for quarantine, and subsequently for isolation, must always be scanty. Moreover, the errors will be found to have been wholly unnecessary as soon as the confusion is removed by adopting a proper term which does not require to be prefaced by a distinguishing adjective. The two diseases, again, are not varieties of the same species, but are perfectly distinct, however similar they may sometimes appear in certain of their characteristics. The following examples will clearly illustrate my meaning :
1. Some cases of measles occur in the family at home during vacation, and the boy about to re-enter school, having already had the illness, is permitted to return to his boarding house after thorough disinfection at the sanatorium. Within a few days, however, he exhibits characteristic English measles, and it is ascertained on inquiry that his previous illness was German measles, which, of course, does not afford protection from English measles. In consequence of this error an epidemic is started in the school. In a paper published in THE LANCET³ I have recorded some curious anomalies in the form of measles being followed by rose rash and *vice versa*.
2. Some cases of German measles arise at school, and a boy suffers from headache and malaise. The school medical attendant, in order to avoid wasting his very scanty means of quarantine, refers to the "medical report" to discover the illnesses from which the boy has suffered, and, finding that he has already passed through the malady, leaves him unisolated. Then, to his chagrin, the boy exhibits signs of this illness, and it is ascertained that it was English and not German measles by which he had previously been attacked.
3. When it is affirmed that a boy has had measles twice it generally only means, of course, that he has had English and German measles.

LIFE HISTORY OF ZYMOTIC DISEASES.

The minute seeds of zymotic diseases enjoy their seasons of growth and development exactly as do all other vegetable seeds; and although individual seeds may grow out of season and thus maintain a disease, the main crop, in the form of an epidemic, will only develop in its appropriate season of the year, and then only when probably the meteorological conditions are favourable to its highest (or most virulent) propagation, precisely in the same way as the gardener speaks of a good plum year or a good apple year. These external conditions of environment also affect the host,

⁶ Ibid., vol. xx., p. 213.
¹ A paper read before the members of the Medical Officers of Schools' Association at their meeting on Feb. 21st, 1894.
² Ziemssen's Cyclopædia of Medicine.

³ THE LANCET, Oct. 29th, 1881.

who represents the soil in which the seeds are planted, and thus their development is aided or thwarted and the severity or mildness of an attack produced.

It is this law of seasons which accounts for the minor zymotic diseases—such as measles and rose rash—being epidemic only in the spring and summer, and for the major zymotic diseases—as scarlet fever and diphtheria—being epidemic only in autumn and winter. It is also this law of years which accounts for the presence or absence of epidemics in various years. Another fact is that each disease has its own characteristic seed entirely *sui generis* and no other, although these microphytes may bear some relation to saprophytes in their origin.⁴ But a curious fact in the life history of these zymotic diseases, at present inexplicable, is that the growth of some germs in the body seems to produce so vital an alteration in the soil as to facilitate the immediate fertilisation and growth of the germs of other diseases. For example, the concurrence or sequence of measles and whooping-cough, of scarlet fever and diphtheria, and of measles and diphtheria is well known; and recently I have observed the marked influence which influenza has exercised upon the concurrent or subsequent development of influenza and epidemic roseola, and of influenza and mumps.

The question has occurred to me whether the type of rose rash which so closely resembles scarlet fever would tend in a series of cases gradually to develop into true scarlet fever; but I have never seen the slightest indication in this direction. I have always found, as soon as I knew my subject, that each disease bred true. There was a well-expressed line of demarcation between the two diseases, and notwithstanding their close superficial resemblance every case was either true rose rash or true scarlet fever. I no more believe in its indefinite distinction than I do in what are called diphtheritic sore-throats; either a disease is diphtheria or it is not. The difficulty lies in the accuracy of our diagnosis, and not in the definiteness of the disease; but nothing can be achieved without the capacity of accurate diagnosis, and there are no cases in medicine which at times are more puzzling, and require the expenditure of more thought and judgment, than the zymotic diseases we are discussing—rose rash, measles, and scarlet fever. In their elucidation they have entangled many of the ablest physicians, to our professional discredit and to the detriment of the welfare of schools. Yet they are as separable as typhus fever from typhoid fever. To mistake rose rash for measles causes infinite trouble, but to confuse rose rash with scarlet fever, as is constantly done, is a very serious error indeed, even admitting the difficulties of diagnosis; for if the patient be suffering from rose rash a period of isolation of from fourteen to twenty-one days is usually sufficient, notwithstanding its desquamation, while if the malady be scarlet fever a period of solitary confinement varying from forty-two to fifty-six days is required in accordance with our present knowledge. Conceive the significance of this difference in an extensive epidemic—an isolation of two-thirds longer time for each case of scarlet fever, of wholly unnecessary confinement, with all its attendant discomforts, loss of time, and pecuniary cost entailed for medical attendance, nursing, and isolation.

The difficulties may be gauged when errors are committed even by those who have seen a multitude of cases. It requires some courage, I admit, to suspend one's judgment and plead ignorance when a definite diagnosis is imperative. How much more courage, when one has made a mistake and called the illness scarlet fever, to admit that, after all, it is only rose rash. Having made the mistake myself even so recently as 1889, I can sympathise with those in a similar difficulty. In a group of cases which occurred in that year I fear that the headmaster of Rugby School must have credited me with much modesty of judgment or crass ignorance. One day I diagnosed the cases as scarlet fever, the next as rose rash, and so on for at least a week, until I finally declared in favour of rose rash. I trust, however, that I have now mastered the problem, though, perhaps, only until the next difficulty supervenes. It is in the hope of assisting others by recording my own difficulties that I am addressing you to-day. In the third edition of my work on "Health at School" I have discussed the question somewhat fully on account of its vast importance to our own credit and to schools. I have there shown by the argument of facts that rose rash is essentially a spring and summer disease, while

scarlet fever is a disease of autumn and winter. Another feature in its history which may afford considerable assistance is the fact that in the same group of cases of rose rash some will resemble measles and others scarlet fever; but we never observe in the same epidemic of measles some cases resembling scarlet fever and other measles. The question has also occurred to me repeatedly whether, on account of its area, season, and non-fatality, the very extensive but non-fatal epidemic of scarlet fever which raged throughout the country in the autumn of 1892 and the spring of 1893 was not largely an epidemic of rose rash rather than one of scarlet fever; for it not only occurred to a great extent out of its season, but in both cases in which I was consulted by the headmasters of two schools at a distance from Rugby the epidemic proved to be rose rash and not scarlet fever.

With reference to the infectious character of these zymotic diseases it is too frequently assumed that when exposed to infection all who have not previously suffered will succumb. In certain seasons and in certain conditions of health the body, although at the most susceptible age, is safe from the attack of measles and at another season is susceptible. The same is true in the case of scarlet fever, as I can testify, for I lived at the Hospital for Sick Children in Great Ormond-street for nearly two years, and although we nearly always had several cases of scarlet fever on hand, some of them very malignant in character and rapidly fatal, and although I was frequently with these cases for hours together, I never contracted the illness; but a year after I had left the hospital I was seized with scarlet fever and failed to trace the source. What renders the human body predisposed to, or immune against, the attack of the exanthemata I am not prepared to say. At present we can only state facts and await their interpretation; but the wave of influenza which has passed over us during the last four years must have elicited much thought by reason of the way in which some individuals have escaped, while others have succumbed to every epidemic.

MISTAKES ARISING FROM FAULTY DIAGNOSIS.

The errors arising from defective diagnosis are many and various: (1) Measles is mistaken for rose rash, (2) rose rash is confused with measles, (3) rose rash is mistaken for scarlet fever, and (4) scarlet fever is confounded with rose rash. Measles, however, is never mistaken for scarlet fever, since it never assumes that particular disguise. In one epidemic of rose rash the whole of the cases will resemble measles. In another epidemic of the same illness every case will resemble scarlet fever, as occurred in an entire series of cases in the two schools where I was consulted, comprising sixteen cases at one school and twelve at the other. In another epidemic some cases will simulate measles and others scarlet fever; and here it is easiest to study the epidemic, for under these circumstances its character is unmistakable. Some time ago I had a series of cases of rose rash which all resembled the measles variety, and at the end of the term a certificate was forwarded to each parent informing him that a sequence of cases of rose rash had occurred. However, a few days after the boys had reached home the headmaster received a very indignant letter from one parent complaining that within a day or two of his son's return he had developed scarlet fever, and that the home physician had recommended the transfer of the boy to a cottage with a nurse, with a view to isolation for six weeks. I sent an explanatory letter to the headmaster for transmission to the parent. This evidently cleared away the difficulty, for the boy was released from confinement and returned to school at the appointed time; no expression of regret was deemed necessary. Now, if this event had occurred to the medical officer of a school soon after his appointment, we can conceive the unpleasantness of his position. The illustration enforces the necessity—where, at all events, rose rash is concerned—of great care and judgment being exercised by home physicians, before they condemn the diagnosis of school physicians; and even a suspension of judgment, pending an inquiry into the facts, might prove a commendable course of procedure. Another remarkable fact about rose rash is that, although (there can be no shadow of doubt about it, as the one affords no protection in respect of the others) it is a perfectly distinct disease from measles and scarlet fever, and although both varieties of rose rash may appear in the same epidemic, as I have shown, yet the measles variety, like measles itself, usually occurs in large numbers, while the scarlet fever variety, like scarlet fever itself, always occurs to a much more limited extent.

⁴ Transactions of the Epidemiological Society, 1891: Dr. Louis Parkes.

It behoves us, therefore, who are so deeply concerned in the accurate diagnosis of this very puzzling zymotic disease, to ask ourselves the question: How is it that these mistakes occur?

1. The causes of errors in the diagnosis of this erratic disease lie in the fact that we generally are apt to endeavour to base our diagnosis too exclusively upon the appearance of the eruption alone, without devoting sufficient regard to the history, the incubation period, and the presence, or absence, of other symptoms, whereas these other elements should be primarily considered. Unfortunately, the eruption of rose rash occasionally resembles so closely that of measles, or of scarlet fever, that in certain stages, and in certain cases, no human being, who studies the eruption only, can possibly perceive the distinction. 2. Because the fact of a diffuse red rash, followed by desquamation, is so ingrained a prepossession in the medical mind as constituting an unmistakable evidence of scarlet fever; yet this notion is distinctly contrary to the fact, as I trust I shall be able to show. 3. Because the illness is slight and consequently cannot be scarlet fever, while its severity is assumed to be an unfailing indication of this disease. On the contrary, some of the slightest cases of serious illness I have ever witnessed have been those of scarlet fever, and it is a well-known fact that such cases frequently become fatal from want of requisite care; again, I have found an illness occasioned by rose rash to assume a very severe type.

I now proceed to detail the distinctive features between rose rash and measles and between rose rash and scarlet fever. This I can only do briefly by exhibiting the salient features of each disease. In thus recording them some critics will object that while I am describing one feature in one disease they have noticed exactly the same feature in the other disease. I grant it; but in reply I would point out that I can only deal with types and not with individual instances. And I add that one symptom does not establish a disease when there are several other symptoms which are not common to it, but are associated with the other disease. These diseases all possess their characteristic "smell," which is, when carefully observed, a valuable aid to diagnosis. The smell cannot be described, but it can be readily detected by expert olfactory nerves.

THE DISTINGUISHING CHARACTERISTICS BETWEEN EPIDEMIC ROSEOLA OR ROSE RASH AND MORBILLI OR MEASLES.

Epidemic Roseola or Rose Rash.

Morbilli or Measles.

1. *Premonitory symptoms.*—In many instances none; no headache; no vomiting; no catarrh; no cough, but frequent sore throat. If the attack be severe, some malaise, anorexia, and drowsiness will exist.
2. *Its season* is spring and summer.
3. *The incubation period* is usually eighteen days, but with a range of nine to twenty-one days.
4. *The eruption.*—In the measles type this appears as minute *rosy-red* dots, not patches. It shows itself first behind the ears, and on the scalp and face, especially on the oral circle; from these situations it extends to the neck and chest, and gradually covers the entire body. The minute dots become larger and gradually coalesce, forming patches, of the bat's wing pattern, indistinguishable from measles.
5. *Additional symptoms:*—
 1. *Throat.*—The fauces look dry, with a dark motley red hue.

1. *Premonitory symptoms.*—Usually considerable malaise, headache, anorexia, vomiting, watery eyes, catarrh, and characteristic cough for about three days.
2. *Its season* is spring and summer.
3. *The incubation period* has a range of seven to eighteen days from exposure. Rash appears on fourteenth day.
4. *The eruption* appears on the fourth day from the commencement of the malaise and catarrh. It shows itself behind the ears in the first instance, then on the scalp and forehead, and gradually spreads all over the face, body, and limbs, forming crescentic blotches. The eruption is papular in character and *brick-red* in colour, and may gradually assume a blue-red tint, but it never assumes a bright *rose-red*.
5. *Additional symptoms:*—
 1. *Throat.*—The fauces are red and swollen, but differ from the fauces of rose rash.

2. *Eyes.*—The conjunctivæ are pink-red and suffused.
3. *Glands.*—The lymphatic glands throughout the body are enlarged, tender, and hard like peas—notably, the posterior cervical, the axillary, and the inguinal.
4. *Desquamation.*—In the measles variety there may, perhaps, be a little branny desquamation, but frequently there is none.
5. *Kidneys.*—Rarely affected, and then only with a transient trace of albumen.
6. *Diarrhœa.*—Never.
6. *Sensations of illness.*—Even with a full eruption, as intense as in measles, the patient usually states that he does not feel ill, although there may be other indications to show that he is really ill.
7. *Tongue.*—Clean or slightly furred, never coated with a thick white fur, which peels on the fourth day.
8. *Pulse.*—Normal, or slightly increased in frequency, but always bearing a ratio to the temperature.
9. *Temperature.*—Varying from normal to 103° or 104° F.
10. *Course of illness.*—The symptoms, however severe, pass off in a few days.
11. *The duration of infectiveness.*—From ten to fourteen days where efficient disinfection is in force.
12. *Protection.*—The attack affords no protection against measles.
13. *Sequelæ.*—Practically none.
14. *Termination.*—Usually complete recovery in a fortnight.
15. *Treatment* in both cases is very similar.—The patient requires about five days in bed, followed by three days in-doors, then about six days in the fresh air, and, after complete disinfection, may safely mix with others.

2. *Eyes.*—The conjunctivæ are very red, watery, with marked photophobia.

3. *Glands.*—Not usually affected. The posterior cervical rarely so, and then not markedly; but the bronchial glands are always enlarged.

4. *Desquamation.*—There is a little branny shedding of the epidermis, varying according to the intensity of the rash.

5. *Kidneys.*—Not affected.

6. *Diarrhœa.*—Very frequent.

6. *Sensations of illness.*—I have been repeatedly informed by strong, as well as by delicate, boys that they have never felt so ill in any illness. They continually suffer from delirium and complete anorexia, and lie quite prostrate.

7. *Tongue.*—Slightly furred but not coated.

8. *Pulse.*—Usually accelerated, and may be very feeble and dicrotic, but always bearing a ratio to the temperature.

9. *Temperature.*—Usually heightened from 101° to 104° F.

10. *Course of illness.*—Convalescence more protracted, often considerable prostration.

11. *The duration of infectiveness.*—From fourteen to twenty-one days, according to the severity of the illness, where efficient disinfection has been carried out.

12. *Protection.*—The attack affords no protection against the scarlet fever or measles variety of rose rash.

13. *Sequelæ.*—Pneumonia, bronchitis, pleurisy, ophthalmia, otitis, &c.

14. *Termination.*—Usually complete recovery in a fortnight at the school age; but sometimes followed by a prolonged period of ill-health.

15. *Treatment* in both cases is very similar.—The patient requires about five days in bed, followed by three days in-doors, then about six days in the fresh air, and, after complete disinfection, may safely mix with others.

It must be noted that abortive cases of roseola are frequent, and their occurrence difficult to detect.

There are also two other eruptions which have a close resemblance to that of epidemic roseola: the one is *roseola simplex*, which arises in hot weather, after chill, or as the product of various indigestible articles of diet. It is readily distinguished, however, by the absence of enlargement of the lymphatic glands. The other eruption is that occasioned by handling *caterpillars*, which boys are very fond of keeping.

I discussed this question fully in a paper in THE LANCET in 1881.⁵

I may also mention a medicinal eruption occasioned by copaiba, which Mr. Hutchinson called the morbillio sine catarrh.

THE DISTINGUISHING CHARACTERISTICS BETWEEN
EPIDEMIC ROSEOLA OR ROSE RASH AND
SCARLATINA OR SCARLET FEVER.

*Epidemic Roseola or Rose
Rash.*

*Scarlatina or Scarlet
Fever.*

1. *Premonitory symptoms.*—In many cases none, even where there is a copious eruption; neither headache, nor vomiting, nor catarrh, nor cough, but frequently sore-throat.
2. *Its season* is spring and summer.
3. *The incubation period* is usually eighteen days, but with a range of from nine to twenty-one days.
4. *The eruption* is usually the first noticeable symptom, and will cover the whole body with a considerable rash in a very few hours. It has a bright *rosy red* hue, is raised somewhat from the surface of the skin, and often occurs in patches, with well-defined edges. The sensation of heat of the skin to the touch, even where the rash is very full, is much less than in scarlet fever.
5. *Additional symptoms:*—
 1. *Throat.*—The fauces are usually reddish, but bear little relation to the extent of the rash.
 2. *Eyes.*—The conjunctivæ are pink and suffused.
 3. *Glands.*—The lymphatic glands throughout the body are enlarged, hard, and tender, and feel like peas. Those mainly affected are the posterior cervical, the axillary, and the inguinal.
 4. *Desquamation.*—In the scarlet fever variety the desquamation may be slight, or as complete as possible, even extending to a general desquamation of the hands and feet; but the desquamation bears no relation to the intensity of the eruption, for it often happens that a very full erup-
1. *Premonitory symptoms.*—Usually malaise for a few hours, and frequently vomiting. If the attack be slight the patient only feels tired, but usually complains of some amount of sore-throat.
2. *Its season* is autumn and winter.
3. *The incubation period* is from two to three days, with a range from a few hours to seven days; it very rarely extends beyond the fifth day.
4. *The eruption* is diffuse, *dusky red*, papular in character, and appears first behind the ears. It presents a *goose-flesh* appearance. No isolated dots at any stage, or patches raised and with well-defined margins. It appears early about the clavicles and on chest and the covered parts of the body. Not so full as in epidemic roseola and markedly hot to touch.
5. *Additional symptoms:*—
 1. *Throat.*—The appearance of the fauces may vary from the most insignificant affection to an intense dusky redness, with marked swelling, showing sometimes white spots of inspissated secretion; and the severity of the throat affection bears usually a distinct relation to the skin eruption.
 2. *Eyes.*—Normal.
 3. *Glands.*—The lymphatic glands of the throat and neck can be scarcely detected during the first few days, but subsequently they may be enlarged in proportion to the severity of the faucial affection.
 4. *Desquamation.*—The desquamation always bears a ratio to the extent of the eruption. A copious eruption signifies a free desquamation, while a scanty eruption is followed by a sparse peeling, which, however, does not cease for many weeks. It commences invariably by a peeling

tion may be followed by little or no desquamation, and what does occur is over in a week or two. On the other hand, a full eruption may be attended by a general peeling as free as in the worst cases of scarlet fever, but always in small scales rather than in flakes or sheets.

5. *Kidneys* rarely affected.

6. *Sensations of illness.*—Where the eruption is slight there is no illness of any kind; and where the eruption is copious the *feeling* of illness is sometimes scarcely apparent, although I have seen boys really ill with it.

7. *Tongue.*—Clean or slightly furred, never coated with a thick white fur, which peels on the fourth day, leaving the tongue raw.

8. *Pulse.*—In slight cases normal, and where the case is a well-marked one the pulse is quickened, but bears a ratio to the temperature; that is to say, where the pulse is accelerated the temperature is raised to a proportionate degree.

9. *Temperature* varies from 98° 4' to 103° or 104° F.; but even with a very extensive rash the temperature is not necessarily high.

10. *Course of illness.*—The symptoms, however severe, pass off in a few days, leaving comparatively little feeling of illness. The glands continue enlarged and tender for about three weeks, and I have seen the submaxillary glands swollen. Desquamation continues for two or three weeks, or longer.

11. *The period of infection.*—I do not know any illness which is so infectious in its earliest stage, even before any symptoms are manifest. It arises from this cause that schools suffer to such an extent when once it has found entrance. In its later stage, even while desquamation is taking place, it is not infectious beyond two or three weeks, after thorough disinfection.

12. *Protection.*—The attack affords no protection against scarlet fever.

of the tongue on the fourth day, which extends to the lips and is followed by peeling of the face and behind the ears; one of the easiest places in which to detect it early is on the ears themselves. Desquamation is in shreds rather than scales and very free about hands and feet.

5. *Kidneys.*—Albuminuria very frequent. Acute nephritis very liable unless the treatment be appropriate.

6. *Sensations of illness.*—In slight cases there is no apparent illness; but I have never seen a case with a severe eruption where the patient was not really, and also felt, very ill.

7. *Tongue.*—Coated with a thick white fur, peeling off from the tip and edges on the fourth day, leaving the "strawberry" tongue.

8. *Pulse.*—Even in slight cases it is accelerated, and in severe cases very greatly quickened, and always out of all proportion to the height of the fever; that is to say, even with a temperature only just above normal (99° F.) the pulse will be very rapid (120).

9. *Temperature* ranges from 99° to 106° F., but never increased in the usual ratio to the pulse. A full rash always means a high temperature.

10. *Course of illness.*—The illness gradually subsides in from four to seven days. Desquamation commences as eruption fades, and continues for from seven to eight weeks or more, and lasts longest on the hands and feet.

11. *The period of infection.*—The least infectious of any illness in its early stages. After the first forty-eight hours it is very infectious, but how long the infection lasts I am not prepared to say. Until this can be ascertained the only safe rule is to assume that it may last as long as desquamation itself, although I am quite clear that this is inaccurate.

12. *Protection.*—The attack affords no protection against the scarlatina or measles variety of rose rash.

13. *The duration of infective-ness*—From ten to fourteen or even twenty-one days where efficient disinfection is in force.
14. *Sequelæ.*—Practically none; but I have seen the submaxillary glands enlarged.
15. *Termination.*—Usually complete recovery in a fortnight.
16. *Treatment.*—Every case of scarlet fever, however slight, requires twenty-one days of lying in bed absolutely. The patient should be clothed in a flannel night-shirt, and the skin daily greased with carbolic or eucalyptus oil. No food should be given for the first week, except milk and farinaceous food, however slight the illness, for this helps to guard against nephritis. The patient should not be permitted to join his friends for six or eight weeks, but I do not think it essential to isolate cases until all desquamation has ceased *from the hands and feet*, for this process sometimes occupies several additional weeks. I have acted on this assumption for many years without harm, even transferring boys to their homes. Of course, complete and thorough disinfection is imperative. In roseola, on the other hand, the patient may be permitted to get up on the fifth or sixth day, or as soon as his strength permits, irrespective of the desquamation, and without danger from sequelæ. He then requires three or four days indoors, followed by five or six in the fresh air; and may safely join his schoolfellows at the end of from fourteen to twenty-one days, notwithstanding desquamation, provided the disinfection has been thorough.
13. *Duration of infective-ness.*—From six to eight weeks or more—i.e., when the desquamation has ceased; but infection probably does not last so long after efficient disinfection.
14. *Sequelæ.*—Nephritis, supuration of the submaxillary lymphatic glands and others, otitis, rheumatism, and endocarditis.
15. *Termination.*—Usually complete recovery, but sometimes a prolonged convalescence on account of the sequelæ; and the disease shows a high mortality in the very young.

It is this type of rose rash which, being mistaken for scarlet fever, accounts for the prolonged period of incubation which is assigned to scarlet fever by some writers; whereas it cannot be sufficiently emphasised that the period of incubation of scarlet fever is *usually* two days, *rarely* exceeds five days, and *never* seven days.

ON SO-CALLED "COLOUR HEARING."

By W. S. COLMAN, M.D., M.R.C.P. LOND.,

ASSISTANT PHYSICIAN TO THE HOSPITAL FOR SICK CHILDREN;
PATHOLOGIST TO THE NATIONAL HOSPITAL FOR THE
PARALYSED AND EPILEPTIC.

THE subject of this paper has for many years attracted considerable attention in Germany, France, and Italy, and more recently in America, but up to the present time practically no account of it has been given in this country, although its occurrence is far from infrequent. The phenomenon in question is one of a group, variously known as "associated sensations," "secondary sensations," or "synæsthesiæ," terms applied to sensations depending, not on the stimulation of the appropriate sense organ, but of some other. "Colour hearing" is the term applied to the special case in which a colour sensation is excited by some auditory stimulus, as, for example, by the pronunciation of the vowel sounds. Although, to those who do not possess this faculty, it may seem ridiculous to talk of sound being coloured, yet almost everyone has experienced the similar "associated sensation" of *feeling* sound. If a slate pencil be held vertically and drawn down a slate an extremely shrill squeak is produced, and coincidentally with this there is an unpleasant shivering cutaneous sensation in the small of the back, commonly expressed by saying "one's blood runs cold." Another well-known "associated sensation" is excited in almost all individuals by the sound of a saw being filed, "one's teeth being set on edge." It is to be observed that

these secondary tactile sensations, like the secondary sensations of colour, are not produced by any and every stimulation of the organ of hearing, but only by certain sounds. This faculty of *feeling* these two unpleasant sounds is one which is possessed by almost everyone, but the phenomena of "colour hearing" are experienced only by exceptional individuals, the most liberal estimate being 12 per cent., and in only a few of these is there any high development of the faculty.

The auditory stimuli which give rise to secondary colour sensations are mostly sounds which are mentally associated in series, such as the vowel sounds, the numerals, days of the week, months of the year, and musical notes. Colours are also excited in many people by the sound or thought of the series of letters of the alphabet. This is more common in my experience than colour sensation from vowel sounds. Although references were made by Hoffmann, Goethe, and others in the last century to the existence of this faculty the first accurate description was given by Sachs¹ in 1812. He published a most interesting account of the individual peculiarities of himself and his sister, who were both albinos, but who also possessed in a very marked degree the faculty of "colour hearing," which was most vivid in association with serial objects and least definite with the spoken vowel sounds. Little attention seems to have been paid to this publication. Isolated cases were published in ophthalmological and physiological journals, but interest was first generally excited by a paper which was read before one of the scientific societies of Vienna by Nussbaumer,² who gave an admirable account of the phenomena experienced by himself, and also by his brother, who was an accomplished musician. The paper was received in a very sceptical spirit, one eminent neurologist who was present expressing the opinion that the phenomena were pathological and allied to hallucinations, and that mental disturbance would sooner or later ensue. It is satisfactory to learn that his predictions remain unfulfilled. The subject was then studied by Fechner, who obtained a very large amount of information about it, but did not live long enough to complete his investigations. In 1881 Bleuler and Lehmann (the former of whom possessed the faculty) published the result of their inquiries among 596 individuals in Zurich, among whom 76, or 12.8 per cent., showed the phenomena under discussion with more or less distinctness. They described and analysed the results very minutely, and their paper aroused more general attention than had hitherto been given to the subject, and from this time onward its literature is abundant. The frequency of the occurrence of the phenomena has been independently investigated in this country by Francis Galton³ and in America by Miss Calkins,⁴ whose results agree in the main with those of the Swiss observers. The most extensive and exhaustive inquiry, however, is that just brought to a conclusion by M. Flournoy of Geneva, with the collaboration of M. Claparède, and published in his book "*Des Phénomènes de Synopsie*," which should be in the hands of everyone interested in this subject. Lastly, mention must be made of a remarkable paper published in 1892 at the Congress of Experimental Psychology by Grüber of Jassy, which will be afterwards referred to. My own attention was directed to the subject some years ago, and it occurred to me that it would be well, studied in cases of acquired blindness, as those who possessed the faculty would be sure to have noticed it and to have paid attention to it, and hence able to give a clearer account of their sensations. By the courtesy of Dr. Campbell, principal of the Blind College at Norwood, and Captain Webber, R.N., secretary of the Blind College at Hampstead, I had the opportunity of investigating the condition of the inmates of those institutions. At Norwood I found eight who possessed this faculty and at Hampstead four. I have also met with many cases in healthy individuals. It will be convenient, in the first place, to describe in some detail a few well-marked cases and then to discuss the phenomena.

CASE 1. *Colouration of spoken vowel sounds.*—A heavy, undergrown youth seventeen years of age became completely blind four years before coming under observation. Before that he could see colours quite well. He could not remember when he began to associate colours with the vowel sounds and he never knew that it was an unusual faculty until he heard me make my inquiries about it. He said that when the vowel sounds were pronounced slowly he had accompanying each a sensation of colour "like a transparent

¹ *Historia Naturalis duorum Leucæthiopium*, 1812.

² *Wiener Medicinische Wochenschrift*, 1873.

³ *Inquiries into Human Faculty*, London, 1883.

⁴ *American Journal of Psychology*, 1893.