RESPIRATORY PASSAGES

CARTER

ERRATA.

Page 76, 13th line from top *m*utrition should be *n*utrition.

Page 86, heading *in* Catarrhal Diseases, should be *to* Catarrhal Diseases.

Page 99, 1st line, *æ*sthenic should be sthenic.

CATARRHAL DISEASES

OF THE

RESPIRATORY PASSAGES.

J. M. G. CARTER, M.A., M.D., SC.D., PH.D.

PROFESSOR OF PREVENTIVE AND CLINICAL MEDICINE (FORMERLY PROFESSOR OF PATHOLOGY) IN THE COLLEGE OF PHYSICIANS AND SURGEONS, CHICAGO. FELLOW OF THE AMERICAN ACADEMY OF MEDICINE, MEMBER OF THE AMERICAN MEDICAL ASSOCIATION, THE ILLINOIS STATE MEDICAL SOCIETY, THE CHICAGO MEDICAL SOCIETY, THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, THE CHICAGO ACADEMY OF SCIENCES, ETC.

CHICAGO:
E. H. COLEGROVE & CO.
1895.

PREFACE

Some years ago I was appointed reporter at Waukegan for the Illinois Weather Signal Service. During the time I was engaged in that work I became greatly interested in the manifest influence which changes in the weather exert upon the prevalence of diseases and especially catarrhal diseases. Some of the facts I observed then and since are recorded in this little volume. My studies extended beyond my own vicinity and I am under obligations to numerous observers and writers for some of my statistics. Many of these facts have been previously presented to the profession in papers, but I hope that in this form they may be more serviceable to any who may study in this field.

J. M. G. CARTER.

Waukegan, Illinois, July, 1895.

TABLE OF CONTENTS.

CATARRHAL DISEASES

OF THE

RESPIRATORY PASSAGES.

CARTER.

Chapter I.

CATARRH; RHINITIS AND PHARYNGITIS.

SYSTEMATIC writers group diseases in accordance with some recognized principle deduced from practical observation, clinical experience, pathological facts, or theoretical classification. Catarrhal diseases of the respiratory passages are considered together here because of their close relationship etiologically and pathologically. This group includes rhinitis, tonsilitis, pharyngitis, laryngitis, trachitis, bronchitis, capillary bronchitis and broncho-pneumonia.

These diseases have a similar origin generally and are modified by the same etiological factors. They are at present supposed to be caused by microörganisms or irritants of some form, of which exposure to cold is the chief. The action of cold seems to be this: the impression produced upon the vaso-constrictor nerves stimulates them to contract the capillaries of the skin. The result of this contraction is a diminution of the blood supply to the periphery and a reflux to the internal organs, mucous membranes included. If the organs are healthy and the mucous membranes up to the average normal standard of health, it is possible that no evil results may follow. Soon the capillary circulation is restored to its normal equilibrium and general tranquilization of the circulatory system results and disease does not supervene. In those cases, however,

where there is some deficiency in the strength of the tissues, where an organ or a mucous membrane is below par, the internal resistance is not sufficient to keep up the equilibrium and the capillaries in the weakest part dilate from overpressure.

The tendency to equilibrium, or the law of counter-pressure, which is so predominant in the physical world outside of humanity, is just as marked in our bodies. Nature abhors a vacuum in the human body just as truly as in any other place where physical law prevails. The pleuræ are in juxtaposition except when the cavity is filled or partially filled with fluid or granulations or neoplasms which separate the walls. The vagina, the bladder, the stomach and all body "cavities" are governed by the same law, and the walls are always in apposition except when separated by the presence of some gaseous, liquid or solid substance. The entering substance must have sufficient force to overcome the natural resistance. If some taint of heredity, effect of disease, mechanical injury or exposure has weakened a tissue or mucous membrane, the force of the circulation driven back from the periphery may be so great as to overcome the natural resistance, in which case the equilibrium of the circulation cannot be maintained, and a local congestion or hyperæmia results. If the walls of the vessels and capillaries of a part have been impaired so as to be able to resist the normal pressure only, a hyperæmia may result from the resistance caused by the effect of a slight cold upon the system.

A hyperæmia of a mucous membrane resulting from some such deviation from the normal balance of pressure

and counterpressure, is the first stage of a catarrhal inflammation. If the cause is immediately removed and the paralyzing effect upon the vessels can be at once overcome, the hyperæmia may subside and recovery occur very speedily. Many such cases occur, but few of them come under the observation of physicians except in their own families. If, however, the cause persists, or the paralyzing effect cannot be easily overcome, the case progresses through the other stages of inflammation. The increased rapidity of the circulation, which is the immediate sequence of the vascular dilatation, is soon followed by a slowing of the blood current. The leucocytes begin to seek the peripheral layers of the stream, and stagnation of the blood may occur by their aggregation and final obstruction of the lumen of the vessels. At this stage of the inflammation the pressure upon the blood by the *vis e tergo* is so great that the fluid of the blood is forced through the walls of the capillaries, and, in accordance with the law that causes moving bodies (whether gaseous, liquid or solid) to select the direction of least resistance, this *exudate* is thrown out upon the surface of the mucous membrane. At the same time the cement substance which unites the endothelial plates, of which the capillary wall is composed, is softened so that the force of the heart pressure may be sufficient to drive the leucocytes or white blood corpuscles between the plates and along with the liquid to help form the exudate. Where the exudate consists chiefly of serum, the case is likely to run an acute and brief course. When leucocytes occur in the exudate, it generally becomes suppurative and the case is more prolonged. Acute cases with suppuration do occur, however, and chronic

and subacute cases without suppuration are frequently seen. The acute cases may develop into subacute or chronic cases. I have under my observation at the present time the case of a child who suffered for a week with acute catarrhal sore throat—laryngitis and pharyngitis—and apparently recovered. But in a few weeks examination revealed a subacute inflammation of the pharynx, which extended forward to the posterior nares. In two weeks more the inflammation involved the entire Schneiderian membrane and gradually became suppurative, so that now at the end of two months and a half we are battling with ozena.

This class of catarrhal troubles is frequently met, not only in the lake region, but wherever catarrh prevails. They sometimes appear to be relapses, but it is often the case that they assume an intermittent course, and it requires careful watching to prevent being deceived. If neglected in these intermissions or remissions they tend gradually to pass into a subacute or chronic form. It is frequently observed that these cases give trouble in another way. I have just dismissed a case of severe diphtheria. A brother while away from home suffered from catarrhal sore throat. There is no doubt that the case was one of catarrhal and diphtheritic inflammation combined, for there is no reason to doubt the physician's diagnosis of catarrhal sore throat as the symptoms described are those of that disease ; but the sequelæ are those of diphtheria. He was at home but a few days when my case, a younger brother, was taken sick. I was summoned early and found the throat in a general catarrhal condition, but with a distinct diphtheritic patch on one tonsil half an inch in diameter. Soon the entire

throat and posterior nares were involved in the diphtheritic inflammation. The whole of the Schneiderian membrane became rapidly involved, breathing was difficult and preparations were made for performing the operation of intubation; but the patient began slowly to mend, and has gradually recovered. I have no doubt that the disease was conveyed by the diphtheritic bacillus from the older brother's throat. It was not a mere coincidence.

Rhinitis frequently is more annoying to children than to adults, not simply because they are more susceptible to the disease but because it is difficult for a child to breathe through its mouth, and any interference with the nostrils obstructs its breathing.

Catarrhal Pharyngitis, uncomplicated, is less troublesome than laryngitis or bronchitis. Still a severe acute attack of catarrhal inflammation of the mucous membrane of the pharynx may be painful, especially if it assumes the dry form, congestion without very much liquid exudation. This is a very common form of catarrhal cold. The inflammation is likely to involve other parts, especially the tonsils and larynx. The clearing of the throat in this disease, both in the acute and the chronic form, is largely necessitated by the secretion from the membrane flowing down and collecting on the vocal cords. This interferes with the normal tone of the voice and makes the patient attempt to clear his throat before speaking. If the condition becomes chronic this unpleasant "dropping down" of the secretions may be very annoying. Subacute and chronic forms of rhinitis or coryza, pharyngitis and tonsilitis are seldom attended by fever, but the acute forms are gen-

erally marked by some elevation of temperature for two or three days. Authors have stated that infiltration of the glands of the neck accompanying sore throat is evidence of the diphtheritic nature of the inflammation; but I think that every physician of wide experience must have met many cases where there was no tendency to a diphtheritic exudate, and where the catarrhal symptoms were well marked, and yet where the cervical glands were largely infiltrated. If the tissue *about* the glands becomes involved in the infiltration, the case may at once be suspected to be of a diphtheritic nature, but I do not think this condition even, except in non-strumous cases, should be accepted as proof positive that we are dealing with diphtheria. The presence of the bacillus, in the absence of the membrane, is the only absolute test.

The treatment of the coryza following such cases should be simple but persistent. Douches of boric acid will frequently be all that is required. If the case is one in which the secretions are not abundant, nebulizations of the essential oils are of value. In the form where venous congestion is a prominent feature and the exudate is abundant, I prefer astringent preparations chiefly by atomization. A very valuable mixture for atomization is eucalyptus and bismuth in glycerin; it is soothing and yet astringent. The same method of treatment may be applied to the pharynx. In both cases, however, the treatment should be preceded by antiseptic douches to prepare the parts for the more rapid absorption of the medicament. Otherwise the treatment should be conducted in accordance with general principles.

CHAPTER II.

A STUDY OF TWO HUNDRED CASES OF CATARRHAL TONSILITIS.

ON the permeable, sandy shore of Lake Michigan, with a prevailing northeast wind for a great part of the year, in connection with the natural humidity of the atmosphere near so large a body of water, we would expect to meet with a large number of cases of throat and chest diseases. It was under such circumstances that the cases occurred, which I desire to report briefly. For the purpose of getting a better understanding, possibly, of the relation existing between catarrhal tonsilitis, diphtheria, rubeola, rötheln, and scarlatina, it may be well to mention the occurrence of these diseases in the order of their sequence, during the time which is represented by the two hundred cases of tonsilitis that are here reported.

These cases occurred during two years. In the fall and early winter of 1883, I had some forty cases of scarlatina. In the months of 1884 the scarlet-fever epidemic subsided, and immediately succeeding it came an epidemic of tonsilitis. Following that, in the summer, we had some cases of rubeola. The measles subsided by fall, and again there were many cases of tonsilitis, and although there were a few cases of mild scarlet fever through the winter or 1884–85, there were many more of sore throat. During the

spring and summer of 1885 we had an epidemic of rötheln.

During the epidemic, or rather endemic of tonsilitis following the epidemic of scarlet fever, I treated within the months of March, April and May, about ninety cases of this disease of the throat. During the same months of 1885 I treated sixty cases. The others were somewhat sporadic, and distributed throughout the remaining months of the years 1884 and 1885.

The disease is marked at the beginning by chilliness ; aching in the limbs, back of the neck and head ; nausea ; a feeling of stiffness in the throat. The throat and tonsils show catarrhal inflammation, are red and the tonsils swollen ; the glands at the angle of jaw are sometimes swollen and tender. In 75 per cent of the cases, on the second day, there are white patches on the tonsils, and in 5 per cent a tendency to the formation of a diphtheritic membrane. In 20 per cent of these cases there are no patches or membranes. The initial symptoms are the same in all, and ordinary cases extend over a period of from three to five days—usually beginning to grow better on the third day. Five cases were sick as long as two weeks ; three cases developed into quinsy, and I opened the tonsilar abscess ; one case had quinsy and diphtheritic deposits. Two cases had suppuration of the glands—one in the submaxillary and the other in those of the neck, both on the left side. In both cases it was necessary to lance the abscess. In two cases the swelling of the tonsils was very rapid and the pain of swallowing excruciating.

The pulse was usually about 120, and tempera-

ture 103° to 104° in adults. In children, the pulse ranged from 120 to 160, the temperature being the same as in adults. As the swelling of the tonsils began to subside, the fever began to abate. One other case I will mention, because of its close apparent relation to scarlet fever. A young Miss of fourteen was taken with the symptoms described above, the tonsils being very large. There being some scarlet fever about, we were anxious and examined and watched for development of the disease. She recovered in five days, but manifested no other than the symptoms of catarrhal tonsilitis. Five days later I was called to see one of the children in the same family, and discovered at once a case of scarlet fever. Four of the children had the disease in the next ten days, three of them being malignant cases, of whom two died. Of this family the only child that did not have scarlet fever had a protracted siege of typhoid fever, three months later. Perhaps 25 per cent of the cases I have reported were left with chronically enlarged tonsils. During the time of the occurrence of these cases, I treated but six cases of diphtheria, and they were not severe. Of the two hundred cases all recovered.

The treatment in these cases varied very little in most cases. It consisted mainly of aconite and belladonna, with, occasionally, chlorate of potassa. Sometimes, especially if there was much disturbance of the stomach, I added gelsemium. This was used internally, usually in small doses, every thirty or sixty minutes. In adults and children old enough to gargle, or use a gargle as a throat bath, I employed local treatment. I have used several gargles—alcohol and water, alcohol and

chlorate of potash, water and chlorate of potash, hot water, ice water, salt and vinegar, salt and water—according to circumstances and the condition of the patient. Ordinarily I prefer alcohol and chlorate of potass. where the patient can use a gargle. Excellent external applications are mustard, camphor, kerosene, alcohol, red and black pepper.

In some cases of rapid swelling and intense pain, I secured the quickest results from steam atomization, using carbolic acid and chlorate of potass. I have used the steam from hot water in many cases with benefit. I was called to a gentleman who was subject to quinsy. He said that he should go through the full course of the disease, he knew, for he had never succeeded in having it checked. I gave him one drop of tincture of aconite and tincture of gelsemium, each, and four drops of tincture of belladonna every hour. I also directed the use of steam and an alum gargle. The throat grew better, and he recovered without going through any "course" of disease. He has had one similar attack since, and by treating him in the same way we had a similar result.

The tincture of the chloride of iron I employed in a few cases. In one case I employed the compound of tincture of iron, carbolic acid, glycerin, chlorate of potash and water, and with no better result than I received from more palatable preparations.

The ordinary course of tonics was prescribed, in some cases, as an aftertreatment, but generally no tonic treatment was needed. Lactic acid, nitric acid, and hydrochloric acid were freely used in a few cases.

I will repeat that in the great majority of cases alcohol, glycerin, chlorate of potass. and water gave the

most satisfactory results; while internally tincture of aconite, tincture of belladonna and tincture of gelsemium are equally beneficial.

There must be some cause for such a prevalence of this disease in any locality. There must be a cause for its prevalence at the same season of the year. It will be remembered that the greater number of these cases occurred during the months of March, April and May. In casting about for some special features, which during these months are different from, or in excess of, those of other months, we find an apparent cause in the prevailing northeast wind. During the three months named the western shore of Lake Michigan has more days of lake winds than of winds from any other direction. The lake winds prevail more generally at Milwaukee than at Chicago. During the month of May, for instance, at Milwaukee the easterly winds are to the westerly as 62 to 24, while at Chicago they are as 44 to 40. In this relation, Waukegan more nearly approaches Milwaukee. We usually have an increase of the disease under discussion during the month of July, and during that month there is a preponderance of lake winds at the points mentioned. At Chicago the easterly winds are to the westerly as 60 to 33, while at Milwaukee they are as 48 to 37.

At Waukegan the record for ozone during the last year included in the time of these cases showed that the presence of that agent was very marked during the months when tonsilitis prevailed; that is, the lake winds seem to sustain some special relation to ozone in the atmosphere. During the last summer, especially in July, northeast and east winds prevailed to a greater ex-

tent than usual. Rötheln was the prevailing disease, seventy-five cases of which occurred in my practice. More than 50 per cent of these cases were accompanied with sore throat, the symptoms being precisely the same as in simple catarrhal tonsilitis. Nearly one-half of the total number of cases of rötheln had white patches on the tonsils.

Exposure to cold has not been a frequent cause of this sore throat, for a very large proportion of my cases were parties who had not been exposed to cold; however, such exposure in some cases was known to be the exciting cause. I would mention one other point. I have noticed that rheumatic and nervous patients were not so well during these periods.

From a consideration of all these points I have been led to suspect that the disease under discussion, like nervous disorders and rheumatism, is affected by, if not due to, the electrical condition of the atmosphere; but whether to an excess or a deficiency of electricity, or to the preparation of a suitable culture medium for micro-organisms I have not sufficient data to determine. We know this, that the disease prevails when there is a humid atmosphere, an excess of ozone, a lake wind, and a low temperature. We know, further, that these agencies work changes in the electrical condition of the atmosphere and favor the growth of microörganisms.

CHAPTER III.

CATARRHAL LARYNGITIS.

LARYNGITIS is a common disease in regions where catarrhal inflammations of the respiratory organs are frequent. On the Pacific coast, in the lake region and on the Atlantic coast, especially in eastern Canada, and in fact throughout the world in climates which predispose to catarrh, there are many cases of laryngitis. The death rate from this disease is so small that statistics afford little help in locating the region where it prevails most. Another difficulty with statistics is that many cases of death from laryngitis are reported as croup, by which most physicians understand laryngitis or tracheitis or both in which a membrane is formed. If the membrane is diphtheritic it should not be included in the disease here treated ; but if the membrane is croupous it bears a closer relationship to the catarrhal form of inflammation, and very likely was catarrhal in the commencement.

The death rate as given in any locality shows only the relative severity of the disease in that community as compared with other communities, not the comparative frequency of its occurrence ; for in some localities it is nearly always mild, while in others it frequently assumes a severe grade or merges into croup. Neither is the frequency of the disease always known to local physicians or boards of health, for not only are many cases

allowed to pass without the aid of a medical man, but many sore throats develop a laryngitis which is overlooked by the attending physician. These cases frequently are unaccompanied by any marked rise of temperature; often the thermometer registers only 99° or 99.2° F. There may be a slight cough, which is attributable to a mild bronchitis. It should be remembered thatmost cases of laryngitis occur in connection with tracheitis. This explains the ease with which an error of diagnosis may be made. Hoarseness may not occur, because frequently the abundant liquid exudate is easily removed from the vocal cords, and the thickening is not so great that it cannot voluntarily be overcome by the patient; hence the tone of voice may not be modified, and the diagnosis must be made without reference to this symptom. The difficulty of diagnosis is reduced to a minimum when the larynx can be examined by the aid of a mirror, but the mistakes are generally made by those who have no mirror or whose attention is not directed to the larynx.

The small aperture in the larynx of children is almost closed in severe cases and a peculiar hoarseness is present.

In some cases the glottis is closed, in some the larynx, and suffocation rapidly supervenes and requires intubation or tracheotomy for its relief. If relief is not speedily secured death may result, in which case, if no autopsy is made, croup is often assigned as the fatal cause. Ordinarily croup does not develop so suddenly, except the spasmodic variety, and the history of the case will usually enable the physician to clear up the diagnosis.

The abundant infiltration in these cases often approximates œdema, but in my own observations œdema had not actually occurred except in dropsical conditions, scalding or diphtheria. If the dyspnœa is due to infiltration instead of œdema, the utility of external counterirritants, and capillary constringents like ergot, is easily understood.

There is a form of catarrhal laryngitis the pathology of which is not always comprehended. The cases are very frequent in the lake region and in localities where the air is loaded with a considerably larger per cent of moisture in the morning and evening. In such cases the voice easily becomes hoarse as the dew begins to fall, often remains hoarse if nothing is done through the night and is found in the same condition next morning. The pathology of these cases is not difficult to understand. Usually the larynx is in a state of chronic venous congestion. Now it is known that in damp atmospheres mucous membranes in such a condition become full and distended because evaporation is prevented and the blood vessels are full. It is easy to see that under such conditions the vocal cords must be enlarged, and a coarser tone produced when they vibrate. As the sun rises, and the atmosphere becomes dry, evaporation is accelerated and the vessels become less congested.

The throat and larynx being the common channel through which the air must pass to the lungs, are subject to all the noxious and irritating substances which we breathe. Gases, ptomaines and bacteria are constantly riding upon the air into our bodies to find a lodgment and perhaps to produce disease. Many of

these have only an irritant effect upon the mucous membrane of the larynx and cause an inflammation as a mechanical irritant. Especially is this true of gases and fine particles of coal dust and other solid substances arising from various occupations. The effect of cold and heat as well as that of moisture is largely mechanical. A part of the effect of ptomaines and bacteria is mechanical. A large proportion of the cases of laryngitis are caused by ptomaines or bacteria. Secretions decay in the throat, ptomaines from the air lodge upon the mucous membrane thus injured and through irritant or specific action inflammation is produced. The effect of bacteria or their toxin products is similar. The throat and larynx constitute a favorite site for bacteria to accummulate. If the mucous membrane is in a healthy condition, little harm may result from their temporary residence in this locality. But if any diseased condition or impairment of the vitality or structural integrity of the part exists, it may furnish a suitable soil for the growth of certain bacteria and in their development an inflammation results and we have to contend with a case of specific laryngitis. One of these forms originates suddenly, reaches its acme in thirty-six hours, and subsides in three days from the beginning, under the most favorable conditions in previously healthy individuals. If the circumstances are not so favorable, or if the patient is not in a good general physical condition at the time of the supervention of the disease, the case is likely to require forty-eight hours more time, completing the cycle in five days.

In regard to duration this class of cases is identical with one variety of catarrhal tonsilitis, but in regard to

frequency, in my observation, the relation is not so marked. The specific causes, the particular species of bacteria, in these forms of disease have not been differentiated, and it is necessary at present to give full weight to other causes. Of these, none is so important as the weather. The weather changes have, apparently, the first place etiologically; but we may ask whether these changes actually cause the disease or whether they may not more probably favor the rapid development of some species of bacteria which sustains the prime causal relation?

The most important cause after variableness of climate it is difficult to determine. I have found that an excess or deficiency of ozone in the atmosphere increases the tendency to laryngitis as it does to other catarrhal conditions of the respiratory organs. Excessive humidity increases the tendency to passive congestions of the respiratory organs, and thus augments the number of cases of this form of laryngitis. Where there is a low percentage of humidity the evaporation of water from the mucous surfaces is increased and these passive congestions are benefited, while the active or arterial congestions with diminished secretion are made uncomfortable.

In treatment it is necessary to observe the variety of congestion, the extent of inflammation and the condition of the weather. In passive congestions of the larynx in good weather inhalations of paregoric in steam (℥j to pint of water) will give excellent results. At other times the steam will give some relief unless the relative humidity of the atmosphere is too high. When there is dryness or diminution of secretions I frequently

find inhalations of camphor, menthol or the essential oils greatly beneficial. Sprays of various astringents, eucalyptus, hamamelis, hydrastis, etc., are often very valuable. In subacute and chronic cases, which sometimes develop from this form, anodynes, expectorants and alternatives are helpful.

CHAPTER IV.

CATARRHAL SORE THROAT IN THE LAKE REGION.

I shall use the term catarrhal sore throat, in this connection, to indicate that class of diseases, whether of the tonsils, pharynx or the larynx, where there is actually present or where there exists a strong tendency to a catarrhal inflammation of all these organs. In order to limit my meaning more definitely, I will refer briefly to the fact that all inflammations of the throat, of whatever form, may be classified as catarrhal, croupous and diphtheritic. A catarrhal inflammation, whether mucous, serous or purulent, is accompanied by an exudate which has no tendency to coagulate. A croupous inflammation is accompanied by an exudate which contains a greater amount of albumin and fibrin than the catarrhal variety, and consequently does tend to coagulate and form what is termed a false membrane. A diphtheritic inflammation causes the epithelial cells (which only suffer desquamation in the other two forms) to die on the spot, the exudate coagulates, and the deeper tissues are involved in the destructive process. It is evident that the croupous and diphtheritic forms may be introduced by the catarrhal form. The variety of which I speak now, however, is a catarrhal inflammation which usually terminates in three to five days, without croup-

ous or diphtheritic inflammation supervening to any marked degree.

In the last twelve years, during which I have resided on the shore of Lake Michigan, I have observed several thousand cases of throat disease in various forms. The form which has constituted by far the greater number of cases has been catarrhal, reaching in number more than two thousand; sometimes tonsilitis, sometimes laryngitis, and sometimes pharyngitis; but in the majority of instances the entire throat was involved.

I have noticed, particularly in relation to the catarrhal forms, that changes in the weather were followed by an increased or decreased number of cases, according to the elemental conditions of the change. Among these were variations of ozone, temperature, humidity, and direction and force of the wind. We are told by Sir E. Solly that the proper proportion of ozone in the atmosphere is about 1 to 700,000. This would not disturb the most sensitive mucous membrane, but when this ratio is perceptibly increased, ozone acts as an irritant. M. Girerd, of Panama, informs us that ozone transforms albumin into fibrin, and hæmoglobin into oxyhæmoglobin. The continued and prolonged action of ozone on the fibrin thus produced, reduces it to a natural state, and renders it incoagulable.

If other conditions are likewise unfavorable, catarrhal diseases of the throat and respiratory tract occur more frequently in damp weather, particularly if accompanied with cold. In such weather there is an increase of CO_2, and an excess of electricity. A venous distention occurs in damp weather (Weber), which produces a passive hyperæmia of the mucous membrane, and disposes

to catarrh. Dr. Weber further states that dry air also irritates mucous membranes, disposing to catarrhal affections. The dry air takes moisture from the mucous membrane of the respiratory passages by evaporation. The body loses moisture in such an atmosphere, the circulation is increased, the mucous membranes become hyperæmic and more easily excited by irritants. And it is under conditions of dry air and the like after storms that ozone occurs in excess, and acts as an irritant.

It is known to scientists, as related by Reclus that the air of America is moister than that of the Old World in general, and this increased moisture results from the fact that the American Continent is narrower and more largely influenced by sea breezes. This will help to explain the frequent occurrence of catarrhal epidemics of various kinds in our country—catarrhal diseases of the respiratory tract in the northern portions, and of the alimentary tract in southern regions. From this it appears that cold air with moisture tends to produce catarrhal diseases of the respiratory tract, while warm air with moisture disposes to catarrh of the alimentary tract. The most agreeable humidity for breathing is 70 to 80 per cent, the diminished evaporation from the lungs causing the air to be less irritating to the respiratory mucous membrane.

We are informed by Parkes that there is a tendency to catarrh over soils which contain ground water, and where springs are abundant. Wagner states that strong winds, especially from the east and northeast, cause catarrh to grow worse, and of course must act as a cause of acute attacks.

Dr. N. S. Davis, of Chicago, gives the opinion as a

result of his experience and observation, that high winds, either northeast, northwest, or west, are to be considered factors in the production of catarrhal affections of the respiratory tract, but that these winds bear some relation to mountain elevation or ocean currents. He further gives some interesting and valuable statistics from a laborious work of Daniel Drake compiled from army records. It is stated there that the number of cases of catarrhal diseases of the respiratory passages occurring at Fort Snelling, near St. Paul, Minn., was 600 in 1,000 soldiers, and at Fort Dearborn, Chicago, was 102 in 1,000 soldiers. Other posts are included in his report, and from these Dr. Davis is led to the conclusion that the important factors in the production of this class of diseases are cold, variableness, moisture and high winds. After reviewing a large area and many causes, Dr. Drake gives the ratio of cases occurring at different times in the year as 119.8 in the first quarter, 72.7 in the second, 48.7 in the third, and 99.6 in the fourth. He further makes the statement that the number of cases decreases in the ratio of 31.5 for each degree of latitude, going south.

In a paper read before the Chicago Medical Society, November 16, 1885, I stated that in the epidemics of tonsilitis which had occurred in Waukegan, Ill., I had observed an excess of ozone in the atmosphere, and east or northeast winds preceding and accompanying the outbreaks. The Michigan State Board of Health and others (Earle), have since made similar observations.

It would be a matter of great interest to know the influence of this climate upon the aborigines, in the

causation of catarrhal troubles, but so far as I am aware the investigations in this direction are not sufficiently extensive to enable us to form a very satisfactory opinion in the matter.

We are informed by Cohen that the North American Indians are subject to such catarrhal affections as afflict the white population, and that they ward off catarrh and acute sore throats by sleeping enveloped in blankets, and breathing through the partially closed fist. Another authority states that bowel troubles are the most frequent form of disease among the Indians. The probability is that the same etiological factors are at work among aboriginal races as are found to produce pathological conditions among acclimated people; namely, that cold and damp climates tend to produce catarrhal affections of the respiratory passages, while warm and moist climates dispose to like disease of the alimentary canal.

During the year ending March 31, 1892, I treated 389 cases of catarrhal sore throat, not including the patients treated in my office practice. These cases occurred as follows: April, 38 cases; May, 23; June, 10; July, 13; August, 20; September, 15; October, 20; November, 26; December, 44; January, 73; February, 66; March, 41. The ratio here, when compared with that mentioned in Dr. Drake's report given above, will indicate that the same etiological factors have operated in the causation of these catarrhal affections, the difference being due to the fact that his report refers to an extensive area of territory, while mine is confined to an area of not exceeding 120 square miles. He gives the ratios: First quarter, 119.8; second quarter, 72.7; third quarter,

48.7; fourth quarter, 99.6. In my cases the ratio was: First quarter, 120; second, 47.3; third, 32; fourth, 60. During the winter half of the year, that is, from November 1 to May 1, I had 288 cases; while in the warm or summer half, that is from May 1 to November 1, I had 101 cases. I think that the excess of my ratio above his in the first quarter, *i. e.*, January, February and March, is due largely to the presence of the lake, and perhaps also to the ground water under Waukegan, indicated by the numerous springs found there. The average temperature in January from 1871 to 1880, at St. Paul, Minn., was 15° F.; that at Waukegan, Ill., was 25°, a difference of 10°. This may be considered an average climatic difference. Now an atmosphere at 25°, other things being equal, will contain more moisture than one at 15°, and a cold, moist air has a greater tendency to produce catarrhal affections of the respiratory organs than a cold, dry air. The average per cent of humidity at these two places is about the same. The presence of the lake keeps the air at Waukegan, especially when the wind is N. E., E. or S. E., heavily loaded with moisture, so that the humidity is higher, and as the wind during the three months named is cold, the excess of cases of catarrhal throat disease in Waukegan, above the ratio given in the large area included in Dr. Drake's investigations, is readily understood. This excess does not occur when compared with St. Paul alone. Hence I reiterate my opinion that the relations of temperature, humidity, winds, ozone, and very likely electricity, are very important, if not the chief factors in the production of catarrhal diseases of the respiratory passages.

Another fact which I have observed in these cases, as well as in cases apparently due to la grippe, is that they are more frequent after cyclonic disturbances. This has also been observed by others. The same statement may be made with regard to true croup and diphtheria.

The course which some of these cases take, their infectious nature and the swelling of the cervical glands, and the submucous infiltrations (Baginsky) that also frequently occur, lead us to believe that many of them are of bacterial origin. In all probability it will be found in these cases, as Dr. Pfeiffer and others have found in the influenza of la grippe, that there is a bacillus in the blood and sputum. It is very likely that the climatic elements enumerated above so impress the respiratory mucous membrane as to furnish a suitable soil for the cultivation and growth of the particular form of bacillus or coccus which causes the disease. As it is known that the mouth is a focus for bacteria and micrococci (W. B. Miller), it may be the more easily believed that some of these sustain an etiological relation to catarrhal sore throats. Indeed various authors (Dubousquet-Labordere) of late have maintained the contagiousness of tonsilitis, as well as other catarrhal diseases. Gulland affirms that a function of the tonsils is the reproduction of leucocytes. In catarrhal disease this function is interfered with and hypertrophy results, but in debilitated patients the arrest of this function may cause bacteria to enter the tonsils. I believe, however, with Allen, that the natural condition of enlargement of the tonsils which occurs in children and youth is often mistaken for hypertrophy from disease.

It is interesting to note, in this connection, that horses are affected, in epidemics of catarrhal diseases of the respiratory passages, a few weeks before members of the human family are attacked (Fleming).

It is a matter of common observation that some persons are more susceptible to catarrhal diseases than others; that is, the power of resistance to disease, which every one has to a certain extent, is so strong in some individuals that they will pass through an epidemic unharmed while the more susceptible are first affected. Those who are susceptible to catarrhal sore throats are liable to have recurrent laryngitis, pharyngitis and tonsilitis, until a chronic form may result. The increased number of capillaries in the cuboid space posterior to the nares (Flint) renders that region a favorite retreat for chronic catarrh.

The habit of wearing mufflers about the neck is liable to make the throat more sensitive, by being usually kept in a state of perspiration, which permits a refrigeration of the skin to occur more easily, and the reflux of blood to the dense network of capillaries in the larynx (Landois) and adjacent mucous membrane produces congestion, and consequent catarrhal sore throat.

The attack usually begins suddenly. It is characterized by general muscular soreness or aching, chilliness, sometimes pain in the back and back of the neck, generally a sense of stiffness in the throat and neck, nausea, temperature increased, varying from 102° to 105°. Generally the entire throat is in a state of catarrhal inflammation, the most susceptible part (*pars minoris resistentiæ*), suffering the most intensely. The tonsils are sometimes covered with small patches of coagulated

material, while the remainder of the throat is involved only in catarrhal inflammation. The active symptoms subside in three to five days, and complete recovery occurs within a week. When the glands are much enlarged, as occasionally happens, it may be two weeks before they return to the normal size. The glands are often slightly enlarged, but subside with the fever. They all terminate in recovery. However, it occasionally happens that cases of diphtheria occur during these endemics. It is generally easy to distinguish the one from the other by the second day of the disease, and often from the beginning. Another important fact is that it not unfrequently occurs in a family where there are several cases of the disease, that one will take the form of diphtheria. Albumin has been found in the urine of many of these cases (Ingals), but it is probably due to the same causes which explain its presence in other febrile diseases.

Treatment. Hot wine gargles have been recommended in these sore throats. Lennox Browne states that menthol, an antiseptic and local anodyne, contracts the capillaries of the nose and throat, and checks secretion, and, in consequence of these virtues, recommends it in hoarseness and soreness of the throat, in this class of troubles (Bishop). My own experience with this remedy is that in certain cases it acts well, but in other cases it fails to give relief. I have thought that in cases occurring in damp weather, when the mucous membranes are in a state of venous distention, the inhalation of menthol produced better results than in dry weather. The same is largely true of astringent gargles. In dry, cold weather, when the mucous membrane is constantly

parting with the moisture which forms nature's covering, some more bland treatment will succeed better. In these cases the spray of vaseline (Robinson), or vaseline applied with a soft brush or absorbent cotton, acts very soothingly. I have also in such cases used a gargle consisting of alcohol, glycerin and water, varying the proportions to suit the sense of dryness in the throat.

I have found gargles of milk to be very excellent in the dry form, hot, warm or cold, as the patient prefers. I have been especially pleased with the results of ice and cream. The ice is to be shaved or scraped, and mixed with sweet cream, in the proportion of one of ice to two of cream. This is particularly valuable in small children who cannot or will not gargle, nor allow the spray to be used. Sugar may be added, or any flavoring extract, to suit the taste. In older patients the ice and cream may be used in equal proportions. Ice cream serves an excellent purpose in many cases to control the nausea. This treatment acts well, also, in those medium cases where it is difficult to decide whether they should be classed with the dry or moist form.

The essential oils, by spray or nebulization, are also valuable in these dry forms, and are usually very agreeable.

The treatment by atomization, since its recommendation by Jean Sales-Girons, and later by Dr. Pserhofer before the French Academy, has become very popular, as it deserves to be.

Solutions of chlorate of potash and permanganate of potash, and other astingent preparations, are useful when sprayed into the throat, in the forms of sore throat where the secretion is profuse. They may also

be used in the form of gargles. Dr. Gabrilovicz recommends inhalations of peroxide of hydrogen. I have used the peroxide, but it seems to me to be adapted to a special class of cases, or at least to serve a better purpose in special cases, where there is a tendency to the formation of a pellicle on the tonsils, or where the whole secretion is too albuminous. I like to use it as a spray in such cases, and believe its action to be similar to that of the continued action of ozone ; that is, I believe it acts beneficially by dissolving the albuminous pellicle when it has been formed, and when it has not already appeared by rendering the exudate incoagulable. If this view is correct, it will be found valuable in the form of inhalation and spray in diphtheria, true croup, and those cases of tonsilitis and sore throat where the exudate contains an excess of albumin and fibrin. It should be diluted. Yerba Reuma by atomization is sometimes very valuable. Cases of croupal laryngitis (Curtin and Watson) are best treated by inhalations, although atomization acts well, and the remedy should be determined, as in cases of general sore throat, by the class of inflammation, whether dry or moist. The patient should be kept in bed. Coupard and Saint Hilaire recommend a 3 per cent solution of antipyrine in catarrhal laryngitis.

In nearly all cases where there is general febrile disturbunce, I have found the use of aconite and belladonna (Ringer) invaluable. An excellent protection for sensitive throats is the use of a silk handkerchief in front of the neck, in place of mufflers around it.

When all has been said, it remains to the physician to determine what the treatment in any particular case

shall be, not by what the books say, but by studying the class of inflammation present, and the condition and idiosyncrasies of his patient. Then by the use of medicated inhalations and medicated sprays, the cold compress to the throat in croupal cases, together with simple gargles and some simple preparation to equalize the circulation and reduce the temperature, all these cases will recover. The minimum amount of medication that will suffice and the maximum amount of care that can be secured in nursing should be the rule here, as in the treatment of all diseases.

CHAPTER V.

BRONCHITIS AND ITS RELATION TO BRONCHO-PNEUMONIA AND OTHER DISEASES OF THE RESPIRATORY PASSAGES.

TO fully understand a bronchitis or an inflammation of the bronchi, it is necessary to bear in mind the character and kind of tissue involved. The bronchi are lined by mucous membrane and the pathological conditions to which this membrane is subject in the bronchi are similar to those occurring in other mucous surfaces.

The three forms of inflammation so frequently met with in the throat, catarrhal, croupous and diphtheritic, likewise occur in the bronchi; and a very common, indeed the most common, form is the catarrhal, technically known as catarrhal bronchitis. Such an inflammation in the bronchi and bronchioles passes through the same stages as occur in membranes lining other cavities or tubes, hyperæmia, congestion, exudation, suppuration, etc. These processes in the bronchial tubes, however, may induce serious consequences which would not follow such morbid conditions elsewhere. The infiltrated membrane diminishes the lumen of the bronchi, and if considerable may produce dyspnœa or asthmatic breathing. This condition with a sense of suffocation is of frequent occurrence in climates productive of acute and sudden attacks of bronchitis, tracheitis and laryn-

gitis. In these cases the stage of exudation is one of relief. Bronchitis is not a very fatal disease in the United States, the mortality from this disease reaching only about one-seventh of that in England. For instance, in the United States there are about 1,451 deaths from this disease in a total mortality of 100,000, while in England the mortality from bronchitis is 10,586 in 100,000 deaths from all causes. This difference, so favorable to the United States, is due in part to the greater density of population in England. Even in the United States there is a great difference between rural districts and cities in this respect, showing that the causes prevail to a greater extent in cities than in agricultural regions. The ratio of deaths from bronchitis in rural districts may be given at 155 per million of population in this Republic, and in cities at 561. Undoubtedly some of this difference is due to overcrowding, accumulation of filth, occupation, and improper ventilation in cities; but evidently much of it must be ascribed to the inhalation of coal gas and other noxious gases and vapors in cities, and the absence of the pure air and habituation to the weather and its changes which constitute some of the safeguards to a rural population. The endemics and epidemics which occur in different places and at different times led many physicians to suspect a bacterial cause long before any investigations had been made to determine this fact. It is now known that bacteria cause this disease in some instances even when it does not accompany la grippe. In all influenzas accompanied by bronchitis, bacteria probably sustain a direct causal relation to the disease. It will be found by a perusal of the tables given below that bronchitis

is common, and it may be said to be endemic in wet, windy, changeable climates.

Habituation to exposure diminishes the susceptibility to bronchitis. Acclimatization often has a similar tendency to diminish the mortality from this disease. In the United States, for instance, the mortality from bronchitis among Indians is 10 per 1,000 deaths, negroes 17 per 1,000 and whites 28 per 1,000. In some localities, however, as I have learned from private communciations, bronchitis prevails largely among the aboriginal population. Phthisis, on the other hand, is a terrible scourge among the Indians, especially those who have been brought under the influence of civilization, reaching the enormous ratio of 286.99 per 1,000 deaths. Bronchitis is more fatal in the United States among the whites than among the colored population. Those of Irish parentage are more susceptible to this disease than those of German descent, and it is more fatal in children and those of advanced age than in those of intermediate age. This is due to the rich network of capillaries in the lining membrane of the bronchial tubes which in children is loosely bound to the muscular wall and lies in folds. The epithelium is easily shed and readily proliferates. These tissues become more dense after five years. In old people the lessened vitality renders the bronchial mucous membrane more susceptible to catarrhal inflammation. Most deaths from bronchitis in this country occur in the middle Atlantic region, New England, Ohio and Missouri River Belts and along the shores of Lakes Huron, Erie and Michigan. The mortality is low in the south Atlantic coast region, south Mississippi belt, western plains, western

mountain region, central part of Michigan, and northern portion of Wisconsin and Minnesota. It is more prevalent on the Gulf and Pacific coasts than on the adjacent islands. Like catarrhal sore throat it is more common in the lower lake regions and northern inland regions. In this country bronchitis reaches its maximum mortality in December and March. The disease in this country is more common in November and December, pneumonia in January and February; and bronchitis prevails again in March, while pneumonia is frequently prevalent in April and May. Climatic changes affect all mucous membranes, so that various catarrhal diseases of the respiratory organs prevail where bronchitis is marked, but a study of the following tables will show that the mortality ratio is a variable quantity. From the first table we learn that bronchitis is common in Iceland, Norway, Sweden, Russia, Siberia, England, Scotland, Ireland, Belgium, and Canada; that it is common and fatal in England, Scotland, Ireland, Belgium, Italy, Spain, and Portugal. It is less prevalent in Canada than in England but more fatal, the ratio of deaths being 227 in England to 309 in Canada. The disease is less frequent, or at least less fatal, in France, Switzerland, United States, Mexico. As broncho-pneumonia is usually classed with bronchitis or pneumonia in mortality tables it will be profitable to compare the death rates from these two diseases. In this way we may determine approximately what countries are most afflicted with broncho-pneumonia. The mortality rate per million living in Norway is 1,458 for pneumonia and 1,805 for bronchitis; in England these ratios are 1,012 for pneumonia, 2,464.6 for bronchi-

tis ; in Scotland they are 1,090 and 2,040 respectively ; in Ireland they are 438.5 and 2,315.3 ; in Belgium approximately 1,000 and 2,000 respectively ; in France 2,202.9 and 1,750.9; in Switzerland 1,669.4 and 1,485.8; in Spain at Madrid they are 2,900 and 4,800 ; in Canada they stand 1,344 and 3,357, but in the United States the relation is 1,257 and 337.8.

From these figures we should expect to find broncho-pneumonia most prevalent in England, Ireland, France, Spain and Canada, and comparatively rare in the United States. It is very desirable that mortality tables should record this disease, but it is well known that officials sometimes, for various reasons, do not record the cause of death as certified by the attending physician.

Broncho-pneumonia is a comparatively fatal disease and where it prevails its mortality rate is high. The tables here presented bring into comparison the mortality from laryngitis, croup, influenza, whooping cough, pneumonia, bronchitis, pleurisy and phthisis. Diphtheria has not been introduced because in the cases of that disease originating in catarrhal inflammation, death rarely results and a comparison would avail little to instruct us in regard to this class of diseases. Bronchitis is often present in croup, influenza and whooping cough, so that it seems fitting that they should be enumerated. In Eastern Asia, the Islands of the Sea, Africa and South America, and some countries in the regions represented in these tables there are no statistics that I could secure or else they were unreliable and are not detailed here. In some cases I have used the terms "common" or "rare," as indicated by the authorities I consulted. The numbers represent the *rate* of *deaths* per *million*

TABLE I.

REGION.	Mean Annual Temperature.	Rainfall.	Croup.	Influenza.	Whooping Cough.	Pneumonia	Bronchitis.	Pleurisy.	Phthisis.
Iceland	32° to 39°	29 in.	common	frequent	very rare	common	common	common	rare
Norway	40°	45 in.	250	common	513	1304.1	917.7	158.4	2500
Sweden	45°	22 in.	238 in towns.	common	85	in Fahm. 1800	common	.....	3500
Stockholm	.....	.....	.....	.....	.....	2180	.....	.....	.....
Denmark	47°	.....	common	.....	662	1700	moderate common	.....	3052
Russia, in Europe	.....	.....	.....	.....	.....	.....	.....	.....	.....
Baltic Region	3.67°	20.2 in.	.....	frequent	230	frequent	common	occasion.	frequent
Northern Region	1°	.....	frequent	.....	.....	frequent	most common	frequent	8221
Central Region	4.5°	21.9 in.	common	.....	frequent	frequent	common	common	.....
Southern Region	10°	4.1 in.	not rare	.....	.....	not rare	not rare	not rare	frequent
Germany	8.6°	28 in.	common	frequent	414	1422	common	70	2779.5
Austro-Hungary	8.8°	33.7 in.	.....	common	976	.....	.....	.....	3910
England and Wales	49.4°	30.4 in.	170	common	513.3	1012	2464.6	49	2120
Scotland	46.2°	33.1 in.	170	.....	common	1090	2040	84	2045
Ireland	49.8°	29 in. Dublin.	.....	.....	.....	438.5	2315.3	.....	1954
Netherlands	9.6°	18.3 in.	303	.....	340	.....	.....	.....	1977 Brussels
Belgium	49.8°	49.8 in.	.....	.....	common	aprox. 1000	aprox. 2000	.....	5600
France	53.1°	25.5 in.	common	common	180	2202.9	1750.9	.....	3341.8
Switzerland	47.8°	.....	common	common	240.2	1669.4	1485.8	186.4	2080
Spain and Portugal	60.7°	32.7 in.	excessive and fatal	common	291	Madrid. 2900	Madrid. 4860	120	Gibralter 980
Italy	59.2°	28.5 in.	excessive and fatal	common	230	common and fatal	common and fatal	.....	2390
Siberia	37.7°	Orenburg	not frequent	frequent	rare and mild	common	common	.....	rare
Canada	40.0°	26.7 in.	common	common	.....	1344	3357	.....	2762.5
Toronto	46.0°	35.7 in.	.....	.....	.....	.....	.....	.....	.....
United States	48.0°	40 in.	392.3	.....	.....	1257-1800	337.8	38.7	2517.6

TABLE II.

REGION OR CITY.	Mean Annual Temperature. Degrees Fahrenheit.	Mean Annual Rainfall in Inches.	DISEASES.—MORTALITY PER MILLION LIVING POPULATION.								
			Croup.	Influenza.	Whooping Cough.	Pneumonia.	Bronchitis.	Pleurisy.	Phthisis.	Broncho-Pneumonia.	Laryngitis.
United States	53	40	392.3	.....	.....	1257	337.8	36.7	2517.6	.....	.....
East Atlantic Region	59.3	48.8	230.8	.....	.....	1057.8	.....	.....	2136.7	.....	.....
Lake Region	44 91	28.3	271.6	.....	.....	995.2	.....	.....	1753.8	.....	.....
Central Region	56.66	42.40	452.7	.....	.....	1256.9	.....	.....	1738.3	.....	.....
Southern Plateau	61.19	13.01	302.5	.....	.....	1256.9	.....	.....	1398.8	.....	.....
Southern Central or Appalachian Region	48	50	814.8	.....	.....	1164.9	.....	.....	1855.2	.....	.....
Gulf Coast	73	55	271.6	.....	.....	981.5	.....	.....	1105.5	.....	.....
Pacific Coast	56.5	26.50	120.7	.....	.....	1074.4	.....	.....	2467.2	.....	.....
California, 1890-92	57.63	20.44	251.9	170.9	80.6	1594	490	33.1	2576	80.6	.....
Sacramento, 1890-92	59.2	23.57	107.7	33.3	116.5	1132	333	.....	2264.4	498.5	33.3
San Francisco, 1890-92	55.7	24.03	380	.....	53.8	2003	925	.....	1565	261.6	.....
Los Angeles, 1890-92	60.5	17.89	107.6	.....	38.4	1166.5	284.5	.....	3037.5	.....	.....
Illinois, 1881-85	50.8	40.5	182.9	4.97	65.8	687.3	296.06	12.2	670.4	.....	30.8
Chicago, 1881-85	49	37.34	452.1	4.81	142.2	1148.9	799.2	27.5	1478.8	.....	81.5
Milwaukee, 1892	45.1	33.63	327.7	100	330	1602.7	891.5	.....	1380	.....	.....
Providence, 1891	49.6	54 98	118.5	259.2	492.6	1800	866.7	44.4	2740.7	59.2	.....
Knoxville, 1891-92	57.5	53.87	272.4	.....	177	1266.6	272.4	.....	2887.4	68.1	38.1
Baltimore, 1892	55.6	42.36	101.05	408.5	68.8	1758.7	591.2	.....	2423.05	.....	.....
Denver, 1892	49.3	14.99	116.7	75	116.7	941.7	350	33.3	2583.3	133.3	.....
Buffalo, 1891-92	46.25	38.3	603.7	207.4	127.78	2212.9	653.7	44.44	2027.8	348.1	.....

living, and of course represent the degree of fatality of the disease rather than the frequency of its occurrence. The second table includes reports from a few States and cities of the United States. The numbers refer to the deaths per million living as in the first table.

It is to be regretted that the numbers in the tables from reports of the United States and Illinois are not complete, and can be considered as representing only the relative frequency of the occurrence and fatality of the diseases named. The reports from cities, I think may be considered reliable. I present herewith some additional remarks concerning the tables, and a few countries not mentioned in them, which will give a better idea of the prevalence of these diseases throughout the world than could be gained from the tables alone.

Iceland. Croup is common. There are 32 deaths from croup per 1,000 deaths. Influenza, local and epidemic, is not uncommon. Whooping cough is not endemic. Bronchitis is sporadic, and not more frequent than in Southern Europe. The same may be said of pneumonia.

Norway. Croup is a fatal disease and occurs at all seasons, especially in the cold months. Croup causes 1 in every 66 deaths; in England 1 in 112 deaths, so that it is nearly twice as fatal in Norway as in England. The fewest deaths occur in autumn. Whooping cough is common. Influenza not so frequent as in Iceland. Acute bronchitis caused (1886–7) 3.6 per cent of mortality; chronic bronchitis 2.1 per cent, or 5.7 per cent for both forms. In England 10 per cent or more of the mortality is due to bronchitis. Broncho-pneumonia is of common occurrence, but this disease is less fatal than

in England. Bronchitis is a town disease; most cases occur in the southern portion, possibly due to the difference in humidity. Greatest mortality in cold months, January, February and March; least in July, August and September.

Sweden. Croup is frequent and fatal, most common in northern part, and more fatal in the north than in the center. Influenza is as frequent as in other European countries. Whooping cough is common, and 5 per cent of the cases are fatal. Occurrence in spring 21.8 per cent; summer 28.2 per cent; fall 29.4 per cent; winter 20.6 per cent. Bronchitis is common, and pneumonia more common than in England; hence we should expect many cases of broncho-pneumonia. In the interior bronchitis constitutes more than 20 per cent of all diseases treated.

Denmark. Whooping cough is one of the most fatal diseases of childhood. Bronchitis is less fatal than in many countries of Southern Europe. Pneumonia is as common as in Northern Europe generally.

Finland. Croup is frequent, pneumonia common and bronchitis likewise frequent.

Russia in Europe. The Baltic Provinces are the starting point of influenza, the pandemics moving southward and westward. Bronchitis is common in winter. Pneumonia, which is moderately prevalent in winter, is common in spring.

Northern Russia. Croup is frequent. Bronchitis is one of the commonest maladies, and pneumonia is frequent.

Central Russia. Croup is somewhat prevalent, especially in the western portions. Bronchitis is next in frequency to pneumonia, and both are common.

Southern Russia. Croup, bronchitis and pneumonia are less frequent than further north.

Germany. Croup is more frequent than in any other European country except Austria. Influenza is common, passing westward. Whooping cough is one of the most dangerous diseases in Saxony and Baden. It is more fatal in large than in small towns. Bronchitis is less fatal in Germany than in England. Most frequent in Potsdam, Arnsberg, Schleswig, Stralsund, Magdeberg and Dusseldorf; least so in Posen, Bromberg, Gumbinnen and Münster. Most fatal in large towns.

Austro Hungary. Croup is frequent. Influenza is common. Whooping cough is more fatal than in Germany and England, and the same may be said of pneumonia.

England and Wales. Croup is most fatal in London, more fatal in females than in males, and prevails most from December to May. There is less influenza than bronchial catarrh, but there are some cases of local influenza. Pneumonia prevails. Bronchitis takes the first place among causes of deaths in England, and the death rate is still increasing; it is most fatal below five years and above fifty-five. From five to fifteen it occurs most frequently in females, at other years in males most fatal. In warm years the mortality is low, in cold years it is high. November to April high. May to October low, in the ratio of 990 to 867. In croup mortality is more common west than in east side of England; bronchitis is most common in the south and southwest, least common in the north and northeast, generally, but the limits are variable.

Scotland. Croup is as common as in England and

pneumonia more so. Bronchitis is less frequent than in England ; as in other countries, it is less fatal in rural districts.

Ireland. Pneumonia gives less than half the rate of mortality of this disease in England, the ratio being 438.5 to 1,012 per million population. Bronchitis is also less, 2,315 (1878–1881) to 2,464.6 (1875–9) being the ratio.

Netherlands. Croup is most prevalent in Overysel and Friesland, rare in Limburg and Gröningen. Whooping cough is less fatal than in England, the ratio being 32 to 46. Acute respiratory diseases are twice as fatal and frequent as the chronic forms.

Belgium. Croup is prevalent, but bronchitis is less frequent than in England. The occurrence of pneumonia, however, is about equal to that in England. Whooping cough occurs about as in other countries of Europe.

France. There is a heavy mortality from croup. Whooping cough is not fatal. Pneumonia and broncho-pneumonia are more fatal in the south than in the north. North of 48° the rate being 1,919.9, south of 45° 2,655 per million ; in England 1,058 for the same time. Bronchitis has a death rate of 2,291 in London, while it is but 1,711.7 in thirty great towns of France. The rate is less in the north than in the south, the ratio being as 1,660.8 to 1,714.1. Acute bronchitis, chiefly in infancy and childhood, caused 669 deaths per million in the north, 819 in the south and 719.6 in the middle region ; chronic 991 north, 1,158.17 middle, 895.3 south per million. Combining we find the rate of deaths from respiratory diseases in France to be 3,809, in England 3,349.

Switzerland. Croup prevalent. Whooping cough moderately fatal. Pneumonia 1,669.4 ; in England 1.058. Greatest mortality not in cities, as in England. Bronchitis less prevalent in country than in town. Acute 486.4; maximum in March. Chronic 999.4 per million.

SOUTHERN EUROPE.

Spain and Portugal. Croup very prevalent and fatal. Influenza not peculiar. Whooping cough moderately prevalent. Pneumonia 2,900 per million and bronchitis 4,800, in Madrid. Table lands suffer more than coast line, north than south, towns than country. Bronchitis reaches its maximum in December and January. Pneumonia in February and March.

Italy. Croup more prevalent than in England. Whooping cough is comparatively rare. Bronchitis, pneumonia and pleurisy give a combined death rate of 4,610 per million. They are cold weather diseases reaching the maximum in January, February and March and the minimum in September.

Greece. Bronchitis is of a milder type than in the north of Europe. Respiratory diseases less fatal (and frequent) than in England.

European Turkey. Croup occurs. Chest affections in Constantinople are as frequent and common as in the larger towns of Europe.

NORTH AND WESTERN ASIA.

Siberia. Influenza frequent besides general epidemics and pandemics. Croup not frequent. Whooping cough rare and benign. Bronchitis, etc., prevalent.

Mongolia. Influenza or "catching cold" frequent.

Corea. Bronchitis is frequent, but pneumonia is rare. Asthma is a frequent disease.

Asia Minor. Bronchitis and other catarrhal affections especially prevalent in Armenia; pneumonia occurs frequently on the plains of Troy.

Syria. Bronchitis is frequent, but pneumonia rare at Beyrouth.

Mesopotamia. Bronchitis not rare in winter.

Arabia. Bronchitis rare on coasts, common in plateau.

Persia. Croup rare. Bronchitis and pneumonia prevalent in winter and spring.

Asia, India. Whooping cough at long intervals; it is mild. Croup not very frequent. Chest affections increase in frequency and fatality westward and northward. Bronchitis is more frequent in lower Bengal and Assam than elsewhere. Pneumonia most frequent and fatal in places of greatest temperature change—Rohilkand and Merrut. Bronchitis is the most fatal of respiratory diseases actually, but not in proportion to cases treated.

Ceylon. Death rate from bronchitis 412 per million, very much less frequent than in England, but more frequent than in the United States. Pneumonia not very frequent, but severe. Whooping cough is found occasionally.

Burmah. Bronchitis is moderately prevalent, and the same may be said of pneumonia.

South Eastern Asia, Malayan Peninsula. Bronchitis very rare, and the same may be said of all respiratory diseases. No deaths from bronchitis.

Indo-China, Siam. Bronchitis is common among both natives and strangers.

Cambodia. Bronchitis moderately common. Pneumonia rare.

China. Influenza frequent. Bronchitis and pneumonia frequent in North China. Bronchitis is more common in the south-eastern provinces, and most cases occur in spring.

Hong-Kong. Chest affections cause a death rate 2,438 per million. Most fatal in October and November.

Japan. Bronchitis is common in all parts and particularly fatal to children. Most common in spring and summer.

Sumatra. Bronchitis and catarrh are frequent. Well marked pneumonia is very rare.

The Riouw Archipelago. Catarrhal diseases frequent.

Borneo. Whooping cough prevails. Bronchitis is of frequent occurrence and pneumonia rapidly assumes the asthenic form.

Java. Bronchitis and other catarrhal diseases of the lungs are rare.

Philippine Islands. Bronchitis frequent. Pneumonia, influenza and whooping cough rare.

Australia. Influenza sometimes prevails. Whooping cough 190 per million, less than one-half the death rate of England. Low death rate from bronchitis, less than one-third that of England. Pneumonia more frequent but less fatal than that of England. Congestion of lungs common in both native and foreign population.

Tasmania. Influenza frequent; also occurs in animals—dogs. Bronchitis more frequent than pneumonia 660 to 576.

New Zealand. Whooping cough is moderately fatal, about one-half that of England, 277 per million. Croup less fatal than in Australia (N. Z. 125.6) and less than one-third as fatal as in the United States. Bronchitis 459.4 per million. Pneumonia 398.

Polynesia. Influenza spread by trade winds, chiefly from east-south-east. Bronchitis rare. Pneumonia more frequent.

New Caledonia. Whooping cough and influenza both occur. Bronchitis and pneumonia and other respiratory diseases are the most fatal of diseases among the natives.

Society Islands. Influenza occurs. Bronchitis and pneunomia not rare.

Hawaiian Islands. Influenza frequent. Whooping cough rare. Pneumonia and bronchitis frequent.

Marquesas Islands. Bronchitis is common.

Africa, Morocco. Respiratory diseases comparatively rare.

Algeria. Bronchitis was one of the fatal diseases in 1888—2,156 deaths per million of which 1,104 was acute and 1,052 chronic. England 1,971, France 1,711.7. Native civil population most affected. Broncho-pneumonia and pneumonia occur. In 1888 these two formed a death rate of 2,751 per million. Respiratory diseases are excessively fatal in Algeria contrary to what would be expected.

Tunis and Tripoli. Bronchitis and pneumonia are seldom met with.

Egypt. Respiratory diseases are rare. The military report gives 295 to 1,000 admissions and 1 to 1,000 deaths.

Senegal, Sierra Leone. Respiratory diseases are common among the natives.

Coasts of Guinea. Repiratory diseases probably rare unless among the natives.

Congo. Respiratory diseases are rare among Europeans and frequent more among natives.

South Africa, The Cape. Respiratory diseases are comparatively rare. Bronchitis 20 per 1,000 admissions, 18 per 1,000 deaths. Pnemonia 32 per 1,000 admissions and 114 per 1,000 deaths.

Natal and Zululand. Bronchitis especially rare.

Bechuanaland. Whooping cough is common but mild. Croup occasionally occurs and is relatively fatal. Bronchitis and pneumonia are rare and mild.

East Africa. The Coast Region. Whooping cough uncommon. Bronchitis comparatively rare and mild. Pneumonia and pleurisy more frequent, especially at the beginning of the rainy season.

South Central and East Central Africa. Whooping cough sometimes epidemic. Bronchitis and pneumonia prevail. Coughs occur frequently (Livingstone). Bronchitis is common in some places—Mpwapwa—but pneumonia is rare. Catarrh during the cold season. Pnemonia common in upper Nile basin. Influenza occurs at the end of the rainy season.

The Western African Islands, The Azores. Madeira. Bronchitis is common and mild. Pneumonia low and asthenic, is frequent and fatal. Respiratory diseases common among laboring classes.

Canary Islands. Bronchitis and pneumonia are excessively frequent but not correspondingly fatal.

Cape Verd Isle. Bronchitis, catarrh and pneumonia are "maladies of all seasons and localities."

St. Helena. Respiratory diseases common and fatal, 92 per 1,000 deaths.

Lesser East African Isles, Zanzibar. Bronchitis less common than in Europe, but frequent in March and April.

Madagascar. Influenza sometimes. Bronchitis and respiratory affections in adults rare. Acute bronchitis and broncho-pneumonia common and fatal among native children in cold season. Less frequent on the coast than in the interior.

Mauritius. Bronchitis, colds and catarrhs rare. Pneumonia comparatively so, but excessively fatal in some fever localities.

North America, Greenland. Influenza prevalent in autumn, and the same may be said of pneumonia and pleurisy. They occur in both natives and Europeans.

Sitka, Pacific Coast. Pneumonia and pleurisy are more prevalent than in England, 60 to 52.

Labrador. Whooping cough has been known since 1875–76.

Canada. Respiratory diseases but not throat trouble prevalent on Atlantic coast where they are most fatal. They prevail less in the interior of Canada than in England. Bronchitis is less prevalent but more fatal, and pneumonia more prevalent and fatal than in England. Croup is common in eastern provinces.

Newfoundland. Bronchitis and other respiratory diseases very common.

United States. Influenza prevails extensively. Croup prevails most in eastern portions of Nebraska, Dakota, Wyoming, Oregon, Mountains of Virginia, Kentucky, North Carolina, Tennessee and Georgia. Least in New England, Southern Atlantic Coast, Gulf Coast, Rocky Mountain Region (except as above), Texas, Mississippi, Ohio and Missouri River belts. Bronchitis is a subordinate disease in the United States, scarcely one-seventh as fatal as in England. Pneumonia gives a death rate

of 1,257 to 1,800 per million living. Bronchitis 155 in rural districts, 561 in cities. Bronchitis is rare along the Atlantic, Gulf and Pacific Coasts, shores of Lakes Ontario and Erie, and in Michigan, South Central Appalachain Regions, interior plateau and heavily timbered regions of the northwest. Most frequent and fatal in southern interior plateau, South Mississippi River belt, North Mississippi River belt, southwest central region, central plains and prairies, prairie regions, Mississippi River belt, western plains and Cordilleran regions. Among the Indians 10 deaths (or 1 per cent) per 1,000 are due to bronchitis. Among the whites 28, among the colored 17. Pneumonia furnishes a mortality among Indians of 101 per 1,000 deaths, among whites 109, colored 141. Phthisis, Indians 288, whites 167, colored 187. Pleurisy frequent.

Mexico. Pneumonia frequent and fatal on plateau. Pleurisy frequent on table-lands.

Central America. Pneumonia occurs occasionally in old and weak, in winter.

Costa Rica. Bronchitis is common on the table-land. Whooping cough first known in 1866. Pneumonia is comparatively rare.

Panama. Diseases are similar to Costa Rica except that pneumonia is more frequent.

West Indies, Bermudas. Bronchitis and other respiratory diseases comparatively rare.

Bahamas. Bronchitis 1.9 death rate per 1,000. Pneumonia 3.5.

Cuba. Bronchitis rare, and most common among the negroes. Pneumonia frequent.

Jamaica Whooping cough rare and mild. Bron-

chitis gives a death rate of 388 per million living. Pneumonia 962.

Puerto Rico. Croup occasionally. Bronchitis and other catarrhal affections frequent in winter.

Trinidad. Bronchitis, tracheitis and laryngitis are moderately frequent.

South America, British Guiana. Bronchitis rare and mild, pneumonia more frequent.

Surinam or Dutch Guiana. Bronchitis and other respiratory diseases rare.

French Guiana. Bronchitis common among the colored inhabitants, pneumonia the same. Croup rare.

Brazil. Influenza local and epidemic, frequent in winter and spring. Bronchitis more frequent in southern provinces than further north, but is not marked by frequency or fatality anywhere. Pneumonia common.

Equador. Bronchitis is very common.

Peru. Pneumonia very common along the coast.

Sierra. Bronchitis and pneumonia are very common.

Chili. Bronchitis is common. Pneumonia causes 189 per 1,000 deaths.

Argentine Republic, Uraguay, Paraguay. Bronchitis common. Pneumonia one-third as fatal as in Chili.

The relation of bronchitis to other diseases of the respiratory organs is very well illustrated by the tables. From a careful study of these tables and the relative frequency of the occurrence, of other diseases with bronchitis will justify the opinion that a larger number of respiratory diseases have their origin in bronchitis than is usually granted ; that broncho-pneumonia is of more frequent occurrence than statistics indicate, and that many cases reported as bronchitis or pneumonia

or congestion of the lungs might be correctly named broncho-pneumonia. Another fact is observed also, and that is the great difference between the death rate from bronchitis in the United States and the actual number of cases of this disease which we meet in our practice. There is a close affinity between nasal and pharyngeal catarrh and bronchitis, but I have no statistics to assist in determining the numerical relation. H. Gradle and others have assured me that they have frequently observed a bronchitis apparently resulting from an extension of nasal catarrh, or at least bearing a consecutive relation to that morbid condition. This is especially likely to be observed in chronic bronchitis. I have made the same observation and have also seen many cases of acute nasal catarrh or catarrhal pharyngitis followed in a few hours or days by an acute bronchitis. In some instances I have observed these cases to pass into a broncho-pneumonia.

Another comparison worthy of mention has reference to the months of maximum and minimum frequency of these diseases. Croup is most frequent in London from the middle of November to the end of April, the absolute maximum being, according to Richardson, in February and March. The absolute minimum occurs from the middle of June to the middle of August. In New York the maximum is reached during the months of November and December. Laryngitis attains its maximum in London during the last three weeks of March. Minimum the second week of September. Bronchitis reaches the maximum of frequency and fatality in London in the second week of January, minimum in August. In New York the maximum is

attained the middle of March and the minimum the first week of August. The whole number of deaths from bronchitis in New York is but one twentieth of the total mortality, while in London it is one-eighth. Pneumonia reaches the maximum in London in December and is most frequent from November to April ; the absolute minimum is in August. In New York pneumonia is frequent from November to the middle of May, the absolute maximum occurring in March ; minimum in July and August. Phthisis is fatal from the middle of November to the middle of June, in London, reaching the maximum the middle of March ; minimum the fourth week of September. The death rate is about the same as that of bronchitis. In New York phthisis is fatal from the middle of December to the middle of May, the absolute maximum occurring in March. The minimum is in June. The deaths here from this disease are about one-seventh the total mortality. Pleurisy occurs most frequently in London during the time from the middle of November to the second week of June, the absolute maximum being reached in December and January. The minimum is attained in July and August. In London influenza prevails from November to April except in February. Whooping cough reaches its maximum in London during February, March and first half of April. The minimum in September and October. In New York there are two maxima, September and February ; and two minima, November and June.

In the treatment of bronchitis we do not usually give sufficient prominence to medicated inhalations and sprays. These may be applied with atomizers, nebu-

lizers, insufflation of finely divided powders or by means of medicated steam. Some of the best agents to be thus used are subnitrate of bismuth in powder or combined with eucalyptus in liquid ; camphorated tincture of opium and carbolic acid in steam ; alcohol and camphor or menthol by inhalation ; astringents and the essential oils by atomization or nebulization. Cough mixtures containing anodynes and expectorants are essential but are usually simply palliative. Otherwise the treatment should be conducted in accordance with general principles. I usually direct that the chest shall be enveloped with cotton batting, often bathing in alcohol and anointing with camphorated oil or oil of cocoanut; the application to be changed every eight or twelve hours. Patients who suffer from chronic bronchitis should be advised to go out into the fresh air every suitable day. Abundance of fresh air and moderate outdoor exercise are especially to be recommended in patients who have a tendency to bronchitis, or a catarrhal diathesis.

CHAPTER VI.

CATARRHAL ASTHMA.

I HAVE seen a few cases of asthma which I have called catarrhal. I will refer to this form briefly. It arises under peculiar weather conditions, similar to those mentioned as accompanying or causing catarrhal laryngitis. The patient struggles for breath, gasping and sitting bolt upright in bed. There is not that bracing of the arms to support or strengthen the efforts of the respiratory muscles which is usually described in connection with ordinary cases of asthma. The asthmatic rales are sometimes absent, and bronchial rales may not be observed in some cases. The quick pulse, minute rales, an occasional vesicular murmur, agonizing struggle for breath, and succeeding catarrhal symptoms indicating an inflammation of the trachea and bronchial tubes, suggest the character of the disease.

The pathological condition, is probably briefly, as follows : An acute congestion of the smaller bronchial tubes occurs and the infiltration of the mucous membrane so distends it as to almost close the lumen of the bronchi. Difficulty of breathing must result until the exudate is thrown out upon the surface. Eventually the liquid elements of blood are exuded, the expectoration which follows relieves the breathing and complete resolution restores the patient to health. If the case is

somewhat prolonged, a purulent or muco-purulent secretion results from the exudate of leucocytes with the serum. In such cases, the patient may develop a subacute bronchitis. My cases have been acute. They have soon recovered completely. They have occurred when catarrhal diseases prevailed and subsided as they passed away. The peculiar rales which ordinarily accompany bronchial asthma and hay asthma are absent or slightly developed. Tartar emetic and tincture of belladonna in minute doses give quick and positive relief. I put one grain of tartar emetic and fifteen minims of the tincture of belladonna into two-thirds of a glassful of water and prescribe a teaspoonful every five minutes until the symptoms are alleviated. Then the dose is given less frequently—every ten, twenty or thirty minutes according to the urgency of the case. As soon as the acute symptoms are relieved the tartar emetic should be omitted and the case treated on general principles.

These attacks are similar to some cases of rose or hay asthma in their readiness to yield to this treatment, but many cases of hay asthma will not be benefited by this form of treatment. A few cases of what has been termed rose asthma—cases in my practice occurring in the early spring—which seem to be due to damp and changeable weather, have yielded readily to the same treatment.

Chapter VII.

SOME PHASES OF BRONCHO-PNEUMONIA IN CHILDREN.

IN FRANCE, England and the United States of America, broncho-pneumonia is usually reported in mortality tables as catarrhal pneumonia, capillary bronchitis, or congestion of the lungs, and in a study of statistics this should be borne in mind and these terms included under the designation broncho-pneumonia, at least until greater harmony in terminology prevails. It may sometimes be mistaken for acute bronchitis or pneumonia. That these mistakes are made is evidence of two things: 1, a possible carelessness in diagnosis; and 2, some confusion as to the precise pathological condition termed broncho-pneumonia. It is certainly confusing to read some of the definitions given of this disease. If one is to understand the obstruction of a small bronchial tube and the resulting inflammation about it to be the special condition in broncho-pneumonia, then the autopsy would usually have to determine the diagnosis. If an inflammation of the connective tissue of the walls of the minute bronchioles is the chief element in broncho-pneumonia, the diagnosis will always be difficult. If broncho-pneumonia is a disease involving inflammation of both the bronchial tubes and lung tissue, a diagnosis can almost always readily be made. It is in this sense that

I use the term. A broncho-pneumonia may originate in a simple catarrhal inflammation of the mucous membrane lining the bronchial tubes; this morbid condition may extend to the deeper tissues, and eventually involve the lung tissue.

It often happens that the thickening and induration of the walls of the minute bronchial tubes close the lumen of the passages and a portion of lung is destroyed; the vessels to the part may become obstructed and degeneration result.

The catarrhal origin and the involvement of the lung tissue are more easily discerned than the obstruction of vessels or the degeneration of a small area of lung substance. If, however, there are a number of air vesicles occluded, and an appreciable area of lung substance involved, a diagnosis may easily be made.

I desire in this place to call especial attention to a class of cases which may be followed by serious results, but for which the physician is usually not consulted at the proper time. I refer to common colds. It may not infrequently happen that an acute catarrhal cold involving the nose and throat persists, and the inflammation extends into the bronchi and thence to the air vesicles and lungs, and an acute broncho-pneumonia is excited before the patient considers it necessary to call a physician. This class of cases will be met with most frequently in children, but may often be encountered among adults likewise. Such a cold frequently subsides without the interference of medication, and that common fact leads people to be careless in regard to such ailments. This undoubtedly is one of the causal factors of the high mortality of cases which come under the ob-

servation of physicians. Even those cases which do not die at once, frequently are the subject of lesions which eventuate fatally. To illustrate my statement I will refer briefly to two cases occurring in children and two in adults:

Case 1. Robert D., 6 years old, had suffered with two or three hard colds during the fall and winter. January 30 I was called to see him. I was told that he had been sick for a week, and that I was called because his cold did not yield to the domestic remedies which had previously been sufficient. The tonsils were swollen and red, with small deposits of yellowish white exudate. Bronchitis was marked and the inflammation had already involved the air vesicles and lung tissue. The respirations were somewhat labored. Bronchial râles were abundant. Respiratory sounds subdued and interrupted in both lungs. Percussion revealed slight dullness over left lung; right slightly, if at all modified. Pulse 125, temperature 103.5°. Next day patient was slightly better and improved until the sixth of February when he was dismissed cured. The sputum was not seen in this case, but in the following it was stained with blood.

Case 2. Zadie S., eight years old, had spent the winter in the South with her parents. Upon returning home she contracted a severe cold. Had catarrh of the nose and throat and a cough. Medicine was secured to "break up" the cold, but she gradually grew worse until after a week it was found necessary to call a physician. When I saw her she had catarrhal sore throat and some bronchial râles with a persistent and severe cough. I was informed that for several days she had been ailing with what seemed to be only an ordinary

cold. Percussion sounds normal. Auscultation revealed nothing beyond a bilateral bronchitis with a tendency to involvement of the small bronchi and in a few instances the air cells. Pulse 120, temperature 102° The symptoms increased in severity for a week, the temperature gradually rising to 104.6°, and the pulse to 140. Percussion revealed small areas of dullness in the middle third of both lungs, but chiefly in the left. The respiratory sounds were modified, presenting bronchial râles, vesicular crepitation, dyspnœa; some distress was complained of in the stomach. No other pain was present. The symptoms began to subside in eight days and at the end of another week she was dismissed, the lungs being clear and respiration normal. The third case was an adult.

Case 3. Mrs. E., was in usually good health, had always been well, having never needed to consult a physician, except for sore throat from which she suffered at times. At the time of her exposure she was in a severe snowstorm and became thoroughly chilled. For several days she suffered from a severe catarrhal cold of the nose, throat and bronchial tubes. Soon, however, she felt quite well and resumed her ordinary household duties. The first exposure occurred at Christmas time. Another exposure occurred in one month. The cold was more severe. I made an examination of the patient and found her to be suffering from a well-defined case of broncho-pneumonia. Careful nursing and the usual treatment for ten days restored her to comparatively good health, but a slight yet persistent cough remained. Upon my advice she did not resume all her household duties and exercised greater care in guarding against

exposures. Notwithstanding every precaution, in about eight weeks, that is in the latter part of March, another attack supervened. This time the patient was in bed two weeks. The characteristics of broncho-pneumonia were well marked and later croupous pneumonia and hepatization of the lower lobe of the right lung occurred. A rusty or sanguineous sputum, which had not been present in previous illnesses, was expectorated for a week. The disease was bilateral, the chief obstruction to respiration existing in the upper portion of the left lung and the lower portion of the right lung. This seizure was more obstinate than any preceding. The patient rallied slowly, and a well-defined interstitial inflammation remained, in a comparatively active state, involving the lower lobes of both lungs. The pulse remained at 90 to 100, and the temperature at 100° to 101°. The cough was persistent and the expectoration and dyspnœa troublesome. The microscope showed an abundance of bacilli tuberculosis. From this time the case progressed gradually downward, with seldom a temporary rally, until death occurred just two years and six months from the first exposure. An uncle and aunt of this patient are said to have died of consumption.

Case 4. The last case I wish to report was similar. She has been subject to catarrhal colds for several years. In the autumn of 1892 she was living with a married sister, and the sickness of one of the children caused her to overwork. Later, she contracted a cold from which she recovered slowly. She returned home in the early winter and felt quite well, but had a slight cough until February. The latter part of that month she contracted a cold which was very obstinate. March

1, 1893, I was called to see her and found a well-defined case of broncho-pneumonia. I learned that she had suffered in the first place from a catarrhal cold, involving the nose and throat. She recovered after a week, but a persistent cough remained. In a few weeks she called at my office and I found a subacute inflammation of the lungs involving the lower and middle thirds of both lungs. Both nasal and laryngeal catarrh were present, and she suffered considerable from dyspnœa. Pulse 80, temperature 99°. The microscope showed many micrococci but no bacilli tuberculosis in the sputum. She did not fully recover until the next winter which she spent in Calfornia.

These four cases have been related to show the difference in the prognosis usually in adults and children. In children, the temperature may run higher, the symptoms be more acute, but the prognosis is more favorable, especially after five years.

Of the last 1,000 cases of all diseases that came under my observation prior to 1894, 221 were cases of lung disease and of these 20 were cases of broncho-pneumonia. One was in an old lady who died. Four in adults between twenty-eight and thirty-seven, one of whom died and another is the fourth case related above; the other two have a persistent cough with a doubtful prognosis. Fifteen were in children from two and a half to eleven years. One, the subject of whooping cough, was two and a half years old and died. The others all recovered, of whom only two were considered dangerously sick.

I refer to this experience to illustrate four facts which I believe to prevail in reference to the etiology and prognosis of broncho-pneumonia :

1. Old people almost always succumb to an attack of broncho-pneumonia.

2. Young adults are likely to recover slowly or develop phthisis.

3. Children over five years generally recover.

4. Children under five years show a heavy mortality. Another fact which may be reiterated here for the purpose of making it more emphatic is: Many cases of broncho-pneumonia are so slight as to be allowed to pass without consulting a physician. It may be affirmed with probability that many cases of severe catarrhal colds in children, which come under the care of physicians and are treated merely as severe colds, would, upon careful examination, be found to be cases of mild broncho-pneumonia.

It is known that the rusty sputa, commonly supposed at one time to be pathognomonic of pneumonia, may be present in severe cases of bronchitis and broncho-pneumonia. Hence great care is often necessary to prevent a confused diagnosis.

Any physician may be troubled to make a correct diagnosis in many obscure cases, and it requires a very accurate ear to be positive without the aid of instruments.

The limited area of dullness on percussion, the slight disturbance of the respiratory murmur, except by bronchial sounds, the slight change in vocal fremitus and bronchophony all aid in determining the character of the disease.

The treatment of mild cases is simple enough. A jacket of cotton batting should cover the chest. Some stimulating liniment, turpentine, or camphorated oil

applied twice or thrice a day will assist in making the patient comfortable. Soothing and anodyne cough mixtures, inhalations of medicated steam or sprays, and rest in bed will serve to restore the patient to health, in the majority of cases, in a few days. If the case is prolonged, or if there is a tendency to recurrence, as in the two cases reported which occurred in adults, a sustaining and general tonic treatment must be prescribed, viz.: Concentrated food, malt, cod liver oil, hypophosphites and iron. I have felt that the use of aromatic sulphuric acid, boric acid and salicylic acid and creosote internally have given me excellent results.

Chapter VIII.

CHRONIC BRONCHITIS AND ITS RELATION TO PHTHISIS.

AS FREQUENTLY occurs in other classes of disease, acute catarrhal inflammation often is accompanied by obstinate symptoms, or shows a tendency to relapse. In the case of bronchitis this is very common. Inveterate tendency to relapse, or a continued bronchial irritation with cough and expectoration following acute or subacute bronchitis usually ends in chronic bronchitis.

Many cases of chronic bronchitis are not of serious moment, only causing trouble through the winter or spring, or sometimes in the autumn after the cold winds and rains begin, but in the summer time or in mild climates cease to give any annoyance.

After a few relapses have occurred, and in cases with a tendency to continued bronchial irritation, there is exacerbation of symptoms on the slightest exposure. A light draft on the back of the neck, an exposure to damp or moist atmosphere, a strong wind, cold rain, variations in ozone or sudden changes of temperature may cause an increase in severity of symptoms or cause the supervention of an acute attack. When this state of susceptibility is reached the least variation from hygienic rules and a quiet life, the slightest increase in the irritating properties of the atmosphere and any change

of clothing will remind the patient of the lurking inflammation of the bronchial mucous membrane, which was neglected at the proper time when it might have been easy to produce a cure. Like gleet, it will return upon the slightest variations from correct living. Eventually, however, the cough becomes permanent, milder in the summer, more annoying in the winter. It may be years after the cough becomes permanent before the strength and flesh of the patient begin to fail. Finally the health begins to show the inroads of disease. The prolonged coughing and constant expectoration produce more waste than the natural processes of metabolism can repair. Dyspnœa occurs upon muscular exertion, due to weakening of air vesicles from overstrain, and occasionally asthmatic breathing supervenes. Certain structural changes accompany these morbid conditions. The hyperplasia of the mucous and submucous tissues modifies the normal circulation, in addition to the changes which result in excessive secretion. Severe coughing produces disastrous results upon the air vesicles. This continued strain upon the air vesicles and the pulmonary circulation cause constitutional disturbances. The heart, lungs and abdominal organs all feel the effect of the disturbance, and the disease in some of its manifestations begins to remind one of tuberculosis. By a careful study of these diseases, however, we may generally make a clear diagnosis, even without the aid of the microscope. A difference in the appearance of patients even in advanced stages of the disease will often be of great service. In phthisis there is emaciation from the beginning; in chronic bronchitis this occurs late, ordinarily. The change in phthisis often

involves wasting of all tissues connected with respiration before any respiratory changes can be detected. In chronic bronchitis the respiratory changes are the first to be observed. The elongation of the neck, due to sinking of the clavicles and the projection of the chin, is generally indicative of phthisis, and results from the contraction of the upper lobes of the lungs. Again, the silky smoothness of the skin in phthisis and long blue veins are different from the conditions in bronchitis. In the latter, except in the later stages, the chest is full, clavicles elevated, neck shortened, chin drawn back, the complexion often suffused, neck sometimes traversed by tortuous veins, skin dry, leathery, easily drawn into non-elastic folds, thickened.

In the later stage of these diseases the greatest difficulty in diagnosis is met. In fact many cases occur where without the aid of the microscope it is difficult, sometimes almost impossible, to make a certain diagnosis. It is not chiefly in the old nor yet in the young that this difficulty exists in greatest degree. In the old we generally meet bronchitis, in the young phthisis. But it is in those of middle age where the greatest obscurity exists and where the greatest skill is required to determine what disease confronts us. It not unfrequently happens in these cases that a chronic bronchitis apparently, supervenes after a period of special susceptibility to catarrhs ; after a time the severe symptoms of bronchial catarrh are developed, and eventually decline and wasting occurs and the microscope reveals the bacillus tuberculosis. This is illustrated in the following case : Mrs. A. is of a healthy race, no constitutional diseases having occurred in her family. In January

last she contracted a cold—perhaps a bronchitis. She did not feel the need of a physician and none was consulted. After a few months she was treated for bronchitis of the chronic form. The attending physician did not consider the case serious. The patient was enciente and in good condition. After a normal confinement she did well for a few weeks. A slight exposure aggravated her cough, she began to emaciate, her appetite failed, hectic supervened, she rapidly declined until the time she came under my supervision—in August. At this time she was breathing rapidly, thirty times in the minute, pulse 90 to 100, temperature 102°, sputum tuberculous, bacilli abundant. The general condition of the patient and the drawn features showed that I had to deal with a case of tuberculosis and that little could be expected from any method of treatment; and the microscope confirmed the diagnosis. If space permitted other cases might be reported where tuberculosis seems to supervene upon a chronic bronchitis, especially in middle life, but possibly also in the young. The "old fashioned consumption," of which we hear, is only chronic bronchitis, sometimes in the later stages complicated by phthisis pulmonalis. Enough has been said to establish a relationship between chronic bronchitis and phthisis, but the extent of that relationship, I think it premature to attempt to circumscribe. The following table may assist in differentiating individual cases:

Chronic Bronchitis.	Phthisis.
In middle life and old age.	In young and middle life.
Wasting late in disease.	Wasting early.
Shortening of neck, due to	Elongation of neck, due

efforts of coughing, without emaciation.	to emaciation and sinking of clavicles.
Chin retracted.	Chin projected forward beyond line of chest and abdomen.
Muscles of neck normal.	Muscles of neck thin.
Retraction of cheek very late.	Retraction of cheek toward angle of jaw.
Features nearly normal.	Pinched features.
Conjunctivæ œdematous.	Brilliant conjuctivæ.
	Bird-claw contour of hand
Skin dry, leathery, thickened.	Silky smoothness of skin.
Enlarged, tortuous, dark-colored veins.	Long blue veins.
Nose and ears thickened.	Nose and ears thin.
No fever.	Fever.
No bacillus.	Bacillus in sputa.

Having determined that there is a close connection between chronic bronchitis and phthisis in certain cases, it would be interesting if we had reliable statistics to show the numerical relations existing between these diseases in various countries. The reports up to the present time are so meager and so often based on different methods of comparison, that little information can be gained for general study. In Norway, France and Switzerland, the comparison is as follows :

DEATHS PER MILLION POPULATION.

	From Chronic Bronchitis.	From Phthisis
Norway.....	338.1	2,500
France.....	1,014.6	3,341.8
Switzerland.....	999.4	2,080

These figures are so few and various that we should not be justified in attempting to draw any general conclusions from them, but the very fact of their variety, taking into consideration the geographical position of these countries, would urge us to seek for more extended tables, hoping from them to learn something definite and valuable.

The most important point in reference to this comparison, especially as it concerns the patient, is the lesson taught in regard to treatment. My own opinion in this matter is definite and positive. The *facts that* these diseases are sometimes confounded, *that* they both undermine the general mutrition of the system and prevent the normal metabolism of the body, and *that* they both deteriorate the quality and even the quantity of the blood, make it necessary that a vigilant system of supporting treatment should be adopted.

Treatment. Strong feeding is of first importance. Next to this, tonics and stomachics. Lastly expectorants, antiseptics, antipyretics, anodynes, and whatever will add to the comfort of the patient. I would give pilocarpine in all cases. In selected cases climatic treatment is curative in chronic bronchitis. These cases are those in whom no structural changes have occurred, whose families can go with them or whose family circumstances are such that the change would not work any ill effect upon the mind. In this country the most desirable climates are the table-lands of New Mexico and Texas, Southern California, the central portions of Georgia and South Carolina and the elevated and dry portions of other Southern States. The requirement is a dry, equable climate. Now this is just the re-

quirement in the climatic treatment of tuberculosis. The hope for improvement, however, is much greater in the local than in the constitutional disease. When a successful change of climate is made the patient, whether bronchitic cr tuberculous, can secure the benefit of out-door life, invaluable to his comfort and recovery. Where patients have not been able to take advantage of a climatic change, especially in the winter or cold months, I have administered compressed air. I believe this to be of more service than the oxygen treatment. The proper time to begin this treatment is when the blood begins to lose its color and the red corpuscles are found impaired. A very simple method for applying this treatment is as follows: With a hand bellows fill a rubber bag (five or ten gallons) with fresh, pure air, driving in the air as long as the bellows can be worked. Attach an inhaling tube of sufficient length. Put a weight upon the bag equal to the weight of the patient —I have sometimes used the patient as the compressing weight. A stopcock or spring applied to the rubber tube connected with the inhaling tube retains the air until the patient is ready to take a deep inspiration. The inspiration should cease as soon as discomfort occurs from the expansion of the lungs and compression made on the rubber tube to prevent the escape of the air in the bag during expiration. This process should be repeated until the bag is emptied. If fresh air is administered to patients once a day it will aid in sustaining a normal condition of the blood, assist in restoring the expansion of unused air cells and maintain a more natural pulmonary circulation. It has seemed to stimulate the appetite and assist digestion.

A change of climate or the administration of compressed air conduce largely, as just suggested, to success in proper nourishment of the body. I believe proper nourishment to be an essential element in the treatment of either disease; most so, however, in phthisis.

The stomach in the later stages of chronic bronchitis, as in phthisis, is sensitive, and the selection of food that can be taken easily and easily digested and assimilated requires considerable thought, and must be chosen with a view to individual cases. Milk, kumyss, matzoon, buttermilk, beef tea, animal broths, eggnog, custard (raw or cooked), peptonoids (liquid or dry), beef meal, beef jelly, beef extracts, various invalid foods, etc., furnish an extensive list of foods, some one or more of which may be of service in supporting the system until a more substantial diet of fruits, meat, vegetables and the like can be borne. It should be constantly remembered that without sufficient food all other efforts in behalf of the patient are futile.

The next element of treatment mentioned is the administration of tonics. These assist, or should assist, that just described. If any medicine produces nausea or any unpleasant effect in the stomach, it should be discontinued at once and replaced by some other. Cod liver oil can be taken by a few patients, and is often valuable; but its virtues have been overestimated. Malt in some form, brewers' yeast, light wines, ales or other alcoholics, by stimulating digestion, are sometimes of service. Terraline is often as valuable as cod liver oil. The hypophosphites of lime, soda, iron, etc., are often very valuable. Some mild form of iron, like the albuminate or the pyrophosphate, hæmoglobin and arse-

nic in anæmic conditions, are valuable. The tr. chloride of iron is excellent when it can be taken. The vegetable tonics frequently accomplish good results, and I believe it a good plan, often, to give quinine in small doses—one-half to one grain—three or four times daily. Sometimes good results may be obtained by applying the quinine to the skin by inunction. If used in the latter way, larger doses should be used. I frequently direct an alcohol bath—sponge bath—to be given twice a day, to be followed by annointing the body with olive or cocoanut oil, the alcohol or the oil to contain one-fourth of a teaspoonful of quinine.

Anodynes—morphine, codeine, belladonna and similar remedies should be given as needed. For persistent and irritating cough, steam inhalations are often very soothing. An ounce of paregoric in a pint of boiling water furnishes a steam which will often relieve an irritative cough very quickly. Carbolic acid, buchu, tar or other antiseptic may be added as may be indicated. Menthol or peppermint inhalations frequently give relief. To patients where there is a tendency to swallow the sputa antiseptics *ought to be* administered internally; and in any case they may prove advantageous. The inhalation of alcohol or camphor will often give temporary relief. Antipyretics are not universal remedies in chronic bronchitis, for fever is not a regular symptom; but when exposures occur and fresh cold is contracted, or the inflammation of the bronchi excited to acute attacks, fever may supervene as under other circumstances, and should be treated symptomatically. Expectorants are remedies, however, to which frequent resort must be made. Ipecac, senega, squills, muriate of ammonia,

and, in depressed heart's action, carbonate of ammonia, constitute a list that will seldom need to be extented. It should be added that the clothing of bronchitic patients must be carefully regulated, especially when advantage cannot be taken of mild climate. The body should be protected against chill, as the lungs must against the inhalation of cold or impure air. In conclusion, I will say that a proper change of climate *early* may be favorable in phthisis ; that it is curative in the early stage of bronchitis, may be curative later, and is beneficial in all stages. The sputa should be destroyed instantly in all cases of phthisis, and never allowed to dry on the floor or on clothing.

CHAPTER IX.

THE RELATION OF CATARRHAL DISEASES TO PHTHISIS PULMONALIS.

IT is not my object here to make an exhaustive study of this subject, but to present briefly some of the more salient points in this phase of etiology. It has long been taught that phthisis—acquired tuberculosis—may result from pneumonia. Later it has been recognized that catarrhal pneumonia or broncho-pneumonia may often be succeeded by pulmonary consumption. Sometimes it appears to have this relation in those of a tubercular diathesis; but not infrequently it occurs in patients who have no such history. It cannot be doubted that coincidences may occur, and that one who is infected with the tubercle bacillus may by exposure to cold and succeeding pneumonia hasten the development of the fatal disease. The following is a case in point. Mrs. N., belonged to a tuberculous family, but had always been perfectly well, except some catarrhal trouble in the throat. She was exposed to a damp piercing wind. A moderate broncho-pneumonia supervened, from which she soon recovered except that a persistent but not very annoying cough remained. Three months later another exposure was followed by croupous pneumonia, and the patient rapidly developed phthisis pulmonalis from which she died in two years.

Other cases occur in which some catarrhal disease

seems to develop into tuberculosis where there is no history of hereditary taint and where there is no reason to believe that any special exposure to tuberculosis has occurred. As an illustration I present the following: Mrs. W., was a healthy woman, of a healthy family. No evidence could be discovered of any case of tuberculosis among either branch of her ancestors. She was delivered of a healthy child in August. Two months later she came into my office. She had done well for a few weeks after the birth of her child, but then took cold and had been coughing ever since. Such was the brief history given. Auscultation revealed bilateral bronchial rales and fine rales in the middle and the upper third of left lung. Percussion revealed slight dullness over the upper and middle third of the left lung. Four weeks later the dullness had disappeared, but the bronchial rales persisted. The cough was obstinate. Two months later she had a persistent "hollow" cough, slight evidences of dullness in the middle third of left lung, and marked symptoms of a chronic bronchitis. Incipient tuberculosis was undoubtedly present. The case has gradually progressed downwardly until at present, a year after the birth of her child, she is in the last stages of phthisis as indicated by her symptoms and the presence of the bacillus tuberculosis in sufficient numbers to portend a fatal termination. These cases illustrate an observation that most physicians, who have an extended experience with tuberculosis, have made. The actual proportion of tuberculous cases dependent upon the previous existence of catarrhal disease may not be even approximately stated at the present time, but some idea of the relation may be extracted from the

following tables. The first shows the number of deaths per million living population resulting from bronchitis and from phthisis respectively.

TABLE I.

Name of Country.	Deaths per Million from Bronchitis.	Deaths per Million from Phthisis.	Total from Both.
Norway	917.7	2500	3417.7
England and Wales	2464.6	2120	4584.6
Scotland	2040	2045	4085.0
Ireland	2315.3	1954	4269.3
France	1750.9	3341.8	5092.7
Switzerland	1485.8	2080	3565.8
Canada	3357	2763.5	6120.5
United States	337.8	2517.6	2855.4

This brief table is apparently very unsatisfactory. At first glance it would appear that nothing can be learned from the figures given. A closer study, however, will reveal some facts that bear upon our subject and teach some very important lessons. One basis fact to remember in this comparison is that we are dealing with death ratios and not totals of cases. Likewise it must be borne in mind that the majority of cases of bronchitis recover, while the majority of cases of tuberculosis die. The table represents an immense area of territory and considerable variations in climate. Except under conditions of moisture and strong winds, mild and equable climates produce comparatively few cases of bronchitis. Most cases of bronchitis like most cases of tuberculosis of the lungs occur in cities; that is, the largest mortality ratio in each disease, with few exceptions, occurs in cities. Bearing these points in mind there still remains an unknown quantity, but one which need not greatly mar our conclusions. In this table I mention only one

of the catarrhal diseases, bronchitis, because I do not have access to any reliable reports of several of these diseases in most of the countries named. It is not improper to assume that occasionally a case that dies of chronic bronchitis is classed in the "consumption" mortality table. After making all these allowances there are still marked differences between different countries dependent upon local or general manifestations of the factors of the etiology of these two diseases.

From this table it will be seen that Canada has the greatest mortality from the two diseases named and the United States the least. Undoubtedly some causal factors exist which we cannot now name, but two influences may be stated which help to make the difference between these two countries. It is known, for instance, that Indians subject to influences of white men, wherever they come in contact with civilization, are victims of tuberculosis in excessive numbers. This fact will increase the mortality from that disease in such a country as Canada. Second, it has been demonstrated that bronchitis is especially prevalent along the Atlantic Coast of the Dominion; due in part, probably, to bleak winds from the Ocean. That the death rate from these diseases in the United States is smaller is due, to some extent, to the modification of the climate and winds on both coasts—the eastern by the proximity of the gulf stream and the western by the influence of the warm return trade winds from the Pacific Ocean. While Indians in the United States are subject to the same civilization influence as in Canada the proportion is not so great and the death rate from tuberculosis is not materially affected. In Table II., which follows, bronchitis

is included in the numbers given in the column of catarrhal diseases, but it is also given separately to show the relation between bronchitis and phthisis in this country.

TABLE II.

Name of City.	Death Rate per Million from Bronchitis.	Death Rate per Million from Catarrhal Dis.	Death Rate per Million from Phthisis.
Buffalo, N. Y.	653.7	1942.7	2027.8
Providence, R. I.....	866.7	1696.2	2740.7
Milwaukee, Wis.....	891.5	1651.2	1380
San Francisco, Cal.....	925	1624.9	1565
Chicago, Ill.....	799.2	1485.8	1478.8
Baltimore, Md.....	591.2	1169.6	2423
Sacramento, Cal.....	333	1122.3	2264.4
Knoxville, Tenn.....	272.4	928.7	2887.4
Denver, Col.....	350	791.7	2583.3
Los Angeles, Cal.....	284.5	630.5	3037.5

It will be observed that the mortality from phthisis in Knoxville, Denver and Los Angeles is very high. The rate is undoubtedly greatly increased by the death of consumptives who visit, or remove, to those cities in search of health. In three of the cities named, according to the reports consulted, catarrhal diseases cause more deaths than phthisis pulmonalis. I am unable to discover the cause for the variations here shown. With the new methods of diagnosis which modern medicine has furnished the confusion of chronic bronchitis and pulmonary tuberculosis, which we have reason to believe has happened in the past, will be a rare occurrence, and our comparative tables will be more satisfactory. We can feel sure, however, that the causes which produce catarrhal diseases, while exerting a powerful influence, do not operate to the same extent in the etiology of tuberculosis; but they may prepare a suitable soil for the growth of the bacillus tuberculosis and thus lead to the development of that disease.

Chapter X.

THE RELATION OF PNEUMONIA IN CATARRHAL DISEASES OF THE THROAT AND LUNGS.

THE relation of pneumonia to catarrhal diseases is sustained chiefly in etiology. Still it frequently occurs that inflammation of the lungs supervenes upon a catarrhal cold, a bronchitis or a broncho-pneumonia. It will be admitted that at times the early stage of a disease is so obscure as to lead to confusion of diagnosis; and what appears to be the initial stage of a croupous pneumonia may develop into a typical case of bronchitis or broncho-pneumonia, and *vice versa*. The following is an illustration. Mrs. M. called me to attend her for a "hard cold." I found the throat red and in a catarrhal condition; the larynx was involved and she was hoarse; some soreness in the trachea indicated that the inflammation extended downward. She was treated for two days for tracheitis and catarrhal cold. The third day the symptoms were somewhat better but there were slight bronchial râles. The fourth day the patient was so much better that further treatment was not thought necessary, notwithstanding some fine and coarse bilateral bronchial râles. During the night of that day the cough became more obstinate and annoying, pain was felt in the left lung, the patient became

chilly and feverish and the expectoration sanguineous. I was recalled on the following morning and found a well-developed case of croupous pneumonia, confined to the middle and lower portion of the left lung.

The following illustrates another form. This was in a lad fourteen years old. I was called because "the boy had a hard cold and was spitting blood." The sputum was rusty. Fine crepitant râles were present in middle third of left lung. Respiration slightly impeded but could not be called labored. Circulation accelerated, temperature 103°. No pain, but some undefined distress in left lung accompanied deep inspiration. The symptoms rapidly subsided and in a few hours he was very comfortable and the rusty expectoration had ceased. The following morning the patient was decidedly better, temperature 101° and all other symptoms greatly alleviated, expectoration mucous. The patient was free from any symptom that would indicate pneumonia on the third morning, but had a well-marked bilateral bronchitis, temperature 102°. The case passed through an ordinary course of acute bronchitis from this time.

These cases show that the causes which produce catarrhal diseases of the respiratory organs often or at least sometimes prevail during the prevalence and perhaps influence the supervention of pneumonia and *vice versa*. To assist in determining the relation between the causes of pneumonia and catarrhal diseases I present the following tables. In the first table bronchitis is taken as representative of catarrhal diseases.

TABLE I.

NAME OF COUNTRY.	Mean Annual Temp.	Mean Annual Rainfall.	Death Rate per million from Bronchitis.	Death Rate per million from Pneumonia.
Norway	40°	45 in.	917.7	1304.1
England	49.4°	30.4 in.	2464.6	1012
Scotland	46.2°	33.1 in.	2040	1090
Ireland	49.8°	29 in.	2315.3	438.5
France	53.1°	25.5 in.	1750.9	2202.9
Switzerland	47.8°	.....	1485.8	1669.4
Spain—Madrid	60.7°	32.7 in.	4800	2900
Canada	40°	26.7 in.	3357	1344
United States	53°	40 in.	337.8	1257

It will be observed from this table that in countries where the greatest part of the population is in cities, as in England, bronchitis is more prevalent, and it is found that catarrhal diseases follow the same law. In countries where the population is chiefly in rural districts, as in Norway and the United States, bronchitis is less prevalent. Pneumonia is most prevalent in Norway and some other countries in rural districts. Canada presents an exception to the law laid down just now. In this instance the great mortality from bronchitis is due to the fatality of this disease on the Atlantic coast. Inland the disease is not excessively fatal. Pneumonia sustains its ordinary proportion in districts away from the coast. The fogs, so frequent on the coast, due to the warming influence of the gulf stream, probably has a marked effect in producing the excess of bronchitis in the Atlantic region; and it may be that this element of relationship may explain the excess of catarrhal diseases and the great mortality from bronchitis in England as well. I am unable to explain the low mortality from

pneumonia in Ireland, and the high mortality from bronchitis. The latter is not strange when compared with that of England and Scotland.

A more definite comparison between catarrhal diseases and pneumonia can be made from the following table, representing ten American cities :

TABLE II.

NAME OF CITY.	Mean Annual Temp. Degrees Fah.	Mean Annual Rainfall in Inches.	Mean Barometer.	Direction and Mean Velocity of Wind in Miles per hour.	Mean Average per cent of Cloudiness.	Mean Average per cent Relative Humidity.	Death Rate per Million from Catarr'l Diseases	Death Rate per Million from Pneumonia
Buffalo, N. Y.....	46.4	36.60	29.276	S. W..... 9.2	60	73.3	1942.7	2212.9
Providence, R. I...	49.6	54.98	30.006	S.W.&N.W. 14.8	47	78.9	1696.2	1800.0
Milwaukee, Wis....	45.1	33.63	29.264	S.W.&N.W. 10.9	55	75.	1651.2	1602.7
San Francisco, Cal.	55.7	24.03	29.981	W. & S. W.. 9.3	41	72.9	1624.9	2003.0
Chicago, Ill.....	49.0	37.34	29.316	S. W..... 8.4	51	71.	1485.8	1148.9
Baltimore, Md.....	55.6	42.26	30.042	N. W..... 5.8	50	67.3	1169.6	1758.7
Sacramento, Cal...	61.5	.....	29.980	S. & S. E... 7.3	55	69.3	1122.3	1132.0
Knoxville, Tenn...	57.5	53.87	29.076	S. W. & N. E. 5.6	50	69.8	928.7	1266.6
Denver, Col.....	49.0	14.29	24.727	S..... 6.3	38	46.5	791.7	941.7
Los Angeles, Cal...	60.5	18.25	29.641	W. & N. E.. 5.2	34	66.	630.5	1166.5

Two prominent facts in this table attract our attention. First, that the mortality from both pneumonia and catarrhal diseases is higher in Buffalo than in any other city named; second, that Chicago and Milwaukee are the only cities in which the mortality from pneumonia is less than that from catarrhal diseases. In general pneumonia is more fatal in rural districts, bronchitis in cities. This may be due in part to the greater exposure of those who live in the country, and the additional fact that usually a less exposure is required to produce catarrhal diseases than is necessary to cause pneumonia. It must be admitted that the study of meteorology in its relation to disease has not been sufficiently investi-

gated, and it is probable that much is yet to be learned. We know, however, that the same causes operate frequently to produce catarrhal diseases and pneumonia, but what particular cause must be in excess in each case, is the factor that is not known. It has not been determined whether microörganisms may find in mucous membranes or lung tissue, under the influence of cold and damp, a suitable soil for development, or whether these pathogenic organisms are wafted on the vapor laden wind until they find a tissue unable to resist their invasion.

Chapter XI.

THE CAUSE AND TREATMENT OF PNEUMONIA.

PNEUMONIA is one of the diseases best known to the medical profession. That a disease is well known and easily diagnosed does not necessarily imply that it is thoroughly understood. When a disease is said to be thoroughly understood, it is meant that its ætiology, its processes or pathological modifications, its sequels and treatments are known, and accepted as settled by the profession. Formerly pneumonia of the idiopathic variety was supposed to be due to some atmospheric influence, which, by checking the peripheral circulation, turned the blood current with greater force to the central organs or lungs, the result of which was congestion and inflammation. The pathological process is still considered to be about the same, but the question of ætiology has given rise to some discussion, and in many minds, to doubt.

The germ theory of disease, which is accepted as a fact in regard to many diseases, has been advanced to explain the origin of pneumonia.

Since the discovery of the peculiar form of bacteria in the lungs of persons dead from pneumonia, a discovery made by Friedländer and Frobenius, much thought has been given to this phase of bacteriology. Six different varieties of bacteria have been mentioned by Bremmer

as causing this disease, and others have been mentioned by later writers.

The diplococcus of Fränkel has lately been shown to be present in most cases of pneumonia, especially croupous pneumonia. Wolff found it in 94 per cent of the cases examined by him, there being but a single negative result in seventy successive cases. Baumgartner thinks it is safe to assume a single, sole cause of pneumonia. In Wolff's cases verification was established by cultures in more than half the cases.

The first investigations were made after death, but later authors have examined sputa and exudations from the lungs of patients. Monti examined the exuded fluid in twenty cases with but one negative result. Sometimes the Fränkel diplococcus was found in company with other bacteria. In these cases of Monti, Friedländer's micrococcus was not seen. Inoculation of fifty-nine rabbits, while universally successful, produced typical pneumonia only when the sputum was introduced into the trachea. Inoculation under the skin produces septicæmia; into the pleura, pleurisy; into the pericardium, pericarditis. Inoculation of the dura mater of a dog produced meningitis and lobar pneumonia. Fränkel, Foa, Whittaker and others have shown that the cause of pneumonia is not confined to the lungs, but invades other organs and tissues. Weichselbaum, Netter, Mircoli and others have found the diplococcus of pneumonia in the ventricles of the brain, connective tissue of the mediastinum, the jugulum, about the clavicle, behind the œsophagus, in cavities about the nose, in the drum cavity and labyrinth of the ear. It has been cultivated from the serum of the pericar-

dium before there were any visible signs of inflammation. It has been found, likewise, in inflammation of the cord.

Emmerich found great numbers of bacteria of the varieties herein referred to, under the floor of a hospital ward where many cases of pneumonia had been treated.

Writing in regard to pneumonia proper, Weichselbaum sums up his conclusions as follows:

1. The bacteria found in different forms of pulmonary inflammation are regarded as the cause of them. This conclusion is completely justified on the following ground: Definite, well-characterized species of bacteria not only occur constantly in acute pulmonary inflammations, but can be demonstrated in greatest abundance and activity in the earlier stages of inflammations. They have been isolated, cultivated, and, when introduced into certain animals, have produced processes which, taking them *in toto*, correspond to inflammation of the lung in man.

2. The pulmonic virus is no unity, inasmuch as acute pulmonary inflammation, even croupous pneumonia proper, can be produced by different kinds of bacteria. In this the pneumonias recall acute inflammation of the connective tissue, in which, also, several species of organisms occur.

3. The separation of pneumonias into lobular and lobar, croupous and noncroupous, has an anatomical but no etiological significance. Moreover, the so-called secondary pneumonias, etiologically considered, are not secondary.

4. The diplococcus pneumoniæ is to be regarded as a most frequent exciter of inflammation of the lungs.

Friedländer's bacillus organism but rarely causes croupous pneumonia. Catching cold has only a possible predisposing effect.

This summary is, perhaps a clear representation of the opinion held by the majority, at least, of bacteriologists, at the present time. The opinions of general practitioners are universally more conservative than those of specialists, and many able physicians still hesitate to accept unchallenged the theories and radical views of some bacteriologists.

It is well known that there is much study devoted to this subject at the present time, and many investigations have been made during the past year, but nothing that can be added, perhaps, to the stock of knowledge or opinion detailed above.

Dr. F. S. Billings, of Chicago, informs me that nothing new has been discovered; and as his personal views correspond with those of many other bacteriologists and the majority of the medical profession, I will quote his own words: "Personally, I do not think either the Weichselbaum, Fränkel or Friedländer organism has any specific relation to pneumonia in man." He gives as a reason or basis for this opinion, "that they are present in the mouths of healthy individuals and do not cause pneumonia, and have also been found attached to the bronchial mucosa of persons killed by accident or dying with intact lungs," but he further states that, "when active and prolonged congestion with serous bronchial effusion is present, then they may cause pneumonia."

When an epidemic occurs of a disease caused by bacteria, it is said that the air is filled with them.

Prof. Nussbaum has stated that during an epidemic of cholera the air is filled with the cholera bacilli, and yet only 1 per cent of the population are affected by the disease. Hence ninety-nine people in every hundred, though eating, drinking, and breathing cholera bacilli, escape the disease. Such may well be believed to be the case with the bacillus of pneumonia, though it must be less powerful in its activities than that of cholera. It is well known that pneumonia is more prevalent in some seasons than others, and that it occurs most frequently under certain atmospheric conditions. Perhaps most cases occur during the winter and spring months. The humidity of the atmosphere and the presence of ozone, also seem to exert a causative influence. On the 12th of October, 1889, at Waukegan, Ill., the wind was in the southwest; it suddenly changed to the northeast, the temperature fell from 70° to 50°; the ozone in the atmosphere was increased. Several cases of catarrhal pneumonia or broncho-pneumonia occurred, the apparent cause being the change in the condition of the atmosphere. I noticed, however, that during the same period many cases of pneumonia were reported as occurring in other localities. The 15th of February, 1890, the wind was in the southwest, the temperature rose from 30° to 65°, ozone not marked, atmosphere humid. Several cases of pneumonia. April 1st to 5th wind mostly east and southwest, rainy, warmer, temperature 40° to 65°. New cases of pneumonia. Such observations are likely to make one believe that atmospheric changes are causative of the disease. Jaccoud, while not denying the etiological influence of bacteria, holds that exposure to cold is also causative, and perhaps generally the exciting cause.

Dr. Baker, of Michigan, demonstrated before the Brooklyn Pathological Society that the curve representative of sickness from pneumonia pretty regularly followed the curve of temperature. His studies extended over many years and included nearly 50,000 cases of pneumonia. He showed, in all his references, "that the sickness curve follows the temperature curve, not only in pneumonia, but also in bronchitis. If pneumonia were due to bacteriological influence, this cause must certainly be influenced by the weather, more than that, bronchitis would probably be caused by the same germ."

Sevestre considers that certain cases of endemic and epidemic broncho-pneumonia in childhood during the summer months, are due to dietary indiscretion, the inflammation extending to the lungs from the intestines through the lymph channel.

Tomasi, Golgi and others believe pneumonia to be caused sometimes by malarial poison, and this view corresponds with that of physicians in the southern part of Illinois and other malarial districts in the United States, where this form of disease is called "winter fever."

Dr. Mosny reported to the Academy of Medicine, of Paris, a case of broncho-pneumonia in a woman who had been nursing a case of erysipelas. The patient died, and the examination of the exudation from the lungs revealed the fact that the pneumococcus was not present, but that the streptococcus erysipelatus was, showing, at least, that the disease was not caused by the bacillus of pneumonia.

At present it must be admitted that the cause of pneumonia is not fully settled by the profession; but

the majority of physicians, probably, are willing to subscribe to the bacillus theory. It has not been proved that the bacillus is not a concomitant rather than a cause of the disease. Still further investigation must make the final decision, and most likely we shall not wait long until the decision is made.

It has been hoped that the germ theory of disease might lead to specific medication. It may justly be anticipated, if this theory is true, that absolute cure of many diseases may be promised as soon as germicides are discovered which will kill the germs without injuring the patient. Is this possible? At present we do not know. So far, at least, as pneumonia is concerned, the knowledge or lack of knowledge of the presence of the pneumococcus is of no avail in the treatment of the disease.

Treatment. In the present state of our knowledge the following indications for the treatment are clear: 1. To equalize the circulation and diminish the determination of blood to the lungs. 2. To reduce the temperature of the body. 3. To sustain the patient's strength. 4. To assist the mucous membranes and organs of secretion and excretion in the performance of their functions. 5. To allay pain.

The first two of these indications are met by the same general treatment. The chief object is to control the high heat, and this is largely accomplished by reducing the blood pressure and allaying the excitability of an overworked heart. I use aconite, gelsemium or digitalis, according to the grade of the fever, the condition of the lungs, the heart and the stomach. In high fever, with bounding, strong pulse, I use aconite and add

gelsemium if there is irritable stomach, with or without headache. Petresco says digitalis may check pneumonia at the outset. It is of value in asthenic cases and where the heart is weak. Convalaria is sometimes advantageously substituted where digitalis is not well borne.

I have not been favorably impressed with antipyrin nor with antifebrin, and of late have not given them. Dr. Humphreys remarks that antipyrin should not be given in catarrhal pneumonia generally, and not in lobar pneumonia when there is œdema of the lungs.

Quinine is usually serviceable, and, in malarial cases, essential, not only to reduce temperature, but also as a germicide and antiperodic. But in some cases it affects the stomach and nervous system badly. Dr. Jacobi considers that quinine lessens pulmonary congestion and strengthens the heart's action. Alcohol, brandy or whisky in large doses will help control temperature and equalize the circulation. It has seemed to me that the alcohol secures this result by its action on the vaso-motor nervous system. I have also seen most beneficial results from early blistering with cantharides. It not only alleviates pain, but assists in controlling the congestion. The congestion is often quickly controlled by ergot.

Liebermeister advises bloodletting when there is œdema of the lung, but I believe this may be avoided by blistering and the use of digitalis. He is also much in favor of the cold bath, preferably in the evening. There is no doubt that a wise use of the bath, tepid or cold, as circumstances may require, will assist in reducing temperature, and has a restorative rather than a debilitating effect.

In many æsthenic cases tartar emetic seems to be of special value. Bruckner has reported over seventy cases treated with this drug, in which the success was so marked as to make him enthusiastically in favor of the remedy.

The ice bags to head and affected portion of lung, as recommended by Angel Morrey, may be used with success and often give great comfort to the patient; but like the baths, they must be attended to systematically. Morrey says the ice bag acts as a tonic to the heart, the nervous system, the muscular system and the respiratory centers. It thus aids in the third indication, maintaining the patient's strength. It soothes the motor and sensory systems, and in this way produces sleep.

For the difficult breathing likely to occur on the fifth day, with a small and rapid pulse, perhaps nothing is better than camphor, benzoic acid, valerian and such stimulants. Alcohol in large doses is likewise beneficial. The inhalation of carbonic acid gas in broncho-pneumonia, as recommended by Dr. Lamallerée, I have not used. The third indication—the maintenance of the patient's strength—is accomplished chiefly by nourishment. With Fräntzel I recommend absolute rest in bed, and liquid nourishment. The patient should be well fed from the beginning. For thirst, lemonade, mineral and vegetable acids are refrigerant, and assist the digestive process. I use aromatic sulphuric acid generally, believing it to have a salutary influence upon the stomach, liver and pancreas, aiding in the digestion and assimilation of food.

The secretory functions should be carefully observed, and aid should be given to the mucous membrane of

the lungs, to the liver, kidneys, pancreas and alimentary canal. Ipecac is an invaluable remedy as a stimulant to the mucous membrane and to the liver. Aromatic sulphuric acid is a stimulant to the pancreas and is of especial value in cases with typhoid symptoms. Digitalis and nitrate of potash are excellent renal stimulants. Mercury in some form in small doses, as a stimulant to the liver and intestinal canal, is very useful. I prefer the mercury and calk mixture given for a few days, and then follow that with muriate of ammonia.

Pain must be controlled, and nothing can take the place of opium. I am in the habit, in uncomplicated cases, of giving the following prescription: ℞. Quiniæ sulphatis, ℥ss; Pulvis Doveri, gr. xl.; Hydrarg. c. Cret. gr xx.; M. et div. in Cap. No. 10.

The dose is for an adult and varied to suit the patient, and his diseased condition, at intervals of three or four hours. This prescription assists in controlling the congestion, acts as a heart tonic, aids the patient in expectoration, assists the liver and intestinal canal in the performance of their functions, alleviates pain, and, if the Dover's powder is made with the nitrate instead of the sulphate of potash, stimulates the kidneys.

CHAPTER XII.

INFLUENZA—LA GRIPPE.

THIS is an acute specific disease. Different names are given to it, depending chiefly upon its character, origin and locality. Influenza and la grippe are perhaps the most common terms used in this country. It may be sporadic, endemic, epidemic or pandemic. It affects the mucous membrane of the respiratory tract and often involves the nervous system, especially the nerve centers. It generally follows an acute, short, favorable course; but often complications arise which prolong the disease and render the prognosis more serious.

Etiology. Influenza has just been called an acute specific disease. This implies that it is caused by a microörganism. Dr. Pfeiffer, of Berlin, has discovered (1892) a bacillus in the sputa of influenza patients. Cannon demonstrated that this bacillus occurred in the blood of twenty consecutive cases, and it has been shown to be characteristic and easily cultivated. It is short, about half the length of the bacillus of mouse-septicæmia and nearly the same thickness as that organism. Kitosato has confirmed Pfeiffer's investigations and has cultivated the bacillus to the fifteenth generation. Many others have pursued investigations that make it probable that Pfeiffer's bacillus is a cause of influenza. These bacilli are found in clumps of ten

or twenty generally, but sometimes fewer. A good staining solution is eosin and methyl blue in alcohol. The bacilli stain blue, the red corpuscles pink.

It is always gratifying, from an etiological point of view, to discover a bacillus which is the cause or supposed cause of a given disease; but in influenza, as in so many other maladies, extraneous circumstances or conditions exert such a manifest influence in the production or continuance of this ailment that these factors must be recognized in a study of the causes of this disease.

It has been observed that the pandemics may be traced definitely in their travels from the usual starting point. The Baltic Provinces or some other portion of Russia are the regions in which influenza originates in many instances and from which the pandemics spread southward and westward, and indeed sometimes they overspread the whole of England and pass to the western hemisphere. These epidemics are sometimes attended by great mortality, as was the case in the epidemic of 1889-1890. In most instances epidemics of this disease in Germany have reached that country directly or indirectly from Russia and passed westward to France, the Netherlands and England. The method or cause of this direction of movement is not definitely known, but it is probable that commercial intercourse and the moving of individuals from place to place may have much to do with the transference of the disease. Many new cases originated in post offices, which has led to the belief that influenza may be conveyed through letters. Another feature must not be overlooked. The variations in atmospheric pressure in the Arctic region

is such as to cause a southward movement of the winds toward the equator; but the rotation of the earth upon its axis causes a change in direction on account of the lagging behind of the winds. This simple physical fact suggests that bacteria may be carried by the wind or atmospheric currents in a southwestward direction. This theory will help to explain the general tendency of these pandemics to move southward and westward and to cross the Atlantic Ocean, as occurred especially in 1889-1890.

In malarial districts influenza may take an intermittent or a remittent form, either during the progress of the disease or near its close. In nonmalarial regions such variations in the course of la grippe have not been so marked. A common observation is that domestic animals suffer with these epidemic catarrhal colds. In England, as in America, horses are subject to the disease, and are frequently affected before cases occur among the human family. Undoubtedly there must be a suitable soil for the development of the bacillus of Pfeiffer just as in the case of other bacteria, but there seems to be no other infection which affects people so generally except that of variola. All classes, ages and both sexes seem to be equally affected. A close observation, however, will discover that those who are in perfect health are not likely to be affected—perhaps never are affected while in perfect health. This is another suggestion of the origin of bacterial diseases which the writer teaches. Pathogenic bacteria, the author believes, are unable to permanently locate upon a tissue and develop there so as to produce its morbid phenomena in the system unless that tissue is previously below the

normal standard—below par. There is a possibility, however, that there may be such an immense number of bacilli or cocci attack a tissue that its resisting force may be overcome, and then the tissue becoming depraved may be subject to an invasion. In this particular disease, for instance, the channel of entrance seems to be through the inspired air. Now when the mucous membrane of the respiratory tract is in a healthy condition the bacilli of Pfeiffer do not affect it—cannot take root, so to speak—and the person passes through an epidemic without harm. If the individual, on the other hand, should not be entirely well or should some tissue, especially the mucous membrane or the blood be a little below the healthy standard, the mucous lining of the tract is impaired and its power of resistance diminished, the bacilli find a soil in which they can grow and manufacture their poisonous products, and the patient soon finds himself prostrated with "the grip." While all ages are subject to influenza, the young, especially children, are less likely to be affected with it than the old. In the old the tissues, and particularly the mucous membranes, have not equal resisting qualities with the same tissues of youth, and therefore not only are they prostrated with this disease in much larger proportional numbers, but they more frequently succumb to its ravages than do the young. Persons of nervous temperament and those whose vitality is depressed by fatigue and anxiety are especially liable to the disease.

Relapses are common and complications may cause a case to continue ailing for weeks or months. The reduced condition of vitality frequently following la grippe may not wholly pass away under three or four years.

I know a man who was sick for one month with la grippe in the winter of 1889–1890. He did not recover his former vitality, and in 1892 he was confined to his bed for two weeks with a second attack of influenza. His vitality continued to remain at a lower plane than before the first attack, and in 1894 he was again confined to his house with symptoms identical with those of his first sickness except that they were of a milder type, and lasted only one week. He still did not recover his original healthful feeling and action until some seven months after the third winter's sickness. He is now apparently as well as he was before the first sickness, five years ago. I could cite other cases with similar experience.

Symptomatology. The distressing catarrhal symptoms, the pain in the cheek bones, eyes, over the eyebrows, and often in the throat and bronchial tubes, the sneezing, suffusion of the eyes, discharge from the nose, inflammation and discharge from the mucous membranes, might be expected from the statement that the channel of entrance is the mucous membrane of the respiratory tract. The pain in the cheek is largely due to the congestion of the mucous membrane of the antrum of Highmore. The pain over the eyebrows is caused by a similar condition of the mucous membrane of the frontal sinuses. The mucus discharge or "catarrh" is a simple catarrhal exudate consisting chiefly of mucus, serum and desquamated epithelial cells. These symptoms and evidences of derangement are so directly related to the point of inoculation that there can be no surprise at their character or degree of severity. The majority of cases, however, are astonished

at the sensation of soreness in the muscles, sometimes the intense pain or aching in the muscles and joints, and the extreme weakness which rapidly supervenes. This sense of weakness is the most lasting of the symptoms of the disease, often not leaving for months. The explanation of these "nervous symptoms," the muscular and articular soreness, and the rapid and extreme exhaustion, is not so easily comprehended as the local manifestations, but they may bear some relation to variations of atmospheric pressure. The slight catarrhal inflammation, even the initial chill and a temperature of 102° to 104°, and a continuance of the disease for five to seven days will not make plain the cause of the great prostration; and when it is remembered that in many cases the disease continues, or at least the active symptoms prevail, for no more than three or four days, the surprise at the low condition of the nervous system following most of these cases increases. The general headache, cardiac debility, pains in the back, and great malaise and restlessness also indicate some poison to the nervous system—the nerve centers—which is probably a toxalbuminous product of bacterial origin. The enlargement of the spleen in many cases, may explain the intermittent and remittent types by suggesting a malarial complication. In no case has a characteristic rash been reported. It must be stated that all the varieties of la grippe have not been described in the brief survey of symptoms given in the foregoing account of influenza. It is not the province of this article to refer to those cases which more especially affect the alimentary canal nor those which show a more decided preference for the nervous system. It is with the form

which is particularly characterized by catarrhal symptoms of the respiratory tract that we have to do now. The complications which may protract a case of influenza or which may render it serious are generally bronchitic, pneumonic or pleuritic. Bronchitis is a frequent complication, so much so that it may be considered a manifestation of the disease, a simple extension of the catarrhal symptoms down the respiratory tract. Pneumonic complications are less frequent and more serious. Both croupous and catarrhal forms occur. The latter, or broncho-pneumonia, is more likely to occur in children or in the aged, while the croupous form may occur at any age. Pleurisy is not so frequently a complication as either bronchitis or pneumonia, and I think it will be found that it does not occur so often as a *complication* as phthisis appears as a *sequel* of influenza, especially the pandemic form—la grippe.

The indications for *treatment* of influenza, in uncomplicated cases, are (1) to equalize the circulation and reduce the congestion; (2) to quiet the pain and soreness; (3) to allay the fever; (4) to allay cough and other urgent symptoms; (5) to support the system. These indications are plainly presented in most cases and the meeting of them is often a matter of simplicity.

In the young and vigorous I sometimes prescribe acetanilide to allay the fever and quiet pain; but to counteract its tendency to weaken the heart's action I combine with it small doses of caffeine. If the nervous system is prominently involved the bromides may be combined with these remedies in such proportion as the case requires. A mixture of camph. tinct. of opium,

spirits of niter and wine of ipecac will often meet the same indications, quiet the cough and equalize the circulation.

The following prescriptions represent the form in which these may be given.

℞. Acetanilide, gr. 35 ; (2 30)
Caffeine, gr. 5 (0.30)
Bromide of sodium, gr. 15 (1.00)
M. et div. in caps. vel. tab. No 10.
Sig. One every 2 or 3 hours.

℞. Tr. opii camphoratæ.
Spr. etheris nitrosi, ā ā ℥j ; (30.00)
Vine ipecac ; ℥ss ; (10.00)
Syr. glycyrhizæ, ℥jss, (45.00)
M. Sig. Teaspoonful every 2 or 3 hours.

Local medication with inhalation of steam, insufflation of astringent, antiseptic and anodyne powders, nebulization with the essential oils and atomization with soothing, astringent or antiseptic solutions may become necessary or prove efficacious. Paregoric, tr. benzoin, benzoic acid, carbolic acid, ammonia and camphor sometimes give immediate relief when inhaled with steam from boiling water. Menthol, ammonia and camphor give relief in many cases when used by inhalation. These local treatments allay the irritation of the mucous membrane and help to equalize the circulation. Inhalations of quinine or better, sprays of quinine and salicine in solution often produce a marked effect. Other remedies which may be used with beneficial results to meet some of the indications, are morphine, Dover's powder, digitalis, squills, salicylate of sodium, quinine, strychnine, arsenic, phosphorus, and other tonics.

To meet the last indication I prescribed quinine,

malt, strychnine, iron, arsenic, phosphorus, the mineral acids and vegetable bitter tonics. A good prescription to increase the appetite and help sustain the strength is the following :

℞. Acidi sulph. arom., ℥ss ; (15.00)
Quniæ sulph., ℈ss ; (2 00)
Strychniæ sulph., gr. j (0 06)
Liq. potass arsenitis, ℥ ij; (8 00)
Elixir simplicis q. s. ad ℥ iv (120.00)
M. Sig. Teaspoonful *in water* 4 times a day.

Food is most important ; an abundant supply of nourishment must be given. Beef tea, milk, eggs, liquid peptonoids and other foods which are easily digested and assimilated should be administered in sufficient quantities and at regular intervals. Rest and freedom from worry are essential to a perfect recovery.

Chapter XIII.

RELATION OF THE CLIMATE OF THE LAKE REGION TO CATARRHAL DISEASES OF THE RESPIRATORY ORGANS.

IN a study of the relations of the climate of the lake region to catarrhal diseases it is necessary to inquire into the climatic elements which differ from those of inland regions and ocean coast countries.

Much discussion has recently been given to the influence of climate on disease, and much theorizing has been indulged. In this discussion, however, we must be guided by facts and logical deductions. It is desirable to know the superficial contour of a particular region as well as its subjacent geological strata before the full influence of temperature, rainfall, barometric pressure, relative humidity, winds, clouds and sunshine can be estimated.

The lakes lie in a series of basins excavated in the older geological strata of the continent, and it is upon these layers that the sand banks and hills which are so numerous about the shores of the lakes are distributed. Catarrhal diseases, especially of the alimentary tract, prevail to a considerable extent where the soil is underlaid by a clay or impermeable stratum, and not infrequently there is a tendency to catarrhal troubles of the respiratory organs over such soils.

That temperature exerts a great influence in the production of certain catarrhal ailments is illustrated by the greater frequency of this class of diseases as we proceed southward or northward. For instance, within certain limitations, we meet with a greater number of catarrhal diseases of the respiratory system as we pass northward and a greater number of catarrhal diseases of the alimentary canal as we pass southward.

In a study of the relations of the climate of the lake region to catarrhal diseases, I have compared the barometric pressure, temperature, rainfall, relative humidity, per cent of cloudiness, direction and force of wind of several stations on the shores of the Great Lakes and of a few cities in other localities. This will aid in the future study of the etiological influence of the climate in these regions in the production of catarrhal disease. I have followed the January isotherms of 20° and 25° and the July isotherms of 70° and 75°, which pass through or near Milwaukee and Chicago respectively from the Pacific to the Atlantic coasts, and observed the prevalence of catarrhal diseases in the interior as compared with their occurrence on the coasts and in the lake region. Some facts of great interest are shown by this study. One of these is similar to that brought out in a like study of catarrhal diseases in Europe. Bronchitis and some other catarrhal diseases of the respiratory organs are more prevalent in cities than in rural districts. It is also somewhat significant that the Indians are comparatively free from catarrhal troubles in most frontier localities; but that this does not always prevail is shown on another page of this article. In the lake region a greater number of catarrh-

al diseases are met with than in the interior districts generally, and along the southern borders of the lakes they are more prevalent than in the northern regions. In this vicinity catarrhal troubles increase with a lake wind and rain.

The prevalence of catarrh with influenza and sometimes alone leads to the inference that pathogenic organisms may be the immediate cause of these outbreaks. I have not found any organisms which seemed to be characteristic of a special form of catarrh, but I have seen many micrococci and a few bacilli in sputa from catarrhal cases. In one case, where a diagnosis of tuberculosis was excluded, the microscope showed both bacilli and micrococci. The micrococci were not different from those frequently met with in catarrhal inflammations affecting the nose, throat and larynx, as in this case. The bacilli, which were not numerous, somewhat resembled the tubercle bacillus. They were straight and curved, of the length of the tubercle bacillus and sometimes twice as long, the ends generally square cut, and were without spores.

The difference that is observed in the frequency of catarrhal diseases of the respiratory organs in the lake region as compared with the same on the Atlantic and Pacific coasts cannot be fully explained by location nor the presence of a large or small body of water. The warm return trade winds of the Pacific coast, and the influence of the gulf stream on the Atlantic coast must be considered in this investigation. My own investigations prove that lake winds, cyclonic disturbances, excess of ozone in the atmosphere, changeableness of temperature and variations in relative humidity and

barometric pressure are marked etiological factors in the production of the high proportion of catarrhal diseases of the respiratory organs occurring in the southern lake region. However, I am inclined to the opinion expressed by Gueirard, that "the quantity of luminous rays traversing the atmosphere, their intensity and the quantity of polarized light" in addition to the points included in my table, exert an influence in the production of disease. (See Table II., page 89).

Taking Milwaukee, Chicago and Buffalo as representing the southern lake region, it is found that the death rate per million population from catarrhal diseases is as follows: Milwaukee, 1651.2; Chicago, or Cook County, 1485.8; and Buffalo, 1942.7. These numbers must be regarded as only relatively valuable. We learn from them that catarrhal diseases prevail to a greater extent in Buffalo where the prevailing wind sweeps over a large body of water. The prevailing wind is S. W., and blows over Lake Erie. The velocity 9.2 miles per hour; per cent of cloudiness, 60. The relative humidity is 73.3 per cent. At Milwaukee the wind is largely from the S. W., but is nearly as frequent from the N. W. Velocity, 10.9 miles per hour; per cent of cloudiness, 55; relative humidity, 75 per cent. Here the prevailing wind is not from the lake. At Chicago the prevailing wind is S. W. The velocity is 8.4 miles; per cent of cloudiness, 51; humidity, 71. Turning from the lakes to the coasts we observe that at Providence, R. I., where the prevailing wind is S. W. and N. W., the velocity is 14.8 miles; per cent of cloudiness, 47; and humidity, 78.9 per cent; the death rate per million from catarrhal diseases is 1696.2. At Baltimore, Md., the

prevailing wind is N. W.; velocity, 5.8 miles; per cent of cloudiness, 50 ; while the relative humidity is only 67.3 per cent. The death rate is 1169.6. At San Francisco, Cal., the prevailing wind is W. and S. W.; the velocity, 9.3 miles ; the relative humidity 72.9 per cent, whereas the death rate from catarrhal diseases is reported as 1624.9 per million. Let us see reports from a few interior cities. At Knoxville, Tenn., the prevailing winds are S. W. and N. E.; velocity, 5.6 miles per hour; per cent of cloudiness, 50 ; relative humidity, 69.8 per cent, and the death rate from catarrhal diseases of the respiratory organs is 928.7 per million. This low death rate, however, is higher than that of two cities in the west. At Denver, Col.,the death rate from this class of diseases is only 791.7. The prevailing wind is S.; velocity, 6.3 miles ; per cent of cloudiness, 38, and relative humidity, 46.5 per cent. At Los Angeles, Cal., where the prevailing winds are W. and N. E.; the velocity, 5.2; per cent of cloudiness, 34 ; and relative humidity, 66 ; the death rate is only 630.5.

I believe Drake's investigations to be reliable, and therefore have not extended my investigations to cities in the northern lake region. He has shown that catarrhal diseases of the respiratory organs prevail most in the southern as compared with the northern lake region.

Comparing Buffalo and Los Angeles, the cities of the highest and lowest mortality, we observe that Buffalo has a lake wind of great velocity, comparatively little sunshine and a moister atmosphere ; that Los Angeles has a land wind of little more than half the velocity of that at Buffalo, nearly twice as much sunshine and a somewhat drier atmosphere. The difference here de-

pends, apparently, upon the kind of wind, whether over land or water, the force of the wind, the moisture in the atmosphere and the amount of sunshine. It will be observed that Chicago has the lowest mortality rate given in cities situated upon large bodies of water. The winds at this point are chiefly land winds, the velocity is less than in any other of the five sea or lake cities, and the relative humidity is lower. Baltimore to be sure is located on a bay of considerable extent, but it cannot be compared with the coast cities—Buffalo, Providence, Milwaukee, Chicago and San Francisco, and must be included in this comparison with the interior or inland cities. If the prevailing wind at Baltimore were southeast I have no doubt that the death rate from catarrhal diseases would be increased; but Baltimore has a prevailing land wind northwest with a slow velocity, 5.8 miles. The remaining inland cities have a lower mortality rate than Baltimore. It will be seen that the mortality from the class of diseases we are considering is very nearly the same in Sacramento as in Baltimore. The former city is more favorably situated in some respects; especially it is not subject to the same variations in temperature as the latter, and has a higher mean annual temperature, and it never has a water or bay wind as sometimes occurs at Baltimore.

At Knoxville, Denver and Los Angeles the death rate is very low, and suggests these cities as proper localities for climatic treatment of catarrhs. They are inland cities, the winds are comparatively dry, and the velocity is not great. It is to be observed, also, that the sun shines a large portion of the time; especially is this true of Denver and Los Angeles. Temperature exerts

considerable influence in the production of catarrhs, but it seems to be the changeableness or variableness of temperature that has greatest effect in this causal relation. While we do not forget that catarrhal diseases of the respiratory organs prevail most in regions where the temperature is comparatively low, and that catarrhal diseases of the alimentary canal prevail most where the temperature is comparatively high, still it can be demonstrated, in fact it has been demonstrated, that great variations in temperature are most productive of these diseases. I have observed this in reference to catarrhs of both respiratory and alimentary organs. Most of the cities mentioned here are those which have the same isotherms as Chicago or Milwaukee or are located near these isotherms, so that the temperature varies from these cities but little, at least in certain parts of the year. The mean temperature for Chicago in summer is 70°, in winter 45°. The mean at Chicago for July is 75°, for January 22°; Milwaukee has a mean temperature in summer of 67°, in winter 43°, in July 70°, in January 20°. Knoxville has the same for July as Chicago. Sacramento and Los Angeles vary from that isotherm very little, while Denver is on the same as Milwaukee. Hence it is evident that simple temperature is not the most important element when considered alone in the etiology of catarrhal diseases, except in intestinal catarrhs. That variableness and extreme changes in temperature have a marked influence in causing all forms of catarrhal diseases, is shown by common observation, as is illustrated by the following reports given in private letters to me from Springer, N. M., and Ft. Berthold, N. D. These places lie on or near the summer isotherm

of Chicago. Dr. Hines, of Springer, informs me that there are no cases of catarrhal diseases of the respiratory organs in that region among natives or those who have come there free from disease. The humidity, he says, is very low—perhaps 27 per cent to 30 per cent. The climate is not very changeable.

From Ft. Berthold, Dr. J. R. Finney, the agency physician of the reservation, writes an interesting letter. He says that during the past year he has treated 187 cases of catarrhal diseases of the respiratory passages, which represented 39 per cent of all cases treated, and enumerates them as follows: La grippe, 113 cases; bronchitis, 21; laryngitis, 7; pharyngitis, 9; nasal catarrh, 37. He says further that every child, with hardly an exception, both Indian and white, under three years of age, suffers from nasal catarrh. He adds: "It often happens that the mercury will stand at 65° or 70° at 12 midday, and at –10° or –20° at midnight; and," he says, "I have seen the temperature at 78° at 2 P. M. drop to –26° at 2 A. M. the following morning. This was in March. The middle of winter and the middle of summer are the seasons when these diseases are least prevalent; but the spring and fall, when the variations of temperature are extreme, are most prolific of all forms of catarrh."

Dr. Finney finds many cases of enteritis occurring under circumstances favorable to other catarrh.

Such evidence as this is of more service than mortality tables for instructing us in reference to the localities most favorable and those least favorable to catarrh. Yet the mortality tables are of immense value, for from them we learn the severity of the disease, while from

registration of cases of disease we learn the actual proportion of various diseases under similar conditions. It appears then, that so far as climatic influences are concerned, the causes of catarrh may be various, including the changeableness of relative and perhaps absolute humidity, polarized light, actinic rays, proportion of sunlight and rainfall; but the most marked influences are produced by marked variableness of temperature, great force of wind, high relative humidity and small proportion of sunshine. Wherever these causal conditions prevail, as they do in many localities on the lake shore, there will be greater frequency of catarral diseases of the respiratory organs.

The work of Dr. Henry B. Baker, the eminent Secretary of the State Board of Health of Michigan, has done much to elucidate the causes of catarral diseases. By a careful study of his excellent report for 1890, it will be found that, although my studies and comparisons were made independently of his work, his tables confirm my conclusions. So far as I am aware, Dr. Baker's work is preëminent in this department of etiology.

I may state that, barring the presence of pathogenic organisms, the most efficient causes of catarral diseases of the respiratory tract are extreme variations in temperature, high winds, moist atmosphere, large per cent of cloudiness, marked variations in ozone, and differences in barometric pressure, whether due to differences in temperature and moisture or not. A change of a few pounds pressure to the square inch of skin or exposed mucous membrane cannot fail to be felt, and frequently is observed to be directiy related to changes in the state of catarrhal troubles.

CHAPTER XIV.

SYNOPSIS OF THE SYMPTOMATOLOGY AND TREATMENT OF CATARRHAL DISEASES OF THE RESPIRATORY TRACT.

Coryza. *Def.* An acute inflammation of the Schneiderian membrane. *Symptomatology.* Idiopathic form. Invasion and symptoms: malaise, chilly sensations, sometimes severe headache, caused by congested frontal sinuses. Distended capillaries of mucous membrane; attacks of sneezing; dull aching pain in cheek or teeth sometimes. These symptoms one to several days. Relieved by free watery or mucoid discharge. In neglected or severe cases the discharge may become purulent.

Treatment. Local; a 2 or 4 per cent solution of cocaine. Current of constant electricity through cheeks. Iodine vapor with air bag, astringents with atomizer. Borax and boric acid by spray.

Constitutional; diaphoretics, anodynes. In strumous cases tonics, cod liver oil, etc.

Chronic Nasal Catarrh. From defective nasal respiration or structural changes in nasal chambers. *Symptomatology.* Discharge muco-purulent or purulent, sometimes containing blood pigment, especially in deep ulcerations. Discharge often very offensive. Some-

times dryness of the nose may be complained of by the patient.

Treatment. Remove obstruction if any. Apply nitrate of silver or other astringents. Use antiseptics. Galvano-cautery to destroy nodules or growths. Palliative treatment when needed. Tonics and abundant nourishment. Alteratives often indicated.

Acute Catarrhal Laryngitis. (Spasmodic croup).

Symptomatology. May be a sense of soreness in throat, burning, tickling irritation. Occasionally difficulty of swallowing. Speaking, coughing, cold air, may cause discomfort. Hoarseness, sometimes aphonia, may accompany cough. Suddenly in the night, a dry hoarse sibilant, barking cough, supervenes with considerable dyspnœa. Often cyanosis. If deep tissues become involved, even in adults, there may be rigor, high temperature, pain, hoarseness, aphonia, dry or barking cough, labored, bloody expectoration, dyspnœa, cyanosis.

Treatment. Quiet in bed, temperature of room 70° F. moist. Cold compress to throat and upper part of chest; ice bags or ice cloths if agreeable. Select cases for this treatment. If increase of secretion is most desirable use warm applications, poultices. Warm inhalations, sprays, muriate of ammonia, or spirits of turpentine, evaporated from hot water. Internally, ipecac, bicarbonate and chlorate of potassium or sodium, hydrochlorate of ammonium. Iodide of potass. in strumous and chronic cases. Anodynes and expectorants. Local depletion in rare cases. Complications treated as they arise.

Chronic Laryngitis. *Symptomatology.* Morbid sen-

sations in larynx, alteration of voice. Exacerbations may occur, dryness, tickling, pressure, unnatural feeling in throat. Efforts to clear the throat. Modification of tone of voice, dysphonia, aphonia. Easily fatigued. Secretion slight or abundant, viscid to purulent and streaked with blood. Malodorous breath. Cough slight or barking and troublesome.

Treatment. Constitutional. The aleoresin of cubebs, comp. tinct. benzoin. Ammon. chloride for diminished secretion. For impaired digestion, alkalies, etc. In chronic diarrhœa, mineral acids. Cod liver oil, hydrated chloride of calcium, iodine, arsenic, iodoform. Keep functions of body normal. Local. Keep parts clean and comfortable by regular treatment with douche, spray, etc. To augment secretion use alkaline treatment (5 gr. to ℥j of water) of ammon. chloride; sodium borate, carbonate, chloride, chlorate or iodide; potass. iodide or chloride. Same by steam. Pyrethrum or jaborandi (5 min. fl. ext. ℥ to Oj water). To diminish secretion use to ℥j of rose water; alum, 5 gr.; tannic acid, 2 to 3 gr.; zinc sulphate or sulpho-carbolate, 2 gr.; lead acetate, 2 gr.; chloride of iron, 1 gr.; or nitrate of silver, ½ gr. For hyperæsthesia of mucous membrane use inhalations of co. tr. benzoin, camph. tr. opium, oil of pine, eucalyptol, creosote, in hot water. Cocaine, nitrate of silver, etc., may be applied directly if indicated.

Tracheitis. *Symptomatology.* Tickling, irritation, soreness and pain, one or all. Pressure on trachea ca' ses cough and expectoration often, with increase of symptoms. The secretion at first sero-mucous may become muco-purulent. If there is much hyperæmia or infiltration of tissues in children, the voice may be

altered and dyspnœa result on account of diminished caliber of trachea; but not in adults unless larynx is involved. Severe cases present symptoms of a cold. Duration, a few days to two weeks. The chronic form, with considerable hypertrophy of mucous membrane, may result from neglected or recurring cases. In mild cases, cough and expectoration less troublesome than in acute cases. Sometimes cough more annoying, expectoration thick, glutinous, scanty or thin, frothy, glairy, semi-transparent, more or less abundant, gray to green and yellow, sometimes streaked with blood.

Treatment. Acute. Dover's powder, warm bath, poultices, or perhaps better, applications of camphorated oil, covered with cotton batting. Soothing inhalations—vapor from decoction of hops, paregoric in hot water, essential oils. Sprays and nebulizations. Sesquicarbonate or chloride of ammonia, bromide of potass., quinine ; eucalyptus leaves smoked. Insufflation of astringent and anodyne powders. Nitrate of silver applied locally. General tonic treatment in chronic cases Complications, as cardiac and broncho-pulmonary, treated as they arise.

Bronchitis. *Symptomatology.* Acute. Chilliness often, soreness or oppression behind sternum; dry, harsh cough. Often general catarrhal symptoms, as sneezing, soreness of throat, hoarseness, etc.; pain in head, fever, expectoration—mucoid to purulent in different stages ; whitish, yellowish to greenish. Convalescence begins seventh to ninth day. Urinary secretion diminished as in fevers. Râles sometimes harsh and dry at first, later coarse; moist râles generally removed by coughing and expectoration. Resonance usually normal. If smaller

tubes are involved (capillary B.) respirations grow more frequent, dyspnœa and restlessness more marked, râles dry and abundant, submucous; pulse quick, expression anxious. Likely to pass into broncho-pneumonia.

Chronic form. Similar to acute symptoms, but milder and without fever. Harsh, full cough, more severe on retiring at night and rising in the morning. Expectoration whitish, mucoid, slightly opaque. Later, and in old people, yellowish or greenish, purulent. If expectoration is excessive, night sweats and emaciation, general decline, impaired appetite, etc. Exacerbations from exposure to cold or damp, especially in more severe forms. The severer form may likewise be accompanied by slight fever.

Treatment. Acute form. Local. Inhalations of medicated steam ; paregoric ℥j in pint of boiling water ; decoction of hops ; essential oils in hot water. These may be used to allay irritation of the mucous membrane. Inhalation of alcohol, camphor or menthol will frequently render good service. General treatment. Anodynes, Dover's powder, morphine, codeine, etc., are frequently necessary to quiet cough, restlessness or pain. Squills, liquorice, senega, muriate of ammon., ipecac and other expectorants as needed. If the skin is dry or the kidneys not active, Dover's powder or spirits of niter. If expectoration becomes purulent salicylic acid or carbolic acid internally, and paregoric ℥j and carbolic acid gtt. x in pint of boiling water for inhalation. If tongue is coated, liver inactive, bowels constipated, urine high colored, give calomel, gr. j to gr. v and soda bicarb. gr. ij to gr. x according to age of patient, four to eight doses, one every four to six hours, fol-

lowed by saline cathartic. During convalescence quinine and tonics may be administered.

Chronic form. Abundant nourishment, sustaining and tonic treatment. Expectorants as needed. Ipecac, muriate of ammon., etc. Keep secretions in good condition. Allay irritability of mucous membrane. For irritative cough or purulent expectoration, use paregoric ℥j carbolic gtt. 10, in one pint of boiling water; inhale the steam every three to four hours. Give internally, in cases of fœtid or purulent expectoration, carbolic acid or salicylic acid. Malt, cod liver oil, etc., must be prescribed in tedious cases. If cough is dry pilocarpin, gr. $\frac{1}{60}$ t. i. d.

Asthma. Two forms, *specific* and *nonspecific*. Specific A., Hay A., Summer catarrh. *Symptomatology.* Annual return, usually latter part of summer and early autumn. Itching in palate, roof of mouth, throat Eustachian tubes, ears, tension about frontal sinuses. Soon nostrils become involved, irritation of mucous membrane, sneezing, obstruction. Short paroxysms at first in morning, later at other times in the day. Exudation soon follows this stage of congestion, the discharge being usually limpid, serous and copious. Drops from the nose. Suffusion of eyes, itching of lids, conjunctivæ and corners of the eye. Eyelids may become swollen and red, the lids and glands inflamed. Special senses impaired. Sensitiveness to cold, sometimes feverishness. Anorexia, lassitude, weakness. Irritation may involve larynx, trachea and bronchi, sense of tickling, harsh dry cough, with glairy expectoration. Depends somewhat upon state of the atmosphere, dry, dusty, worse; rain-storm, better. Symp-

toms increase in severity, spasmodic, retching, vomiting. After third week catarrhal symptoms begin to subside, and disease gradually abates.

Treatment. Change of climate until season is past. Palliative treatment, anodynes, nervines, tonics, quinine, arsenic, galvanism. Sprays of eucalyptus, quinine, etc. Gargles of chlorate of potass., astringents, as needed for throat.

Nonspecific form. Bronchial asthma. Symtomatology. Sudden attacks of dyspnœa, usually in the night. Sense of constriction in chest, difficulty of breathing, sometimes accompanied by whistling sound ; sits up with arms thrown back ; face often turgid, eyes prominent, skin bathed in perspiration. Calls for air, raises windows unless fresh air is playing about him. In two or three hours symptoms abate, and patient may sleep. Such is an attack of asthma. They recur at irregular intervals, though often on successive nights until the disease is cured. Urine may be clear and abundant, diminishing as paroxysm subsides. If not treated the disease may last for weeks or months. During the day many patients feel well, others have a feeling of lassitude, are languid, have digestive or nervous disturbances. Not unfrequently there are evidences of a catarrhal cold. I have found this particularly the case in children. Sibilant or sonorous ronchi mask the ordinary vesicular murmur in some cases. At close of the attack symptoms of bronchitis with bronchial moist râles usually occur. The catarrhal condition of the mucous membrane usually extends from the pharynx or larynx down to the bronchioles. Many if not most cases of asthma are due to a hyperæmic state of the bronchial

mucous membrane, though undoubtedly other causes may produce very distressing asthma.

Treatment. As nearly all forms of asthma are accompanied in some stage by catarrhal symptoms, this fact should be borne in mind in prescribing for the patient. To increase the mucous secretion, give tartar emetic or ipecac or both in small and frequently repeated doses. Combine belladonna with these. Gelsemium if stomach is irritable. Inhalation of smoke from stramonium, saltpeter papers, etc. Bromide of potash and other nervines for nervous symptoms. Nitrite of amyl, a few drops on handkerchief for inhalation, in special cases relieves dyspnœa. Whisky or brandy in full doses will sometimes act well.

During intervals, tonics, expectorants, nutritious, easily digested food in abundance, at regular hours. Fresh air, moderate exercise, dry atmosphere generally; perhaps change of climate. Arsenic, iodide of potassium, quinine, nux vomica, aromatic sulphuric acid, etc., as needed.

Broncho-Pneumonia. Catarrhal P. Lobular P. *Symptomatology.* Mild form, like common cold. Chill, fever, headache, sore chest, aching limbs, tight, dry, painful cough. Bronchial catarrh. If not careful, or if reëxposed, remittent fever, 101° to 103°, may supervene, chilly, sweats easily, easily fatigued, restless sleep, poor appetite, coated tongue, irregular bowels, high-colored urine, troublesome, painful cough. Dry and moist bronchial râles, bilateral, often more marked on one side. Subcrepitant râles, feeble respiratory murmur, prolonged, blowing expiration. Resonance, vocal fremitus may be only slightly impaired. Inflammatory

process extends to air vesicles, consequent closure of certain lobules at anterior margins of upper lobes or elsewhere. Duration, five to ten days, symptoms subsiding. Without treatment or upon additional exposure a more severe form supervenes. *Acute broncho pneumonia* occurs most frequently in children. Often complicates measles and generally follows capillary bronchitis. Nearly always preceded by catarrhal cold. Fever 102°, 103°, or 105°; rapid, shallow breathing, special or severe cases very rapid—40 or 60 to 100 per minute—with violent action of alæ nasi.; elevation motion of thorax greater in proportion than expansion; retraction of base. Suffocative paroxysms. Cough frequent, painful. Sputa whitish, tenacious, often streaked and sometimes mixed with blood, rusty. Pulse rapid—140 to 160 or more; force and volume diminished. Thirst, anorexia. Tongue coated, often brownish. Sometimes diarrhœa, albuminous urine; nervous, restless, with dyspnœa and often delirium. Cyanosis approaches when blood is not sufficiently oxidized; coma, cold extremities, death. Râles from bronchitis, fine subcrepitant râles, occasionally bronchial breathing. Symptoms in children and adults similar, but the severe form is not so common in adults. *Prolonged high fever tends to produce cardiac failure.* Exacerbations and remittent type of fever. All grades varying from common cold to typical cases with variable symptoms, according to the area of lung tissue or number of lobules involved. May leave a chronic bronchitis, or may develop a fibroid phthisis.

Treatment. On account of the different grades of cases and the variable symptoms produced by the extension or modification of the pathological conditions, it

is difficult to plan a typical course of treatment. The chest should be covered with cotton batting, and seldom poultices used. Room should be well ventilated and kept at a temperature of 65° to 70° F. The air should contain about 70 per cent to 74 per cent of moisture, attained in winter by steam from boiling water. If liver secretions are not natural, blue mass or calomel. Antipyretics as needed ; sponging the entire body with dilute alcohol and anointing with sweet oil twice a day ; sponging hands, arms and face as often as necessary for comfort of patient. Anodynes and expectorants pro re nata. Stimulants and tonics will be required. Digitalis or aromatic spirits of ammonia, or both, will often aid the heart to crowd the circulation through the lungs and maintain the natural forces until a crisis is past. Carbonate of ammonia will often serve an excellent purpose both as stimulant and expectorant. Aconite and belladonna are valuable to control fever and nervous symptoms. Belladonna is of value, also, in controlling the congestion by distributing the blood in the general capillary system. During convalescence, muriatic acid or aromatic sulphuric acid, strychnia and quinine, malt, cod liver oil, and other tonics.

Whooping Cough.—A specific catarrhal inflammation, larynx and trachea. *Symptomatology.* Three stages : (*a*) catarrhal, (*b*) spasmodic, (*c*), subsiding.

(*a*) Catarrhal stage like ordinary cold, suffusion of eyes, etc. ; dry, ringing cough, slight fever, anorexia, insomnia or restlessness, a mild bronchitis.

(*b*) Spasmodic stage characterized by paroxysmal cough, a series of rapid efforts diminishing in force and duration to whoop. Face becomes dusky, eyes suffused ;

child may lose breath and fall in syncope, but usually vomits, which ends the paroxysm. May have twenty or thirty paroxysms in twenty-four hours. Sometimes instead of coughing patient may have "choking spells."

(*c*) In subsiding stage all symptoms gradually abate. Most cases before sixth year and between second and fourth years.

Treatment. Anodynes—Dover's powder, morphine, paregoric, belladonna, antifibrin. Expectorants—ipecac, squills, muriate or carbonate of ammonia, drosera, horse chestnut. Antispasmodics—valerian, camphor, asafœtida, musk, bromoform. Best practice is little but soothing expectorants, soothing inhalations of medicated steam, abundant nourishment.

BIBLIOGRAPHY.

A Systematic Treatise on the Principal Diseases of the Interior Valley of North America, etc. Daniel Drake.
Journal of the British Medical Association.
History of Medicine. Baas.
Hand-book of Therapeutics. Ringer.
The Therapeutic Gazette. 1892.
Gazette Médicale de Liège. 1891.
Therapeutique Respiratiore. J. Sales-Girons.
The Climatologist. 1892.
Transactions of the Illinois State Medical Society. 1890, 1891.
American Journal of the Medical Sciences. 1892.
Text-book of Human Physiology. Flint.
Text-book of Human Physiology. Landois and Sterling
The Edinburgh Medical Journal. 1891.
Journal de Médicine de Paris. 1891.
International Medical Magazine. 1892.
Journal of Laryngology and Rhinology. 1891.
Annual of the Universal Medical Sciences.
Berliner Klinische Wochenschrift. 1892.
Report of the Bureau of Ethnology. J. W. Powell. 1881, 1882.
Diseases of the Throat and Nasal Passages. J. S. Cohen.
Archives of Pediatrics. 1892, 1893.
A System of Medicine. Pepper.
Manual of General Pathology. Wagner.
Text-book of Pathology. D. J. Hamilton.

Hygiene. Parkes.
The Earth. Elisée Reclus.
La Semaine Médicale. 1891, 1892.
A System of Practical Therapeutics. Hare.
Wood's Reference Hand-book of the Medical Sciences.
The Medical News.
Zeitschrift der Bakterienkunde.
Weiner Klinische Wochenschrift.
Weiner Medizineische Wochenschrift.
L'Encephale.
Medical Press and Circular.
New York Medical Journal.
London Lancet.
Text-book of Hygiene. Rohé.
American Journal of Obstetrics.
College and Clinical Record.
Deutsche Medicinische Wochenschrift.
The Universal Medical Journal.
Medical Chronicle.
Cyclopædia of Diseases of Children. Keating.
Geographical Pathology. Davidson.
An American Text-book of the The ory and Practice of Medicine. Pepper.
Reynolds' System of Medicine.
Elements of Meteorology. Davis.
Materia Medica, Pharmacology and Therapeutics. Shoemaker.
Pathology of Bronchitis, etc. D. J. Hamilton.
Climate and Time. Croll.
Chemical Physiology and Pathology. Halliburton.
Climatology of the United States. Blodgett.
General Pathology. Payne.
Modern Medicine.
Pathological Anatomy and Pathogenesis. Ziegler.
The Medical Recorder.
Preventive Medicine. Richardson.
Weather Reports of U. S.
Weather Reports cf Milwaukee.
Health Report of State of Michigan.
Health Report of California.
Health Report of Providence.
Health Reports of Baltimore.
Health Report of Knoxville.
Health Report of Illinois.
Weather Reports of Illinois.
Health Report of Buffalo.
Medical Diagnosis. Musser.
Southern California, etc Remondino.
Practical Hygiene. Coplin and Bevin.
The American Therapist.

INDEX.