Hence the importance of local treatment. It is not well to attempt forcibly to remove the false membranes, though some writers recommend that they should be scraped off. As far as possible thorough cleanliness and disinfection of the fauces should be insured by repeatedly spraying, either with carbolic acid, corrosive sublimate (two grains to the pint), chlorine-water, boric acid, Condy's fluid, salicylic acid or peroxide of hydrogen (50 per cent solution), or local application of sulphur with iodoform is recommended. The tonsils and fauces may be thoroughly swabbed every hour or two with a solution of carbolic acid (♏xv) and perchloride of iron (ʒ ijss.) in glycerin (℥ j) and water (℥ j). Agents which are believed to dissolve the membrane are lactic acid, which may be employed with lime-water (two drachms to six ounces) and trypsin (thirty grains to the ounce).

Pepsin has also been used, and the vegetable pepsin, which may be mixed with water and glycerin.

Nasal diphtheria requires prompt and thorough disinfection of the passages. The best solutions are those recommended by Jacobi—chloride of sodium, saturated boric acid, or one part of bichloride of mercury, thirty-five of chloride of sodium, and one thousand of water, or the one per cent solution of carbolic acid. The solution may be applied with a syringe or a spray. To be effectual the injection must be properly given. The nurse should be instructed to pass the nozzle of the syringe horizontally, not vertically; otherwise the fluid will return through the same nostril. In refractory children there is sometimes great difficulty in giving these injections, in which case suppositories of boric acid may be employed, but they are not efficient substitutes.

When the larynx becomes involved a steam tent may be arranged upon the bed, so that the child may breathe an atmosphere saturated with moisture. If the dyspnœa becomes urgent, an emetic of sulphide of zinc or ipecacuanha may be given. When the signs of obstruction are marked, however, there should be no delay in the performance of intubation or tracheotomy. The diphtheritic paralysis requires rest in bed, and the avoidance of sudden exertion, particularly in those cases in which the heart-rhythm is disturbed. In the chronic forms with wasting, massage, electricity and strychnine are invaluable aids. If swallowing becomes very difficult, the patient must be fed with the stomach-tube, which is very much preferable to feeding per rectum.

XVI. ERYSIPELAS.

Definition.—An acute, contagious disease, characterized by a special inflammation of the skin caused by streptococci.

Etiology.—Erysipelas is a wide-spread affection, endemic in most communities, and at certain seasons epidemic. We are as yet ignorant of the atmospheric or telluric influences which favor the diffusion of the poison.

It is particularly prevalent in the spring of the year. This was very noticeable in the Philadelphia Hospital, in which the erysipelas wards were usually empty except in the spring and autumn months. The affection prevails extensively in old ill-ventilated hospitals and institutions in which the sanitary conditions are defective. With the improved sanitation of late years the number of cases has materially diminished. It has been observed, however, to break out in new institutions under the most favorable hygienic circumstances. Erysipelas is both contagious and inoculable; but, except under special conditions, the poison is not very virulent and does not seem to act at any great distance. It can be conveyed by a third person. The poison certainly attaches itself to the furniture, bedding, and walls of rooms in which patients have been confined.

The disposition to the disease is wide spread, but the susceptibility is specially marked in the case of individuals with wounds or abrasions of any sort. Recently delivered women and persons who have been the subject of surgical operations are particularly prone to it. A wound, however, is not necessary, and in the so-called idiopathic form, although it may be difficult to say that there was not a slight abrasion about the nose or lips, in very many cases there certainly is no observable external lesion.

Chronic alcoholism, debility, and Bright's disease are predisposing agents. Certain persons show a special susceptibility to the disease, and it may recur in them repeatedly. There are instances, too, of a family predisposition to the disease.

The specific agent of the disease appears to be a streptococcus which has been very thoroughly studied by Koch and Fehleisen. It was believed at first to have specific and peculiar morphological properties, but it is now generally held that it cannot be distinguished by any biological or chemical tests from the *streptococcus pyogenes*.

Morbid Anatomy.—Erysipelas is a simple inflammation. In its uncomplicated forms there is seen, post mortem, little else than inflammatory œdema. Investigations have shown that the cocci are found chiefly in the lymph-spaces and most abundantly in the zone of spreading inflammation. In the uninvolved tissue beyond the inflamed margin the micrococci are to be found in the lymph-vessels, and it is here, according to Metschnikoff and others, that an active warfare goes on between the leucocytes and the cocci (phagocytosis). In more extensive and virulent forms of the disease there is usually suppuration. It is stated that the inflammation may pass inward from the scalp through the skull to the meninges. This I have never seen, but in one case I traced the extension from the face along the fifth nerve to the meninges, where an acute meningitis and thrombosis of the lateral sinus were excited.

The visceral complications of erysipelas are numerous and important. The majority of them are of a septic nature. Infarcts occur in the lungs,

spleen, and kidneys, and there may be the general evidences of pyæmic infection.

Some of the worst cases of malignant endocarditis are secondary to erysipelas; thus of twenty-three cases three occurred in connection with this disease. Septic pericarditis and pleuritis also occur.

As just mentioned, the disease may in rare cases extend and involve the meninges. Pneumonia is not a very common complication.

Acute nephritis is also met with. It is often ingrafted upon an old chronic trouble.

Symptoms.—The following description applies specially to erysipelas of the face and head, the form of the disease which the physician is most commonly called upon to treat.

The *incubation* is variable, probably from three to seven days.

The stage of *invasion* is often marked by a rigor, and followed by a rapid rise in the temperature and all the characters of an acute fever. When there is a local abrasion, the spot is slightly reddened; but if it is idiopathic, there is seen within a few hours slight redness over the bridge of the nose and on the cheeks. The swelling and tension of the skin increase and within twenty-four hours the external symptoms are well marked. The skin is smooth, tense, and œdematous. It looks red, feels hot, and the superficial layers of the epidermis may be lifted as small blebs. The patient complains of an unpleasant feeling of tension in the skin; the swelling rapidly increases; and during the second day the eyes are usually closed. The first-affected parts gradually become pale and less swollen as the disease extends at the periphery. When it reaches the forehead it progresses as an advancing ridge, perfectly well defined and raised; and often, on palpation, hardened extensions can be felt beneath the skin which is not yet reddened. Even in a case of moderate severity, the face is enormously swollen, the eyes are closed, the lids greatly œdematous, the ears thickened, the scalp is swollen, and the patient's features are quite unrecognizable. The formation of blebs is common on the eyelids, ears, and forehead. The cervical lymph-glands are swollen, but are usually masked in the œdema of the neck. The temperature keeps high without marked remissions for four or five days and then defervescence takes place by crisis. The general condition of the patient varies much with his previous condition of health. In old and debilitated persons, particularly in those addicted to alcohol, the constitutional depression from the outset may be very great. Delirium is present, the tongue becomes dry, the pulse feeble, and there is marked tendency to death from toxæmia. In the majority of cases, however, even with extensive disease, the constitutional disturbance, considering the height of the fever range, is slight. The mucous membrane of the mouth and throat may be swollen and reddened. The erysipelatous inflammation may extend to the larynx, but the severe œdema of this part occasionally met with is commonly due to extension of the inflammation from without inward.

There are cases in which the inflammation extends from the face to the neck, and over the chest, and may gradually migrate or wander over the greater part of the body (*E. migrans*).

The close relation between the erysipelas coccus and the pus organisms is shown by the frequency with which suppuration occurs in facial erysipelas. Small cutaneous abscesses are common about the cheeks and forehead and neck, and beneath the scalp large collections of pus may accumulate. Suppuration seems to occur more frequently in some epidemics than in others, and at the Philadelphia Hospital one year nearly all the cases in the erysipelas wards presented local abscesses.

Complications.—Meningitis is rare. The cases in which death occurs with marked brain symptoms do not usually show, post mortem, meningeal affection. The delirium and coma are due to the fever, or to toxæmia.

Pneumonia is an occasional complication. Ulcerative endocarditis and septicæmia are more common. Albuminuria is almost constant, particularly in persons over fifty. True nephritis is occasionally seen. Da Costa has called attention to curious irregular returns of the fever which occur during convalescence without any aggravation of the local condition.

The diagnosis rarely presents any difficulty. The mode of onset, the rapid rise in fever, and the characters of the local disease are quite distinctive. Acute necrosis of bone may sometimes be regarded as erysipelas, a mistake which I once saw made in connection with the lower end of the femur.

Prognosis.—Healthy adults rarely die. In the new-born, when the disease attacks the navel, it is almost always fatal. This is probably an acute septic infection. In alcoholic subjects and in the aged erysipelas is a serious affection, and death may result either from the intensity of the fever or, more commonly, from toxæmia. The wandering or ambulatory erysipelas, which has a more protracted course, may cause death from exhaustion.

Treatment.—Isolation should be strictly carried out, particularly in hospitals. A practitioner in attendance upon a case of erysipelas should not attend cases of confinement.

The disease is self-limited and a large majority of the cases get well without any internal medication. I can speak definitely on this point, having, at the Philadelphia Hospital, treated many cases in this way. The diet should be nutritious and light. Stimulants are not required except in the old and feeble. For the restlessness, delirium, and insomnia, chloral or the bromides may be given; or, if these fail, opium. When fever is high the patient may be bathed or sponged, or, in private practice, if there is an objection to this, antipyrin or antifebrin may be given.

Of internal remedies believed to influence the disease, the tincture of the perchloride of iron has been highly recommended. At the Montreal

General Hospital this was the routine treatment, and doses of half a drachm to a drachm were given every three or four hours. I am by no means convinced that it has any special action; nor, so far as I know, has any medicine, given internally, a definite control over the course of the disease.

Of local treatment, the injection of antiseptic solutions at the margin of the spreading areas has been much practised. Two per cent solutions of carbolic acid, the corrosive sublimate and the biniodide of mercury have been much used. The injection should be made not into but just a little beyond the border of the inflamed patch. F. P. Henry has treated a large number of cases at the Philadelphia Hospital with the latter drug, and this mode of practice is certainly most rational.

Of local applications, ichthyol is at present much used. The inflamed region may be covered with salicylate of starch. Perhaps as good an application as any is cold water, which was highly recommended by Hippocrates.

XVII. SEPTICÆMIA AND PYÆMIA.

1. SEPTICÆMIA.

Definition.—A general febrile infection, without foci of suppuration, which results from the absorption of toxic materials produced by bacteria. The organisms producing septicæmia are, as a rule, those of suppuration—namely, the forms of streptococci and staphylococci.

Clinical Forms.*—(*a*) *Fermentation Fever.*—This is also known as the resorption fever, aseptic fever, or after fever, and is the simplest of all wound complications. It is the febrile process which is produced after transfusion or the injection of pepsin into the blood. The term fermentation fever was employed by Bergman, as he held that it was caused by the absorption of the fibrin ferments. This fever may follow an injury or operation, particularly if there has been necrosis of the superficial tissues by the solutions used in the dressing. It may also follow the extravasation of blood, particularly when under pressure or tension.

The fever, which appears a few hours after the injury or operation, is not preceded by a chill. It usually reaches its height rapidly, sometimes rising to 103° or 104°. The constitutional disturbance is not great, and it subsides spontaneously in from one to three days. This form is ranked as a septicæmia, since the ferment acts in a manner similar to the toxins produced by micro-organisms. It is not yet certain that bacteria do not play an important part in its production.

(*b*) *Sapræmia.*—This is a septic intoxication caused by the ptomaines produced in wounds by the putrefactive bacteria. There are various forms of these organisms; some are bacilli, others belong to the proteus group.

* I follow here the division in Senn's Principles of Surgery.

In their growth, chemical poisons (toxins) are produced, and under the term sapræmia is included the group of symptoms caused by the absorption of these toxins from any local focus of putrefaction.

The symptoms vary with the dose absorbed. Twenty-four hours, or later, after the injury or operation a chill initiates the constitutional disturbance; the fever rises rapidly, reaching 103° or 104°; the pulse is quick, and there may, in severe cases, be great prostration. Nervous symptoms are common—headache, restlessness, and delirium. The tongue is dry, often glazed, and there may at first be gastric irritation. The clinical picture is that of a severe infection. Three conditions must be present in this form of sepsis—dead tissue, infection of this dead tissue with putrefactive bacteria, and a sufficient time to have enabled the putrefactive bacteria to produce a toxic quantity of ptomaines (Senn). The necrotic tissue may be the blood-clot in a wound, the tissues in the interior of the uterus after parturition, or tissues bruised and rendered necrotic by injury or by the action of cold, heat, or chemical substances.

The outlook in sapræmia depends much upon the dose of the poison which has been absorbed and the possibility of removing and cleansing the infected focus.

(*c*) *Progressive Septicæmia.*—In this the septic intoxication is not the result of the bacteria of putrefaction, but organisms enter the blood from some local septic focus. "The intoxication in this form of sepsis is not only caused by ptomaines which are produced at the primary seat of infection, but ptomaines are also produced in the blood by the microbes which it contains" (Senn). The pus microbes are the most frequent cause of this form of septicæmia, and reach the blood either through the wall of the blood-vessels or through the lymph-channels.

The clinical features of this form are well seen in the cases of puerperal septicæmia or in dissection wounds, in which the course of the infection may be traced along the lymphatics. The symptoms usually set in within twenty-four hours, and rarely later than the third or fourth day. There is a chill or chilliness, with moderate fever at first, which gradually rises and is marked by daily remissions and even intermissions. The pulse is small and compressible, and may reach 120 or higher. Gastro-intestinal disturbances are common, the tongue is red at the margin, and the dorsum is dry and dark. There may be early delirium or marked mental prostration and apathy. As the disease progresses there may be pallor of the face or a yellowish tint. Capillary hæmorrhages are not uncommon.

The outlook is always serious. In severe cases death may occur within twenty-four hours, and in fatal cases life is rarely prolonged for more than seven or eight days. On post-mortem examination there may be no focal lesions in the viscera, and the seat of infection may present only slight changes. The spleen is enlarged and soft, the blood may be extremely dark in color, and hæmorrhages are common, particularly on the serous surfaces. Neither thrombi nor emboli are found.