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.

By J. D. ROLLESTON, M.A., M.D. OXON.,

Assistant Medical Officer at the Grove Fever Hospital of the Metropolitan Asylums Board.

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 precatatarrhal 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.

Sites.

Table II shows that the trunk is the favourite site, no special area of the thorax or abdomen being selected.

The post-auricular region is the next more frequent spot. It is true that the specific eruption of measles first makes its appearance here, but in all the cases noted the prodromal eruption had faded from the part before the efflorescence of the former in that position. The upper and lower limbs are affected with equal frequency. The face and neck, where the specific eruption appears at an early date, are least frequently involved.

General Characteristics of Prodromal Rashes.

The characters common to the prodromal rashes of measles may be summed up under the following eight heads:

1. *Early Appearance.*—The great majority of prodromal rashes appear within the first two days of the disease. Frequently, as is shown in Cases I, II, IV, V, VIII, they precede the catarrhal symptoms, Koplik's spots, and the characteristic stomatitis.*

Occasionally, though much less frequently, they may be seen before any rise of temperature or other signs of constitutional disturbance (see Cases II, V).

2. *Transient Nature.*—The short-lived existence of most of these rashes serves in a certain degree to account for the scanty attention they have received. Some, indeed, are less fugitive than others. Thus, whereas urticaria and blotchy erythema last only a few hours, the scarlatiniform eruptions may last for a day and a night, and the isolated macules and papules even longer.

3. *Localization.*—Closely associated with their transient existence is the tendency shown by these rashes to be localized. Even the scarlatiniform rashes, which are more widely diffused than the rest, seldom occupy the same extent as the fully-developed eruption of scarlet fever, to which they bear, as a rule, but a faint and abortive resemblance.

4. *Capricious Distribution.*—The prodromal rashes of measles do not affect any special situation, such as the abdomino-femoral region, which is the site of election for the initial rashes of small-pox. They may be met with in any part of the trunk or limbs.

5. *Polymorphism.*—Highly characteristic, as is illustrated by Cases II, III, IV, is the simultaneous association of several varieties of eruption. Accidental eruptions, such as urticaria, are by no means unknown in the other acute exanthemata—for example, in scarlet fever—but coexist or follow, instead of preceding, the specific efflorescence.

6. *Absence of Local Irritation.*—The characteristic eruption of measles, like that of scarlet fever, varicella, and small-pox is occasionally attended with considerable cutaneous irritation. The prodromal eruptions of measles, however, are strikingly free from any symptoms of the kind. There is no pain or pruritus to attract the patient's attention, nor is there any subsequent desquamation.

7. *Absence of Prognostic Value.*—With the exception of the petechial eruptions in haemorrhagic cases, the occurrence of initial rashes in small-pox is most frequent in mild forms of the disease. In measles, however, initial rashes appear to be of no aid in prognosis. The course of the disease in which they were noted in no way differed from that of the cases in which they were absent.

8. *Great Diagnostic Value.*—The occurrence of rashes, such as those enumerated in Table I, in an epidemic focus, should alone arouse suspicion of infection, and prompt examination of the buccal mucosa for Koplik's spots and the characteristic stomatitis, and instigate a close watch for any catarrhal symptoms.

CASE I.

D. H., female, aged 2, admitted August 29th, 1902, with a typical attack of mild scarlet fever. Temperature, 101° on admission, became normal on September 1st, and remained so till October 16th, when it was 100.6° at 4 p.m. Nothing else was noted then.

October 17th. Patches of blotchy erythema were seen on the front and sides of the neck and chest, passing up into the scalp. There were no Koplik's spots, and no catarrhal symptoms. Morning temperature, 101.7° ; evening temperature, 100.6° . The temperature kept normal till October 24th; a faint macular rash was seen in the morning of that day on the thorax, upper part of abdomen and neck. There were many Koplik's spots; coryza, lachrymation, and cough were present. At 11.30 p.m. the rash had not developed. Temperature, 100.6° .

October 25th (1.15 p.m.). The rash was more distinct on the upper part of the back, hypogastrium, and behind the ears. The face and limbs were free. The catarrhal symptoms and Koplik's spots were as before. Temperature, 99° . At 4.5 p.m. a large scrolled blotchy erythema

* The stomatitis of measles described by Ringer (Reynolds's *System of Medicine*, vol. 1, 1866), and more recently by Comby (*Maladies de l'Enfance*, 1904, Tome 1), is often mistaken for Koplik's spots.

was seen on the chest and abdomen, which had disappeared by 11 p.m., when the rash noted at 1.15 p.m. was also less distinct. Temperature, 102.4° .

October 26th. Typical generalized measles rash.

CASE II.

C. P., male, aged $1\frac{1}{2}$. Admitted September 15th, 1902, with typical scarlet fever.

October 13th. Several faint macules on trunk. Temperature, normal. October 14th. Rash faded. Temperature, 4 a.m., 99° ; noon, 100.6° ; 4 p.m., 99.8° .

October 15th. Very faint discrete macules scattered over trunk. Slight cough. A few Koplik's spots. Temperature, normal.

October 16th (morning). Rash fading. Temperature, normal; 11.45 p.m., 100.2° . Bright erythema of lower limbs. Fauces injected.

October 17th. Erythema faded. Morning temperature, 91° ; evening temperature, 99° .

October 18th and 19th. Temperature, 99° to 100° . No fresh phenomena. October 20th (noon). Cough, lachrymation, coryza. Buccal mucosa full of Koplik's spots. Large urticarial wheals in both deltoid regions. Small wheals on thighs, sacrum, and buttocks. 3.15 p.m. Urticaria over deltoids faded. Fresh patches in front of thighs. Characteristic measles eruption appearing behind ears and on trunk. 5.45 p.m. Urticaria on front of thighs faded. Fresh wheals on back of thighs. 8.15 p.m. Fresh wheals on buttocks and on front and back of both thighs. Those noted at 5.45 p.m. have faded. 11.15 p.m. Characteristic measles eruption thickly set on face, trunk, and proximal ends of limbs. Urticaria faded. In the course of the night seven more wheals were seen in various parts of trunk, and disappeared within an hour.

October 21st. Measles rash bright and general.

CASE III.

W. B., male, aged $2\frac{1}{2}$, admitted July 7th, 1903, with scarlet fever. Temperature 101.4° on admission, reached normal on July 9th and remained so till September 28th, except on September 1st and 2nd, when it was raised owing to cervical adenitis.

September 28th. Morning temperature, 101.4° ; evening temperature, 99.2° . Coughing and sneezing. Papular eruption on face and behind ears. One possible Koplik's spot on buccal mucosa.

September 29th (morning). Coarse papular rash on cheek; fine macular rash behind ears. Coryza. Numerous Koplik's spots. Temperature, 98.4° . 10 p.m. a few fine macules on the upper part of the chest, and on the back between the scapulae. Temperature, 99.8° .

September 30th. More fine macules on face, behind ears, on upper part of chest, inner side of arms and thighs. Slight cough. Thick nasal discharge. Numerous Koplik's spots still present. Specks on both tonsils. Morning temperature, 98.4° ; evening temperature, 100.6° .

October 1st (11 a.m.). Punctate rash on chest and upper arms. Large urticarial wheal at bend of left elbow. Smaller wheals on right elbow, right forearm, left cheek, on both scapulae, and inner side of right knee. Fauces much injected. Still specks on tonsils. Tongue peeled at tip, peeled posteriorly, papillae prominent. Still profuse nasal discharge and numerous Koplik's spots. Temperature, 99.4° . 5.30 p.m. Urticaria present this morning has gone. Fresh wheals on inner side of right knee, on upper and inner side of right thigh, round umbilicus and on left side of chin. Characteristic measles rash beginning to appear on face and trunk. Temperature, 100.4° . 11 p.m. Urticaria noted at 5.30 p.m. has gone, but several wheals have appeared since. Temperature, 101° .

October 2nd. Measles rash general and well marked. Morning temperature, 102° ; evening temperature, 103° .

CASE IV.

Q. M., female, aged $8\frac{1}{2}$, admitted August 22nd, with scarlet fever. The temperature became normal on August 30th, and remained so till midday on September 25th, when it was 100.4° . A faint erythema was then seen on chest and back. The fauces were injected. There were no Koplik's spots and no catarrhal symptoms.

September 26th. The rash had almost gone. The fauces were normal. Morning temperature, 98.4°; evening temperature, 99.8°.

September 27th (1.15 p.m.). Several faint papules were seen scattered over the trunk. No Koplik's spots. No catarrh. Temperature, 98.4°. 10 p.m. Temperature, 100°. Papules fading. Patches of erythema on chest.

September 28th. Several fresh patches of erythema on trunk, definitely circinate on inner wall of left axilla. Fauces injected. Morning temperature, 98.4°; evening temperature, 98.8°.

September 29th. Rash faded. Morning temperature, 97°; evening temperature, 99.6°. No catarrh. No Koplik's spots.

September 30th. Several minute papules on trunk. Buccal mucosa injected. No Koplik's spots. No catarrhal symptoms. Morning temperature, 98°; evening temperature, 100.6°.

October 1st. Sneezing and lachrymation. Several Koplik's spots. Characteristic measles rash beginning to appear behind ears and on trunk. Morning temperature, 99.6°; evening temperature, 102.8°.

October 2nd. Measles rash, bright and general. Catarrhal symptoms well marked. Morning temperature, 101°; evening temperature, 103°.

CASE V.

A. H., female, aged 4, was admitted September 7th, 1904, with typical scarlet fever. Characteristic desquamation followed. The temperature, which was 101.4° on admission, became normal, and remained so till September 14th inclusive.

September 14th, 11 a.m. A few rose-coloured papules were seen scattered over the trunk. No pyrexia; no catarrhal symptoms. 10.30 p.m. No development of the eruption.

September 15th, 11 a.m. Papules fading; several macules on trunk; temperature normal. 10.15 p.m. Faint erythema of trunk; fauces injected; temperature 102.2°.

September 16th. Rash fading; cough frequent, sometimes croupy. During the next two days several fresh papules appeared on the chest

and abdomen. The temperature ranged between 101° and 102.8°. There were no other symptoms beyond a frequent cough.

September 19th. Lachrymation and coryza, in addition to cough. Numerous Koplik's spots. Appearance of characteristic measles rash.

CASE VI.

W. T., male, aged 3, admitted September 29th, 1904, certified to be suffering from diphtheria.

On September 27th profuse nasal discharge had been noted, and the following day the child had suffered from headache, sore throat, had a croupy cough, and the glands of its neck became swollen. On admission at 1 p.m. small grey patches were seen on the tonsils, uvula, hard and soft palate. The buccal mucosa presented several Koplik's spots and similar patches of stomatitis to those in the fauces. There was profuse nasal discharge, croupy cough, lachrymation, and sneezing. A faint macular eruption was seen behind the ears and on the neck. Temperature, 99.4°. By 10 p.m. the eruption had almost entirely faded. The following day, two faint macules were seen on the neck, but no other eruption. The catarrhal symptoms and buccal phenomena were the same as before.

October 1st. Typical generalized measles eruption.

CASE VII.

D. T., female, aged 3, admitted October 3rd, 1904, certified to be suffering from scarlet fever.

On September 29th she suffered from headache, sore throat, vomiting, and had discharge from the nose.

September 30th. She vomited several times.

On October 2nd the glands of her neck became swollen, and the following day a rash was first seen on the chest.

On admission the patient had a scarlatiniform rash well marked behind the ears, less distinct on the trunk and proximal ends of the limbs. On the right arm there was an urticarial wheal. The face was puffy, the eyes were suffused, and there was a frequent short cough. There was no running from the nose. The buccal mucosa was injected and crowded with Koplik's spots. Temperature, 102°.

October 4th. Typical measles rash appearing on face, trunk, and proximal ends of limbs. Urticaria gone; lachrymation and cough; Koplik's spots fading.

October 5th. Measles rash general and well marked; lachrymation, cough, and bronchitic sounds in chest.

CASE VIII.

E. P., female, aged 6, admitted November 22nd, 1904, certified to be suffering from scarlet fever. On the 20th she had had sore throat, and on the 21st she vomited, and a rash appeared on the trunk. On admission a fine punctate eruption was seen on the chest and back. The fauces were injected, and dirty deposit was seen on both tonsils. Temperature, 103.6°.

The next day nothing fresh was noted beyond some cough. Morning temperature, 99°; evening temperature, 102.6°.

November 24th. The cough increased, lachrymation was present; the buccal mucosa was injected, and showed several Koplik's spots, and the characteristic measles rash appeared on the face, trunk, and limbs. Morning temperature, 100.4°; evening temperature, 102.6°.

CASE IX.

E. W., female, aged 5, admitted October 26th, 1904, for scarlet fever on the fourth day of the disease. The temperature reached normal on November 4th, and kept so till November 19th, when it rose to 100° at 8 p.m. and 100.4° at midnight.

November 20th. Some running from the nose. The temperature kept