with scarlatinal blood, or serum, from the miliary vesicles, and frequently succeeded in producing scarlet fever, which was as severe as, and even more so than, the one employed for the inoculation. If only an infection, and no weakening or diminished localization of the poison can be attained by the inoculation, then, of course, it fails in its object. For that purpose it is not necessary at all to resort to this complicated manipulation; simple contact with the scarlet-fever patients is all that is requisite. Children between two and twelve years of age are most susceptible to the contagion. Very small children are but rarely subject to the fever, and only become affected by it in severe epidemics. The mortality varies from two to twenty per cent. Some very reliable authors assert that a person may have scarlet-fever twice. This, however, seems to occur so very infrequently that there is a greater reason to assume an error in the observation—which, on account of the diagnostic difficulties of some cases, is very excusable—than to believe in the actual occurrence of such instances.

Treatment.—In consequence of the variation of the individual epidemics, it is impossible to prescribe one system of treatment that would be applicable to all scarlatinas; moreover, this variation destroys all faith in the many remedies lauded as specifics.

It is useless to name here the numerous prophylactic remedies, since none have actually proved to be such. The only rational prophylaxis consists in an entire isolation of the children from all scarlatinal patients and all persons who come in contact with such patients. This isolation must last at least from five to six weeks for each patient, but how far and in what roundabout ways the fever may be transported by a third person, it is altogether impossible to say. In grave epidemics, in which a majority of the patients perish, it is best for the children to leave the city altogether, but that is frequently attended by great sacrifices, as the epidemics often rage for a long time and simultaneously in many cities.

The treatment of scarlatina is either attempted with specifics and methods, or it is simply expectant and controlled by the symptoms.

To the specific remedies belong: carbonate of ammonia, ℥ j—℥ ii, in a ℥ v solution—chlorine-water, ℥ j, in an ℥ viii solution; the mineral acids; acetic acid, ℥ ss—℥ j pro die.

The specific methods were, and in part are still: general abstraction of blood, emetics and aperients, and cold affusions—infrictions of fat, often eulogized and again forgotten, and lately urgently recommended by *Schneemann*, in conjunction with cooling treatment. The methodical cold-water treatment, it is true, has not produced the harm dreaded by the older physicians, but in grave epidemics it has proved to be totally inefficacious. This author causes the entire body of the

patients, with the exception of the head, to be rubbed with lard, from the first day on, for three weeks, morning, noon, and evening; in the fourth week once a day only. With this, the temperature of the room should not be above 60° F.; the bed protected from cold during the eruption only, cooling drinks so long as the fever lasts, and internally no remedies are to be given. *Schneemann* very justly lays great stress upon thorough and often-repeated ventilation, but carries his cooling treatment somewhat too far when he advises the temperature of the room to be reduced to between 57° and 59°, and the windows of the sick-room to be kept open three hours every day.

It need hardly be stated that these specific remedies and specific methods have no specific effect whatever, and all of them, in grave epidemics, are set at defiance by the virulence of the scarlatinal poison. In milder epidemics, those remedies are best which torture the children least, and husband their enfeebled strength. Of all the remedies, the preference should therefore be given to a diluted mineral acid; of all the methods, to a moderate infriction of fat.

The expectant treatment of the symptoms is limited to the removal of the patient from all noxious agents, and to the palliation of the particularly grave symptoms.

Proper ventilation of the sick-room is always the best guarantee of a favorable course. This is carried out to the greatest perfection when two adjoining rooms are devoted to the use of the patient, and he spends half the day in one, and half the day in the other room. The temperature of the room should be 60° F., so long as the exanthema lasts; after it has grown pale, or if it did not become properly developed, the temperature should rather be raised than diminished. The garments of the child and bedclothes should be so arranged that it is not kept in a constant state of perspiration, but yet so as not to be chilled. The diet, so long as the fever lasts, should be antiphlogistic; where constipation exists, a mild aperient, of some composition which the child will readily take, should be employed; and, where there is a disposition to diarrhœa, constipating soups and mucilaginous drinks should be given. When the fever is gone, such a scanty diet will vastly retard convalescence; and no apprehension need be entertained in regard to the use of mild, easily-digested, plain articles of food.

When desquamation has been in full progress for several days, its completion may be accelerated by a few baths, given with great caution, after which the patient may be gradually taken out into the free air. In order to guard against all possible reproach, it is well not to allow the patients to go out of the house for six weeks; but this, of course, cannot be accomplished among the lower classes, and where the care of the children is neglected. In normal scarlatina any simple

slightly acidulous, saline, or mucilaginous drinks may be given internally as a vehicle for ammon. carb. 3 ss, daily, in cases where the exanthema is imperfectly developed. In the treatment of symptoms, it is well to observe that, in some of the gravest and most threatening ones, neither hasty nor too energetic measures should be adopted. The violent fever before the eruption may tempt us to resort to the abstraction of blood, or to the use of calomel; but we should always bear in mind that the course of the disease is likely to be retarded by these measures, while the fever is not made to disappear.

Where the eruption is very much retarded, an attempt should be made, by the aid of sinapisms, sponging of the body with warm water, vinegar, or lye, to hasten its progress. Where the rash is already developed, infriction of lard is the most advantageous treatment, by which the annoying itching is palliated, and the protection against any sudden cooling of the skin is effected.

Threatening cerebral symptoms, delirium, stupor, or coma, are materially relieved by very cold affusions of the closely-shorn head, which must be repeated every hour. In the torpid, septic form, the powers of the system should be sustained by quinine, camphor, wine, musk, and castoreum.

In malignant diphtheritic anginas an energetic local treatment, by the application of concentrated muriatic acid or a solution of nitrate of silver, would be very beneficial. But the prostration of the patients and their resistance form great obstacles to this part of the treatment. For the same reason it is but seldom possible to employ gargles, and we have therefore to limit ourselves to the administration of such internal remedies as are regarded as specifics. The best of these are carbonate of soda and chlorate of potassa; the first has a really favorable effect in cleaning the mucous membrane, the second destroys the putrid odor. Both are given separately, dissolved in water, a drachm of each daily.

The treatment of albuminuria has already been spoken of on a former occasion, likewise that of parotitis after scarlatina. Intestinal catarrh must be relieved as rapidly as possible by the aid of opium, and mucilaginous and astringent remedies. Paralysis and convulsions call for the treatment prescribed for these affections on pages 394 and 388. Consecutive inflammations of the joints and serous effusions improve by the aid of warm anodyne cataplasms and resolvents.

(2.) Measles (*Morbilli*).—By measles is meant an acute contagious eruption of the skin, which manifests itself by small, round, red spots, attended by catarrhal phenomena, and terminates by a furfuraceous desquamation of the epidermis.

Since the individual epidemics of measles, just like epidemics of

scarlet fever, present marked variations, and are very different in their course, their danger, and in their sequelæ, it will be more advantageous to first give a description of a normal case, and then to speak of its modifications.

A.—*NORMAL MORBILLI.*

(1), A stadium of prodromata; (2), a stadium of eruption; (3), a stadium of florescence; and, (4), a stadium of desquamation, may be distinguished with tolerable precision.

1.) The Prodromata Stage (*Stadium Invasionis*).—In robust children and mild epidemics, the prodromes are not so violent as to cause the children to take to bed, or to present any signs of a serious disease. The most common difficulties are: catarrh of the nose and sneezing, with consecutive swelling of the nasal mucous membrane, reddened conjunctivæ, lachrymation, slight blepharitis, intolerance of light, hoarseness, and a dry, barking cough. The general symptoms are reduced to languor, prostration, anorexia, slightly-increased temperature of the skin, thirst, and vespertine exacerbations, which, in nervous children, may attain to delirium at night. The tongue is coated, taste bad, and pressure upon the stomach painful. Occasionally the febrile symptoms decline somewhat after a profuse epistaxis.

All these symptoms increase in intensity from day to day, and usually manifest themselves only a few days after infection occurred.

According to *Kerschensteiner's* accurate observations, a period of from ten to twelve days always intervenes between the day that the first child in a family is attacked by measles and the day the other children to whom he gives the disease fall sick. *Panum*, who under extremely favorable circumstances watched an epidemic of measles on the Faroe Islands, assumes a stadium of precisely fourteen days. But, since we know that the exanthema also infects as soon as it has appeared upon the skin, it may therefore be assumed with great probability that the children who subsequently fell sick carried about them the morbilli poison for from ten to fourteen days. The prodromes do not come on till from three to five days before the actual breaking out of the exanthema, and hence it is clear that the morbilli poison remains perfectly inert for the first six or seven days after its reception.

2.) Stadium Eruptionis.—The exanthema first appears on the face, cheeks, or dorsum of the nose, and from these places creeps over the neck to the trunk, on the upper, and lastly on the lower extremities. In previously healthy children, the eruption is completed in twelve hours; in general, however, it progresses slower than that of scarlet fever.

The exanthema begins with faint red, small round spots, of the

size of a lentil. These constantly grow redder—coalesce, when they stand close together, into irregular figures; still there is always some intervening normal integument. As they increase in redness, they also grow in height, and become elevated over the level of the skin, and, when they have attained to their utmost height, turn somewhat yellowish, but never form vesicles. Similarly red, elevated spots of the skin are present in genuine variola, which last for several hours, and cannot be distinguished from those of measles. But the general symptoms in these two exanthemata differ vastly, and genuine variola is hardly ever met with nowadays in civilized countries, on account of compulsory vaccination.

The red, elevated spots feel rougher than the normal integument, and the hand in passing over them perceives a very peculiar feel of unequal hardness. The mucous membrane of the mouth, in fact, also displays some unequally red spots, but here the exanthema is by far less distinct than in scarlatina.

The general symptoms reach their climax with the breaking out of the fever; most of the patients are delirious, very restless, and mislead one to suspect a very grave disease. The bowels are constipated; the urine is dark red, rich in uric acid and urates.

3.) Stadium Florescentiæ.—Measles are visible on the skin for four days; the fever and mucous-membrane symptoms continue in a moderate degree, but the general disturbances visibly decline. The eruption fades in the same order of procession as it appeared, namely, first in the face, next on the trunk, and lastly on the extremities. The greatest amount of tension and swelling is seen on the second day after the eruption; by the fourth these have subsided. The integument sometimes becomes yellowish before it returns to its normal color, and by the fourth day only indistinct traces of the faded exanthema are seen. The conjunctivitis and nasal catarrh also improve, while the bronchitis, on account of the great extent of the ramifications of the respiratory mucous membrane, often continues for a long time, and even in a severer degree than at the beginning. Here the expectoration is very considerable. As soon as the exanthema has faded on the whole body, the skin begins to desquamate, and the process is known as the

4.) Stage of Desquamation (*Stadium Desquamationis*).—Wherever the eruption occurred, there the epidermis is thrown off; not, however, as in scarlatina, in large laminæ, but always only in very small scales, which often lie upon the skin like a white dust, and is best seen when it is rubbed with a black cloth. The more abundant the exanthema, the more whitened and dusty will the cloth become. The mucous membrane of the nose and eyes is now perfectly free, but that of the bronchi, even in normal measles, discharges a considerable quantity of secretion for several weeks by coughing.

The general condition improves remarkably quickly, so that it is scarcely possible to keep the child in bed for more than three or four days after the exanthema has faded. With the exception of the cough, that annoys them but little, these patients are now entirely free from all morbid derangements; they sleep well, their appetite is excellent, the stools and urine are normal, and the strength, which had been considerably reduced by the disease, is recovered in a few days. This is the picture of a normal case of measles, as seen, in any moderate epidemic, in an otherwise healthy child.

B.—*VARIATIONS AND SEQUELÆ.*

These are (1), deviations in reference to the exanthema; (2), in reference to the mucous membranes; (3), in reference to the general affection; and (4), a list of frequent and malignant sequelæ.

1.) Modification of the Exanthema.—The exanthema does not always appear in the order above described. In the nervous, irritable child, especially when covered with superfluous clothing, it breaks out as early as the second day after the appearance of the prodromata, and often departs from its usual order of progress. It may appear first on the extremities instead of the face: the small, red dots may coalesce in some places, and then it becomes difficult to distinguish this eruption from that of scarlatina. These larger spots, however, are never diffused over the whole body, and, besides, they always possess points sufficiently characteristic of measles not to be confounded. An eruption of vesicles, the so-called miliaries, also sometimes appears in the course of measles—still much more infrequently than in scarlatina. When it does occur, however, the desquamation is always more abundant, and larger laminæ are cast off. In malignant epidemics, the exanthemata become bluish, and do not entirely disappear, but leave behind them ecchymosis, and are complicated with malignant affections of the mucous membranes.

The florescence may be variable in duration. Sometimes it lasts only for two or three days, but it may also be seen for five or six days, and it is even reported to have totally disappeared and returned again in a few days with renewed fever.

2.) Participation of the Mucous Membranes.—The mucous membranes are much more extensively and intensively affected in morbilli than in scarlatina, and danger is more frequently to be apprehended from that source than from the morbilli poison.

The ordinary conjunctivitis may become a pernicious blennorrhœa, with severe œdema of the lids.

The nasal catarrh may give rise to such an irritation of the mucous membrane that incessant sneezing, marked congestion of the head, and exhaustion, finally ensue.

The inflammation of the palate and glottis sometimes occasions such an unceasing irritation and coughing as to cause true paroxysms, not unlike whooping-cough, accompanied with vomiting and hæmorrhage.

In malignant epidemics, it becomes more than simple congestion and catarrh of the mucous membranes. Diphtheritic membranes soon form, by which perforation of the cornea, and gangrene of the lids, fetid coryza, and salivation, may result. And, when the mouth and larynx are invaded, salivation and urgent croupous symptoms come on.

Lobar and lobular pneumonia are extremely frequent in measles, and these in particular destroy a great many children under one year of age.

The intestinal canal is much less frequently implicated in this disease than the respiratory organs; still, diarrhœa, of a very pernicious character, also occurs sometimes. The uropoëtic system, quite different from scarlatina, wherein nephritis and albuminuria are the most frequent complications, rarely becomes affected in measles. In girls, diphtheritis of the vagina occasionally occurs, which usually eventuates in gangrene of the labia and death.

3.) Character of the Fever.—Same as in scarlatina: (1), an erethetic; (2), a synochal; (3), a torpid, and (4), a septic character, which may manifest itself in whole epidemics as well as in individual constitutions. Every thing that has been said upon this point, as relates to scarlatina, is equally applicable to measles.

The erethetic form is the usual one, and has been described under "A.—*Normal Morbilli.*" None of its symptoms become grave; the eruption comes and goes at the right time, and is of moderate intensity; the affections of the mucous membrane, the fever, and the cerebral symptoms, are within proper bounds, and there follow no sequelæ of import.

When the vascular excitement becomes very considerable, the *synochal* inflammatory character is assumed. In most instances it is ushered in by a violent precursory stage. The inflammatory affections of the mucous membranes are very severe, the skin becomes burning hot, and the whole body instantly dotted with dark-red, prominent spots. The cerebral symptoms look very threatening; wild delirium alternates with profound soporific sleep. The intensely-developed exanthema, in most instances, lasts longer than four days, and may be distinctly perceived on the fifth and sixth day. The desquamation, corresponding to the preceding intense cutaneous congestion, is very marked. Consecutive affections are frequently observed.

In malignant epidemics, and in cachectic and especially scrofulous children, the torpid character of the fever is most marked and frequent. Here the precursory stage is protracted by grave symptoms, and an extraordinarily rapid exhaustion is noticeable from the very first. The patients complain of vertigo and pains in the limbs, and are fearfully anxious, restless, and sleepless. The pulse is very much accelerated, and small and easy to compress, which, with vomiting, profuse diarrhœa, and croup-like paroxysms of coughing, present a list of symptoms which, even before the eruption of the exanthema, give reason for a very unfavorable prognosis.

The exanthema itself, in this form, seldom appears at the right time, properly developed. It disappears again directly after its appearance, is only seen on some parts of the body, and never attains the usual vivid-red color.

The mucous membranes are very much disposed to diphtheritic inflammation. Profuse diarrhœa, malignant bronchitis, croup, and simple enervation, without any demonstrable morbid lesions, sometimes terminate life.

An eruption of measles, presenting the highest grade of this character, constitutes the *septic* or *putrid* variety. The eruption appears irregularly, and soon becomes complicated with ecchymosis. Coma and syncope are the most prominent cerebral symptoms. The diphtheritic mucous membrane is prone to gangrenous action, and in girls this soon extends to the vulva. Profuse nasal and intestinal hæmorrhages may soon induce a high degree of anæmia, or even scorbutic condition.

This putrid or torpid character is by no means always present from the commencement. It also happens that measles, which at first appeared as synochal, alter their character entirely, in the course of a few days, to that of the putrid variety, and, for this reason, this distinction of different forms has less accurate scientific than practical therapeutic value.

4.) Sequelæ.—The most frequent, and, at the same time, the most serious sequel of measles, is tuberculosis. Sometimes it develops very rapidly and intensely as miliary tuberculosis, so that the patients never recover enough to leave the bed, but continue to suffer from fever, and to cough and emaciate from the time the exanthema disappeared. Generally, however, a lengthy interval is observed between the disappearance of the eruption and the appearance of the first tuberculous symptoms. These children get up again, are free from fever, have good appetite, and the measles is forgotten. A slight bronchitis, however, has remained, and persists, in defiance of the best nursing, uniform temperature, and the numerous expectorants. Very gradually, vespertine exacerbations are noticed, followed by general indisposition,

loss of spirits and strength, and with this the cough increases in severity. The emaciation becomes more and more marked, the tuberculous phenomena are soon physically demonstrable, and, in most instances, rapidly advance to a fatal termination. Their progress is rarely arrested, but, when this does occur, such children will for years be prone to bronchitis, and will often experience new tuberculous attacks. A more detailed description of the symptoms belonging to this condition is to be found in the section on pulmonary tuberculosis, page 313.

Otorrhœa is another consecutive disease, and, in most instances, is complicated with tuberculosis, and often resists the astringent treatment for many months. Impetigo and eczema of the face, and of the scalp, especially behind the ears, are also very common sequelæ. In scrofulous children, chronic inflammation of the eyes, particularly blepharitis, remains for a long time.

Sometimes the diphtheria occasions very protracted hoarseness, or a croup, which, however, in general, affords a somewhat more favorable prognosis than pure fibrinous croup.

Intestinal catarrhs likewise occur, seldom, however, become colliquative, and are quickly arrested by a judicious diet and proper astringents.

In badly-nourished, cachectic children, noma also occasionally supervenes.

The remaining lesions represented as sequelæ, such as hydrothorax, ascites, pericarditis, meningitis, etc., occur so rarely, that one is led to doubt whether he should ascribe any direct connection between them and measles.

At the autopsy, lobar and lobular pneumonia, diphtheria of the mouth and its effects, intestinal catarrh, gangrene of the vulva, etc., are found, but neither in the blood, nor in any organ, can any alteration be discovered that will furnish a clew to the nature of measles.

Diagnosis.—Measles may be confounded with *scarlatina* and *erythema*. Very many new-born children, and infants a few weeks old, are attacked by a fine punctated erythema, diffused all over the body, which differs in no respect from the eruption of measles. This is, most probably, produced by mechanical causes; the young, delicate cuticle, not yet sufficiently accustomed to the contact of the air, baths, and clothing, becomes irritated, and its papillæ inflamed and enlarged. This exanthema, in most cases, lasts for several days, vanishes, returns occasionally, but ordinarily is not complicated with catarrhal symptoms. If these accidentally happen to be present, the whole affection will not run such an exactly rhythmical course, and is not ushered in by such violent fever as ushers in measles. Moreover,

erythema of the new-born child occurs without any contagion. This is particularly instructive when taken in connection with the circumstances that new-born children are far less susceptible to the morbilli contagion than older ones, and usually escape the disease, although it may be in the same house with them.

The differential diagnosis between measles and scarlet fever is occasionally attended by difficulties, especially when both diseases prevail simultaneously in the same locality. It may, therefore, prove useful if the principal symptoms and distinctive characteristics of both exanthemata are once more enumerated side by side.

DIFFERENTIAL DIAGNOSIS.

MORBILLI.	SCARLATINA.
The precursory stage lasts from three to four days.	The exanthema breaks out on the second or third day.
The most constant of the precursory symptoms are: conjunctivitis, intolerance of light, nasal and bronchial catarrh, sneezing, snuffling, hoarseness, coughing. Frequency of the pulse and the temperature of the skin but slightly augmented.	The catarrhal symptoms are almost totally absent. On the other hand, marked dysphagia is present, due to swelling of the tonsils. The fever is intense before the eruption of the exanthema.
The exanthema consists of small, roundish, red spots, slightly elevated above the skin, and only on very few places coalesce and form larger, unequally-elevated patches. It breaks out first on the face.	The eruption, in most instances, covers the entire body, or at least covers large, flat, irregular patches. It is most intense on the parts of the body of the child which are covered. It begins on the neck, and usually spares the face.
As soon as the rash has broken out, all the critical general symptoms disappear.	Fever and angina continue unabated during the florescence.
The exanthema of measles, in general, lasts somewhat longer than that of scarlatina. On the fourth day it is very distinctly seen; on the fifth and sixth it is often still present, though less distinct.	The exanthema of scarlet fever, as a rule, is completely gone on the fourth day.
Desquamation in a fine, white powder.	Desquamation in large laminæ.
Sequelæ: tuberculosis, bronchitis, inflammations of the eye, croup, and pneumonia.	Sequelæ: nephritis, dropsy, parotitis, and otorrhœa.

Notwithstanding these differential cardinal points, the diagnosis in some cases remains doubtful, and for this reason also totally un-