

tion. Contrary to the results obtained from cultures, the pneumococcus must be considered the principal agent in producing the lung infection. The diphtheria bacilli are frequently found and may be the cause of bronchitis with membrane formation, of purulent exudation, of broncho-pneumonia, necrosis, and abscess. They are often found in the lung in much greater numbers than in any other situation, and there may be but little change in the tissue around them.

Spleen.—Lesions of the spleen play but a slight part in the pathological anatomy of diphtheria. The spleen macroscopically does not differ from the normal, except that the lymph nodules usually are more prominent. The most obvious lesion microscopically consists of the formation, in the lymph nodules, of foci of epithelioid cells which are of the same character and formed in the same way as those in the lymph nodes.

Intestines.—The lesions of the small and large intestine in diphtheria in man are relatively unimportant. They consist of hyperplasia of the lymphoid apparatus and the same other changes found in the lymph nodules elsewhere. The slight extent of the lesions does not indicate the action of toxins absorbed from the alimentary canal; they are probably due to the action of toxins from the blood current. There is nothing in the character of the lesions to indicate the elimination of the toxins by the alimentary canal.

Liver.—The lesions produced in the liver in diphtheria are not characteristic, and do not differ from those found in other acute infectious diseases. They are due to the effect of soluble toxic substances, and not to the presence of diphtheria bacilli. The most common lesions are a general degeneration of the liver cells, and necroses which are chiefly found in the centres of the lobules.

Kidney.—Lesions of the kidney varying from simple degeneration to the more serious conditions of acute nephritis are found in all fatal cases of diphtheria. Some of the lesions are somewhat more common in the mixed infections of diphtheria combined with scarlet fever than in pure diphtheria. The more severe forms of degeneration are found in those cases of diphtheria of great intensity which are fatal shortly after the onset.

The interstitial and glomerular lesions are more common in older children and in cases of longer duration of the disease, though these conditions usually are combined. There is no type of lesion peculiar to diphtheria. The lesions in the kidneys are not due to the presence of bacteria in the blood, but to the action of injurious substances in solution in the blood.

Nervous System.—All of the nerves in the twenty-eight cases examined showed various degrees of fatty degeneration, from slight to extreme. The degeneration seems almost invariably to begin in the myelin sheath.

As a rule the change in the myelin which causes it to stain with osmic acid in the Marchi method, begins at some point close to the axis cylinder and gradually spreads around and along it. The myelin breaks up into granules, droplets, and very irregular bizarre figures of which the peripheries usually are more refractive than the centres and often doubly contoured. As a rule the centres of the masses stain more deeply than the peripheries, but sometimes small black globules with pale centres appear.

The change in the axis cylinder seems to consist chiefly of swelling which is often irregular, so that the axis cylinder presents a beaded appearance. As it swells it stains very faintly, so that it is often difficult and sometimes impossible to make it out. When the myelin sheaths have undergone marked fatty degeneration, the axis cylinders usually cannot be distinguished. Whether they have simply swelled up and disappeared, or have undergone fatty degeneration, is difficult to determine; but in no axis cylinder which could be positively demonstrated was there any evidence of fatty degeneration.

Examination of the cerebrum five times, cerebellum twice, pons three times, medulla four times, and cord seven times, showed everywhere a slight to marked diffuse fatty degeneration of the white substance. The

same change was present in the anterior and posterior nerve roots.

The results of the investigation of the nervous system may be summed up as follows: There occurs in certain cases of diphtheria a slight to marked diffuse fatty degeneration of the nerve fibres of the central nervous system and of its peripheral extensions.

SYMPTOMS.—**Pharyngeal Diphtheria.**—**Mild Cases:** Those in which the local lesions are moderate in degree and in which the constitutional symptoms are not serious. These may be divided into two classes. In the first the onset is sudden; the temperature rises possibly to 103° F. in the first twelve hours and then rapidly falls, so as to reach the normal one or two days later. With the rise of the temperature the throat symptoms develop. The mucous membranes appear hyperemic and congested, and after a few hours more or less extensive patches appear on the swollen tonsils, soft palate, pharynx, or uvula. The local symptoms increase for twenty-four hours and then remain stationary. With the rise in temperature and the local signs of inflammation there are rapid pulse, loss of appetite, and some prostration. At the end of forty-eight hours the constitutional symptoms abate. The temperature is rarely above 101° F. The pulse may still be rapid, but is regular and of good force. The local inflammation subsides in from three to seven days, and the patient is fairly well except for a slight anemia. Even in these mild cases feebleness of pulse and heart beat may develop and danger of heart failure be present.

In the second class the throat inflammation develops slowly. There is a little pain on swallowing. The glands at the angle of the jaw are usually a little swollen and the throat feels sore. Inspection will show slightly swollen tonsils, with follicular deposits of exudate or small patches of pseudo-membrane. The temperature is not elevated more than one or two degrees or it may be normal. Except for slight loss of appetite, restless sleep, and slight prostration the symptoms are mainly those of a subacute throat inflammation. The exudate may be strongly adherent, so that it can be removed by force only, or it may be loosely attached. The diphtheria deposit remains for from two to seven days, and then recovery is established. A moderate amount of anemia persists for some weeks. Some cases in either of these two types may, instead of recovering, suddenly begin to extend and develop into the most severe type. Even in these mild cases slight paralysis may occur as late as three weeks after apparent recovery.

Severe Cases: Here, again, two extreme types of invasion are noted: the local and constitutional symptoms may slowly develop, or they may become fully developed within the first twenty-four to forty-eight hours, either with or without high temperatures. In exceptional cases a chill is the first symptom noticed.

The mind is usually clear, although in the worst cases mild delirium or stupor may develop. The mucous membrane of the pharynx and tonsils is reddened and swollen. The uvula may be oedematous, elongated, and greatly swollen. Portions or all of the mucous membrane of the tonsils, the pharynx, and the soft palate are covered with more or less thick and fibrinous pseudo-membrane of a grayish color. The glands of the neck and their adjacent tissues may be slightly or markedly swollen. If the nasal cavities are involved, the breathing and voice are affected. From the nose flows a discharge which may be of an intensely irritant character. The nasal obstruction may be partial, in which case the irritating fluid passes easily, or it may be total, so that it is possible to force fluid through the nose only under high pressure.

After from forty-eight to seventy-two hours the fever, if present, commonly subsides. In favorable cases the pulse becomes less frequent, and remains of fair force and regularity. The appetite improves and the intellect remains clear. After forty-eight hours the local symptoms remain stationary up to the fifth day, and then the swelling subsides; the membrane begins to loosen at the edges, and soon peels off, leaving a superficially

ulcerated surface, or it may more gradually melt away. The glands of the neck decrease in size, and the patient is convalescent and certain to recover unless dangerous paralysis develops.

In other cases the course of the disease is unfavorable. The temperature may fall nearly to the normal, but the pulse becomes more rapid, feeble, and irregular, or it may in certain toxic cases suddenly for a time become very slow—40 to 50 to the minute. Before death the heart's action usually becomes more irregular and rapid. Other patients grow apathetic. The urine is apt to be scanty and contain albumin and casts. These patients may suddenly develop uremic convulsions and die, or may gradually waste away. Some develop a persistent nausea and vomit all food. Others suffer from paralysis of deglutition and of the muscles of respiration. Still others seem to be recovering from the diphtheria when the symptoms and physical signs of pneumonia develop. The temperature then rises to 103° or 104° or even 106° F.

In other cases the false membrane does not limit itself to the pharynx but spreads to the larynx. These patients then have, in addition, the special symptoms due to obstruction to the breathing. Finally, there is a group of cases that seem to be fatal as if from gradual systemic poisoning by toxin. The patients lose weight, become pale and anæmic, have no appetite, the tongue is dry and coated, and they gradually sink away.

Malignant Cases: There are certain cases of diphtheria, both in children and in adults, which run an especially malignant course. Within twenty-four hours the tonsils, palate, and lateral portions of the pharynx are covered with thick membrane and are enormously swollen, the breath is sweetish, the saliva dribbles from the mouth, the glands of the neck and their surroundings tissues are greatly swollen. The temperature is frequently but slightly elevated or it may be subnormal. The heart's action is rapid and feeble or it may be very slow and irregular. Danger of heart failure is always present. The intellect, at first clear, becomes cloudy. Within from three to five days the most robust die.

Another class of malignant cases are the so-called septic cases. The amount of local swelling and exudate on the tonsils and palate may not be very extensive, but it is of a dirty, gangrenous appearance. If the nostrils are invaded, there is a bad-smelling, thin discharge.

The temperature runs a high, irregular course, from 103° to 106° F. The tongue is dry and coated and the appetite is poor. The glands of the neck are moderately or greatly swollen. The extremities are cool, the pulse is rapid and feeble. Pneumonia or suppuration of the middle ear frequently develops. With an irregular high temperature the children become more and more apathetic until death usually supervenes.

Laryngeal Diphtheria.—The symptoms in laryngeal diphtheria differ somewhat according as to whether the process is a primary one or is an extension of a pharyngeal diphtheria to the larynx. In the latter case laryngeal symptoms are added to those already present.

In laryngeal diphtheria the symptoms are those due both to the absorption of the poison of diphtheria and to the mechanical obstruction of the larynx. The obstruction occurs more quickly in children than in adults.

The symptoms may develop slowly; the child complains of a sore throat, of a little hoarseness, has loss of appetite and slight fever. There may be a dry, hard cough. In some, within from twelve to twenty-four hours the hoarseness becomes marked, the breathing is somewhat obstructed, the temperature reaches 100° to 103° F., and the child is restless. Soon, unless relief is given or the process subsides, the symptoms of laryngeal obstruction are fully developed. The respiration is noisy; inspiration and expiration are labored and prolonged. Cyanosis is developed, and there is marked recession of the soft parts of the chest in the epigastric and jugular regions. The accessory muscles of respiration are called into action and the chest is held expanded. In spite of every exertion inspiration and expiration are insufficient.

At short intervals the child will sink back as if ex-

hausted, the breathing is feebler, and for a moment or two the child dozes, only to awaken again to struggle for air. It throws itself about the bed, lies first on one side, then on the other. Until cyanosis is marked the intellect may be clear. Frequent desire to urinate is manifested, which adds to the distress of the child. As the obstruction increases attacks of almost complete suffocation take place; the child struggles violently for air, sitting up and using all its powers. After a time respiration may become freer, and the child sinks back only to have renewed spasms later. Sooner or later it becomes exhausted; the breathing becomes more and more feeble; the extremities are cold and the skin is of cadaveric hue. Death follows from an attack of suffocation or slowly by asthenia. The duration of life in fatal cases is usually from two to seven days when operative relief is not given.

In purely laryngeal cases, when operative relief is not given and death results early, the temperature frequently remains but little elevated, although in a few it may reach 103°-104° F. If, on the other hand, the lungs are involved, the temperature is, as a rule, elevated to 102° or 104°, or exceptionally to 106° F.

After intubation or tracheotomy the temperature frequently rises, in the more severe cases, within twelve hours to 102°-104° F. When operative relief is attained the breathing becomes natural, mucus and shreds of membrane are coughed out, and the child sinks back to sleep. In a portion of the cases the relief is permanent, and the patient progresses uninterruptedly to recovery. In others the symptoms of obstruction again appear, while in still others a secondary pneumonia develops to delay convalescence or cause death.

Symptoms of Diphtheria in Detail.—General Condition. There are a moderate number of cases having very limited patches of pseudo-membrane in which no appreciable symptoms of constitutional poisoning show themselves. They are mostly discovered because of their association with more marked cases. Even mild cases show loss of appetite and of the desire for work or play. They become more or less pale and anæmic. The more grave cases soon exhibit severe constitutional effects. They soon have marked prostration, are restless or apathetic, or both by turns. If they live long enough, they become emaciated. The sleep is uneasy. In septic cases mild delirium or stupor may develop. These cases give the impression of being very dangerously ill.

Temperature. The cases differ greatly. Many, both mild and severe, begin with a temperature of from 102° to 104° F. In the great majority the fever subsides, and even in the most severe uncomplicated cases the temperature is apt to range from 98° to 101° after the first forty-eight hours. Some, severe from the start, have a normal or even subnormal temperature.

A certain proportion of septic cases, and all having a complicating pneumonia, develop a high temperature. Other complications, such as otitis or the development of an abscess, will cause elevation of temperature.

A rise of temperature to 103°-104° F., in a case of laryngeal diphtheria, indicates usually a beginning bronchitis or pneumonia.

Nervous System. In the mild cases, except for a certain amount of apathy, no symptoms are present; in the more severe, there may be also observed the general symptoms of mild delirium, restlessness, and rarely convulsions; also apathy and stupor in the severest cases.

Circulatory Apparatus. In mild cases the pulse is frequent, and perhaps slightly irregular. In bad cases it may be very frequent, 120 to 160, and weak. The force of the heart apex beat is diminished and the sounds are indistinct. After the third or fourth day the rapid pulse may suddenly become markedly slowed. From 120 it may fall as low as from 45 to 50. It is irregular and varies in force. This is an extremely grave symptom. After from twenty-four to forty-eight hours, if the patient lives, the pulse is apt again to become rapid and feeble, and so remain until death. After the first days there is present the danger of sudden heart failure. The pulse may become weak or rapid or more rarely slow while the ex-

tremities become cold and there supervene in a few hours all the signs of collapse.

Digestive System.—In the mildest cases there is little digestive disturbance, but in those of any severity loss of appetite is noted. In the worst toxic cases no food at all may be retained. The bowels are not, as a rule, affected.

The Kidneys. In the mildest cases, usually, no albumin is found in the urine, but exceptionally, after the third or fourth day, it may appear. In the more severe cases casts, kidney detritus, and large quantities of albumin are usually present. In the worst cases partial or total suppression of urine is apt to occur. These may later develop uræmic symptoms. Dropsy is not apt to occur and the prognosis is better than in nephritis following scarlet fever.

Lymph Glands. The lymphatic glands in the neck are usually somewhat enlarged. In the more septic cases they may become enormously swollen. Suppuration is rather infrequent.

Skin. A small percentage of cases develop a general erythema, which may resemble scarlet fever or measles. An urticaria may also appear. In severe and septic cases hemorrhages occur in the skin as well as in the mucous membranes.

Joints. The joints, except in septic cases, are very seldom affected in diphtheria.

COMPLICATIONS.—Pneumonia.—The most feared complication of laryngeal diphtheria is broncho-pneumonia. In pharyngeal diphtheria it occurs but seldom. It may develop within twenty-four hours or it may not occur till convalescence is established. In these a little fever remains, and the lungs give the signs of a moderate bronchitis. The temperature then slowly or quickly rises and the respirations become more rapid. Physical examination shows beginning broncho-pneumonia, perhaps in one or both lower lobes behind, or, again, in disseminated areas throughout both lungs. In these cases the pneumonia is apt to run a subacute but progressive course. After from one to three weeks the child succumbs to exhaustion.

Heart Failure.—From the beginning of the separation of the membrane until well into the fifth week all severe cases are in danger of heart failure. When this symptom is threatening, the patient is pale and the pulse is small and irregular. It is usually rapid and weak or very slow and irregular, 40 to 50. The extremities are cold. The mind remains clear and anxious. The attack may pass off or the pulse may be lost; the patient loses consciousness and death comes gradually. Others, apparently well, suddenly become unconscious, and die almost instantaneously of heart failure.

Paralysis.—This is one of the most characteristic symptoms of diphtheria. Frequently with the final separation of the membrane, but also often after the lapse of weeks, paralysis develops in the muscles of the soft palate, less frequently in those of deglutition, of the eye, of the respiratory organs, or finally of groups of muscles throughout the body. When the palate is affected speech is nasal and fluids regurgitate into the nostrils. When the muscles of accommodation are affected, the child cannot read and the pupils do not react. When the voluntary muscles in general are affected the patient may be completely helpless. As a rule, complete recovery takes place within from three to eight weeks, but in the worst cases marked atrophy occurs and months elapse before recovery takes place.

Relapses.—In a small number of cases, after partial or complete disappearance of the membrane, a slight recurrence results. With the exudate's appearance the temperature may rise and the glands of the neck become swollen. As a rule, the lesions clear up in a few days. The lymphatic glands may remain slightly enlarged for weeks or months. The only cases in which a relapse is serious are the laryngeal ones. A relapse may occur as late as during the fourth week.

DIAGNOSIS.—In deciding whether a doubtful case is one of diphtheria or not it is necessary to take into account

whether the patient has been exposed to diphtheria, to scarlet fever, or to other infectious diseases.

If in any case exposure to diphtheria is known to have occurred, even a slightly suspicious sore throat must be regarded as probably a mild diphtheria. If, on the other hand, no cases of diphtheria have been known to exist in the neighborhood, even cases of a very suspicious nature would probably not be diphtheria.

In judging from the appearance and symptoms of a case one must first acknowledge that there are certain mild exudative inflammations of the throat belonging both to diphtheria and to pseudo-diphtheria which appear exactly alike, and have similar symptoms and similar duration. It is even possible to examine two cases, knowing that one is surely diphtheria and the other surely is not, and yet be unable to determine which is true diphtheria and which is pseudo-diphtheria. It is not meant to imply that a case is one of true diphtheria simply because the diphtheria bacilli are present, but rather that the doubtful cases not only have the bacilli present in the exudate, but are capable of giving true characteristic diphtheria to others, or later developing it themselves; and that those in whose throats no diphtheria bacilli exist can under no conditions give true characteristic diphtheria to others or develop it themselves. It is indeed true, as a rule, that cases presenting the appearance of ordinary follicular tonsillitis in adults are not diphtheria. It is also true that now and then a case having this appearance is one of diphtheria, and almost every physician has seen such cases from time to time in households infected with diphtheria. On the other hand, in small children mild diphtheria very frequently occurs with the semblance of ordinary follicular tonsillitis, and in large cities where diphtheria is prevalent all such cases must be regarded as more or less suspicious.

Appearances Characteristic of Diphtheria.—The presence of irregular-shaped patches of adherent grayish or yellowish-gray pseudo-membrane on some other portions than the tonsils is, as a rule, an indication of the activity of the diphtheria bacilli. Restricted to the tonsils alone their presence is less certain.

Occasionally, in scarlatinal angina or in severe phlegmonous sore throats, patches of exudate may appear on the uvula or borders of the faucial pillars, and still the case may not be due to the diphtheria bacilli; these are, however, exceptional. Thick, grayish pseudo-membranes which cover large portions of the tonsils, soft palate, and nostrils are almost invariably the lesions produced by diphtheria bacilli.

The very great majority of cases of pseudo-membranous or exudative laryngitis, in the coast cities at least, whether an exudate is present in the pharynx or not, are due to the diphtheria bacilli. Cases in which no exudate is apparent and those in which the laryngeal obstruction is sudden and the spasmodic element is marked, are, however, frequently due to the activity of other bacteria. Nearly all membranous affections of the nose are true diphtheria. When the membrane is limited to the nose the symptoms are, as a rule, very slight; but when the naso-pharynx is involved the symptoms are usually grave. Usually a small area of inflammation indicates a slight or moderate severity, and an extensive area a severe infection.

Most cases of pseudo-membranes and exudates entirely confined to portions of the tonsils in adults are not due to the diphtheria bacilli, although a few cases presenting these symptoms are. The more complete the involvement of the tonsils the more apt the case is to be due to them. Cases presenting the appearances found in scarlet fever, in which a thin, grayish membrane lines the borders of the uvula and faucial pillars, are rarely diphtheritic. As a rule, pseudo-membranous inflammations complicating scarlet fever, syphilis, and other infectious diseases are due to the activity of the pathogenic cocci and other bacteria induced by the inflamed condition of the mucous membranes due to the scarlatinal or other poison. But from time to time such cases, if they have been exposed to diphtheria, may be complicated by it, and in some epidemics mixed infection is common.

The Exudate due to the Diphtheria Bacilli Contrasted with that due to Other Bacteria.—As a rule, the exudate in diphtheria is firmly incorporated with the underlying mucous membrane, and cannot—except perhaps during convalescence—be removed without leaving a bleeding surface. The tissues surrounding the exudate are more or less inflamed and swollen. Where other bacteria produce the irritant the exudate, except in the cases due to the bacillus described by Vincent, is usually loosely attached, collected in small masses, and easily removable. Exceptions, however, occur in both these diseases, so that in true diphtheria the exudate may be easily removed, and in lesions due to other bacteria the exudate may be firmly adherent.

Paralysis.—Paralysis following a pseudo-membranous inflammation is an almost positive indication that the case was one of diphtheria, although slight paralysis has followed in a very few cases in which careful cultures revealed no diphtheria bacilli. These, if not true diphtheria, must be considered very exceptional cases.

Bacteriological Diagnosis.—From the above it is apparent that fully developed characteristic cases of diphtheria are readily diagnosed, but that many of the less marked, or at an early period undeveloped, cases are difficult to differentiate the one from the other. In these cases cultures are of the utmost value, since they enable us to isolate those in which the bacilli are found, and to give preventive injections of antitoxin to both the sick and those in contact with them, if this has not already been done. As a rule, cultures do not give us as much information as to the gravity of the case as do the clinical appearances, for by the end of from twenty-four to forty-eight hours the extent of the disease is usually easy of determination. The reported absence of bacilli in a culture must be given weight in proportion to the skill with which the culture was made, the suitability of the media, and the knowledge and experience of the one who examined it.

Diphtheria does not occur without the presence of the diphtheria bacilli; but there have been many cases of diphtheria in which for one or another reason no bacilli were found in the cultures by the examiner. In many of these cases later cultures revealed them. In a convalescent case the absence of bacilli in any one culture indicates that there are certainly not many bacilli left in the throat. Only repeated cultures can prove their total absence.

Prognosis.—Diphtheria is one of the most difficult of diseases in which to make a prognosis. A case which in the first twenty-four hours seems mild may steadily increase in extent and severity until it ends fatally. A case seemingly convalescent may suddenly develop heart paralysis. Laryngeal diphtheria is especially apt to be complicated by pneumonia.

In the smaller cities epidemics vary greatly in their severity from year to year. In the largest cities, however, there are practically always a number of epidemics going on all the time, and the average severity of the whole city does not vary so much. Age has a very marked influence on mortality.

The special dangers to be feared in diphtheria are the invasion of the larynx, the development of broncho-pneumonia, serious paralysis, especially of the heart and respiratory muscles, sepsis, and nephritis.

The following division of the cases of true diphtheria, based on the extent, character, and location of the pseudo-membrane or exudate, after sufficient time has elapsed for the development of the local lesions, has seemed to me to be of considerable value in prognosis:

1. Cases in which the pseudo-membranes are very extensive, thick, and firmly incorporated with the underlying swollen mucous membrane. In these the constitutional symptoms are marked, the mortality at all ages is large, and the danger of paralysis great.

2. Cases in which the development of the pseudo-membranes is largely confined to the larynx and bronchi. This form occurs mostly in young children, is very fatal at all ages, and apt to be complicated by bronchitis or pneumonia.

3. Cases in which the pseudo-membrane is moderate in amount, involving the tonsils and irregular portions of the uvula and soft palate. These often have marked constitutional and local symptoms for a few days, but nearly always recover, except in very young children.

4. Cases in which the pseudo-membrane or exudate is confined to the tonsils. These resemble those in the third division, but the symptoms are less marked. They all recover unless complications exist.

5. Cases in which very little or no exudate is ever present, the mucous membrane being simply slightly swollen and hyperemic. These have usually slight symptoms and recover, but are important to diagnose, as they may infect others.

6. Cases of pseudo-membranes confined throughout their course to the nose. These occur chiefly in young children. The constitutional symptoms are slight, and all so far recorded have recovered. These cases are seldom met with.

7. Exudates or pseudo-membranes confined to the eyelids, skin, rectal and vaginal mucous membranes. The cases confined to the first two locations, as a rule, present few constitutional symptoms if the throat is unaffected. When the rectum and vagina are attacked, the severity of the symptoms will depend on the extent of the lesions.

TREATMENT.—Prophylaxis.—The patient ill with diphtheria is to be isolated, so far as circumstances permit. Wherever possible a separate room should be provided. Those who care for the sick should wear a special outer garment. Before leaving the room this gown should be removed and the hands carefully washed and rinsed with an antiseptic solution.

The patient should, when old enough, expectorate into some receptacle containing a disinfectant. Everything soiled by the mouth discharges should be disinfected by soaking in some disinfectant solution, by boiling, or by burning. The throat secretions are probably dangerous until at least three weeks after the beginning of the attack and possibly for longer periods.

Wherever possible the probable disappearance of the diphtheria bacilli should be established by the bacteriological examination of cultures. At the conclusion of the illness the bedding and, where possible, the carpets should be disinfected by steam, and the furniture, floor, and walls wiped off with a 1 to 500 solution of bichloride of mercury. Finally, it is well to disinfect the surfaces of the walls, furniture, and hangings in the patient's room by means of formaldehyde gas.

The disposal of the healthy members of an infected family is a matter of great importance. They frequently have already become infected before the first case is diagnosed, and, if sent away, they may carry the disease to the children of the families which they visit. It is wise, therefore, to keep them at home if they have been exposed to the one taken sick. All those who have been exposed or expect to be exposed to the contagion should receive a moderate injection of antitoxin as a preventive, 200 to 500 units according to age. As a prophylactic it is well to gargle the throat frequently and cleanse the nostrils with some mild cleansing solution, such as Dobell's, or a weak disinfectant, such as 1 to 10,000 aqueous solution of bichloride of mercury. An immunization dose of antitoxin, together with the frequent cleansing of the throat, will practically insure immunity from diphtheria for at least two weeks. If the danger still persists a second injection of antitoxin is given.

Local Treatment.—If one could destroy all the diphtheria bacilli in the parts infected by local disinfection, the disease might theoretically at least be at once aborted and its extension to distant parts prevented.

Many clinicians of great experience in the treatment of diphtheria have advised various methods to accomplish this desired result, such as the direct application of nitrate of silver or carbolic acid; but personally I believe that their success must always be limited, and for the following reasons: The diphtheria bacilli are not limited to the exact spot where the pseudo-membrane has developed. They are present in the throat secretions, bathing all