

ance of the eruption is effected in two, three, or four days, and accordingly the time occupied by the eruption varies from three to seven days in its entirety. As the eruption fades away, the process of shedding goes on—at first, and for a short period, of a fine, furfuraceous desquamation, the shedding of large scales being subsequently the rule in most cases. The decline of the eruption is coincident with a diminution of the fever, and moderation of the general symptoms. The fever declines by lysis—by a gradual lengthening of the remissions and shortening of the exacerbations. The pulse subsides with the fever, the delirium ceases, the skin becomes moist, sudamina form, there is less and less trouble with the throat, and swallowing becomes easier; membranous exudations are cast off, the tonsils return to their normal size or nearly so, the tongue becomes moist, and its epithelium is reproduced; the appetite returns; the urine passes more abundantly, and carries off wasted and fatty epithelium, the albumin disappearing; and thus, in about ten to twelve days from the beginning of the symptoms, convalescence is established. But few cases, however, go through so mild a course. The points on which the scarlatinal poison may exert peculiar force are various. The degree in which the cervical glands are involved differs greatly. In the mildest there is simply some slight tumefaction of the lymphatics in the neighborhood; in the severest, the whole space between the chin and chest is filled in, extensive suppuration occurs, sloughing takes place, or more or less gangrene. Between these extremes there are numerous gradations of severity. The throat affection may be severe, and the exanthem light, and *vice versa*. It is sometimes the case that, when the throat affection is subsiding and the cervical glands are shrinking to the normal, a new disturbance arises in the glands; they swell to a considerable size, fever comes on, and convalescence is postponed. In the author's experience this reëxcitement in the cervical glands is secondary to an exacerbation of the renal troubles. Great differences also exist in the amount of the kidney complication. The absence of objective evidences of kidney-disease in the urine does not necessarily imply a healthy state of the kidneys. There are, however, very few cases in which a trace of albumin is not visible. When the hyperæmia of the kidney occurs, the urine, besides being scanty and acid, has a smoky appearance, from the presence of altered blood-globules uniformly distributed through it. On cooling, the urine usually deposits a great quantity of urates, cast-off epithelium (Figs. 39, 40, 43), and casts containing much of the tubular epithelium. The epithelium and casts are found at, or about, the time desquamation of the skin has commenced. The amount of albumin, when it first appears, is small. As the fever declines, and desquamation goes on favorably, the amount of urine discharged increases very much; it assumes a watery appearance and its specific gravity is low;

the albumin disappears, and in a short time the urine becomes normal. Parenchymatous nephritis usually develops during the desquamation period, in the third week, and rarely in the second. Then the urine becomes turbid from the presence of urates, blood-corpuscles, granular matter, casts, etc., is rather scanty and high-colored, and throws down a great quantity of albumin. No absolute rule can be laid down as to the period when the most pronounced renal symptoms will make their appearance, but the time named above must be regarded as usual. The occurrence of renal changes is the signal for other disturbances. The lymphatic glands of the neck enlarge very much, the appetite goes, and there are nausea, vomiting, and constipation, and sometimes a severe diarrhœa. Violent headache, disorders of vision, hallucinations, illusions, muscular twitchings, and eclampsia are experienced. The convulsions may be very violent in children, and one succeed another, with days of unconsciousness. The eyelids are swollen, and the legs pit on pressure. The urine may become very scanty, almost suppressed. The temperature may run very high, and the pulse be slow, falling to 60, 56, 50, and even lower, or the opposite conditions may prevail—the temperature may be below normal, and the pulse small, rapid, and feeble. As the symptoms become less grave, the urine flows more abundantly, but casts and epithelium may be present for some days, and albumin for weeks after the disappearance of any apparent disease.

Course, Duration, and Termination.—In the mildest form of scarlatina there may be a simple hyperæmia of the fauces, some swelling of the submaxillary glands, a transient fever of two or three days' duration, and the whole terminating in three or four days. In other cases there may be a pronounced rash, but no throat affection, no implication of the kidneys, and a few days of a mild fever, desquamation being almost entirely furfuraceous. But these mild cases may be followed by albuminuria and general dropsy, acute rheumatism, and other complications. Sometimes the case seems of the mildest character at the onset, but develops into a state marked by all the characteristics of a profound toxæmia. Others begin in that way. At the very onset, headache, delirium, convulsions, coma, tetanic cramps, and rigidity of the extremities, uncontrollable vomiting, severe dyspnoea, and a rapid, very feeble pulse, indicate the severity of the blood-poisoning, and death occurs in collapse before the eruption appears. As in every epidemic many of the mild, insignificant cases occur, so an occasional example of all that is most virulent in the scarlatina-poison is manifested in these cases, fatal within twenty-four hours of their appearing. On *post-mortem* examination no lesions of importance are to be seen, because the changes are of a subtile kind, occurring chiefly in the blood. During the course of a perfectly normal case of the disease, symptoms of a very formidable character may come on, consisting in

sudden and great prostration of the powers of life, the pulse becomes extremely weak, the eruption fades, the skin grows cold, and death usually occurs in a few hours. In many cases, after a satisfactory course to the period of desquamation, the troubles growing out of a renal complication begin. There are differences in different epidemics as to the liability to this complication. When it occurs a general œdema ensues, and dropsical accumulations form in the great cavities, especially in that of the peritoneum. The urine is scanty, dark from the presence of blood, has a high specific gravity, and is heavily loaded with albumin. There are present vomiting and purging, dyspnoea from accumulation in the cavities, headache, somnolence, fever which varies in type, but is usually characterized by considerable remissions, the pulse being very slow and irregular. These cases of scarlatinal dropsy are usually quite fatal, not so much directly from the kidney-lesion, but indirectly from the pulmonary and intestinal complications. In other groups of cases, the specific gravity of the urine falls very low, and the quantity is also very scanty, and may be suppressed even for several days. Very formidable symptoms of uræmic intoxication arise under these circumstances, including defects of vision (amblyopia, amaurosis, albuminuric retinitis*), coma, convulsions (partial of muscles of mouth and extremities, trismus, and general). During such attacks death may ensue from the cerebral complications, by sudden œdema of the lungs, by exhaustion, etc. Although the prognosis is grave under these circumstances, remarkable recoveries from such states are noted during every epidemic. When a tendency to recovery exists, the stupor diminishes, the convulsions cease, the stomach becomes quiet, and food is taken, and the urine becomes abundant. There is a great tendency to relapse, and the change for the worse is often due to the use of solid and indigestible food. Even in those cases proceeding to a favorable termination, the urine is found to contain albumin in small quantity, after apparent entire recovery. These cases usually last from one to two or three months before entire restoration is accomplished. Other cases are remarkable for the persistently high fever, the extent of the throat affection, the severe intestinal troubles, and the cerebral complications due not to uræmia, but to the blood-poisoning. In these cases, which are often fatal, the result may be due to the consequences of the high temperature—reaching 106°, 107°, 108°, and even 109° Fahr.—while the pulse is at 200°; to the obstruction to respiration in the condition of the throat; to septicæmia, cerebral hæmorrhage, hydrocephalus, convulsions, etc.; or to the exhaustion caused by extensive suppuration, sloughing, and gangrene of the throat, etc. The duration of such cases will vary from a few days to a week, or sometimes longer. *Recurrent scarlatina* is a form of the disease in which,

* "Die Albuminurie," etc., von Dr. Hugo Magnus, Leipsic, 1873, *op. cit.*

after the whole process is completed and convalescence established, there occurs an entire repetition of the first seizure, including the desquamation. The second is somewhat shorter and less violent than the first attack. Another irregular form—to conclude the somewhat numerous varieties—is the hæmorrhagic. This is one of the most formidable varieties of the disease. The eruption is imperfectly developed, dark in color; the throat is much swollen, and diphtheritic exudations occur, followed often by gangrene; hæmorrhages take place from the mucous surfaces, from the kidneys, into the substance of internal organs, from the uterus, etc. These cases are uniformly fatal, death ensuing within the first week. Any prognostications in regard to the course and termination of a case of scarlatina should be guarded, for no disease is more uncertain. The case may be regarded as manageable when the initial stage is not severe, the eruption appears at the proper time, and attains its maximum on the second or third day, the throat affection is not extensive, the temperature never goes above 104° Fahr., and the pulse does not exceed 140; the cerebral symptoms consist only of a transient delirium at the highest point of the disease; the temperature regularly and uniformly declines as the desquamation proceeds normally, and no other symptoms arise. Certain complications may exist without life being put in jeopardy. There may be mild complications of the kidney, and slight affections of the joints. The character of the epidemic is an important factor in the prognosis of individual cases. The mortality in different epidemics varies much—from ten to forty per cent.—and is determined largely, apart from the type of the epidemic, by the hygienic surroundings, and especially by age, infants succumbing in larger proportion than children and young adults.

Treatment.—As scarlatina is a self-limited disease, and as we possess no specific against it, our treatment must necessarily be symptomatic. In directing treatment against the symptoms as they arise, we may select with advantage those remedies having a power to destroy ferments. During every epidemic there are numerous mild cases, which require only regulation of the diet, confinement, and supervision; for the mildest cases may be followed by serious complications. For the initial fever, tincture of aconite-root (half a drop to a drop every hour, according to age, in a teaspoonful of water), and, preferably, the tincture or infusion of digitalis (from one to ten drops every two hours of the tincture, or five minims to a drachm of the infusion every two hours), are the most useful remedies. If the stomach is exceedingly irritable, and these remedies are rejected, a combination of carbolic acid and tincture of iodine is highly serviceable (℞. Tinctura iodinii, ʒ ij, acid. carbolic. ʒ j. M. Sig. One half a drop to one or two drops every two to four hours in water). If constipation exist at the same time there is vomiting, the usual condition during the initial stage, the most effi-

cient laxative is calomel—from one sixth to one grain rubbed up with sugar and dropped on the tongue. During the period of eruption, should the surface be pale, the circulation feeble, and the eruption tardy in development, belladonna is the appropriate remedy (from two to ten drops of the tincture every two hours), or, if this fail, turpentine. If the temperature is very high during the eruption stage, and there is delirium, the kidneys acting freely, the wet pack is the most efficient remedy. If this will not be permitted, or is impracticable, the skin should be freely and often sponged with cold water, and rubbed with fat—lard, suet, cacao-butter, etc. In all cases when the eruption is abundant—is out freely—the fat should be used, the whole body in turn anointed every four hours. The effect of this is to allay the unpleasant heat and burning and to reduce the temperature. If vomiting continues during this period, the remedies indicated for this condition of things during the stage of invasion are appropriate at this period. Should diarrhœa be present with vomiting, an excellent means of arresting both consists in the use of bismuth and carbolic acid (℞. Bismuthi subnitrat. ʒj ad ʒij, acid. carbolic. grs. ij ad grs. viij, mucil. acaciæ, aquæ menth. pip., āā ʒj. M. Sig. A teaspoonful every two to four hours). If the throat complication is at all severe, the best method of treating it is to apply wet compresses, cold or warm, to the neck, enveloping it with several folds. The throat should be frequently gargled, if the age permit it, with hot milk-and-water, or pieces of ice may be held and allowed to melt slowly, keeping them well back in the mouth. Caustic applications should be avoided under ordinary circumstances. If sloughing and gangrene are taking place, strong solutions of nitrate of silver, the mineral acids, solutions of carbolic acid, and of permanganate of potassa, chlorate of potassa, etc., may be used. If there is much fetor, dilute sulphurous acid, iodine, and carbolic acid together, in solution, are effective, and may be freely applied to the fauces, and to all suppurating and sloughing surfaces. If there be active delirium during the eruption stage, the most appropriate medicaments for the relief of this condition are bromide of potassium, chloral (if the heart's action is good), morphine, and quinine in combination, if there is anæmia of the brain. During desquamation, the fat inunctions should be continued. Inflammations of the eye and of the ear occurring at this time should receive attention. Kidney complications demand treatment which shall be adapted to the condition present. If the urine is scanty, bloody, and of high specific gravity, if there are pain in the back and strong pulse, leeches or cups should be applied to the lumbar region. Large draughts of water or of milk, milk and lime-water if the stomach is irritable, cream-of-tartar lemonade, infusion of digitalis, topical application to the lumbar region of digitalis, pilocarpine, etc., are the most appropriate remedies. For further particulars of the treatment of the kidney complication,

the reader is referred to the sections treating of these diseases. For those cases exhibiting profound alterations of the blood, the remedies possessing anti-ferment powers, as carbolic acid, salicylic, benzoate of soda, thymol, etc., may be employed. The most useful of these, the author believes, is the combination of carbolic acid and iodine, already mentioned. Extraordinary results have been claimed for the carbonate of ammonia, and equally confident claims have been put forward for yeast. The character of epidemics varies so much that caution is necessary in accepting the conclusions of over-confident therapeutists.

DIAGNOSIS OF VARIOLA, VARICELLA, RUBEOLA, ROSEOLA, AND SCARLATINA.

To avoid repetition, and to make the differentiation as clear as possible, the question of the diagnosis of the above diseases has been postponed until they have been considered in the regular way. They may be compared in their period of invasion, stage of eruption, and stage of desquamation.

Stage of Invasion.—In small-pox the duration of this stage is three days, or until the third exacerbation of the fever; in measles, four days or longer; in scarlatina, one day or two. In measles there is a strongly marked remission at the end of the second or the beginning of the third day—in small-pox there is no such remission; in measles the temperature does not decline at the appearance of the eruption—in small-pox there is a marked remission or an entire cessation of fever when the eruption appears; in small-pox the stage of invasion is often diversified by rashes and there is no coryza—in measles there is coryza but there are no initial rashes. The invasion stage of scarlatina differs from small-pox in duration, in the absence of any initial rashes, in the higher temperature, in the coincident angina, and swelling of the lymphatics.

Stage of Eruption.—The eruption of variola is first red spots, then papules, then vesicles, and finally pustules, and they appear first on the face, forehead, and head; that of measles is reddish, lenticular spots, slightly elevated above the skin, and imparting a sense of roughness to the surface; that of varicella, vesicles; that of roseola, rose-red spots like measles, but not so prominent; that of scarlatina, bright-red spots and diffused redness, with punctations of deeper red. The eruption of small-pox on its appearance has an indurated feel, as of a solid body—a bird-shot—in the skin; that of measles imparts a sense of roughness wholly on the surface; that of varicella has to the touch the sensation of a vesicle elevated above the surface; and that of scarlatina has no roughness, but is a vivid scarlet-red spot, which disappears on pressure, to return as soon as the pressure is removed. The eruption of small-pox requires many days to develop, and its maturation is accompanied by distinct fever; that of measles, roseola, vari-