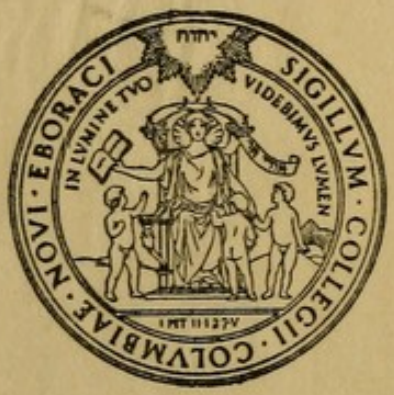
The diseases of the respiratory organs, acute and chronic / by William F. Waugh.

Diseases of the Respiratory Organs.

WAUGH.



The Diseases of the Respiratory Organs,

Acute and Chronic.

Arranged in Two Parts.

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PREFACE.

This book has been prepared because of the writer's belief that the treatment of acute affections of the respiratory organs has progressed far beyond that given in the textbooks on Practice. Most of the new material is dispersed through numerous periodicals, from which it is not always rescued by the compilers of annual and other abstracts. The methods of treatment herein advocated are based upon the author's conception of the *role* played in acute inflammations by the vasomotor nerves, and his belief that the future of scientific therapeutics lies in the study of such pathologic states, and the influence of drugs upon them, rather than in the consideration of these maladies as pathologic entities. There is this to be credited further to this conception of therapeutics, that it points to the active intervention of the physician at a period in the history of the case not only before the time when the diagnosis is usually made, but even before the malady has become fixed in the tissues. That remedial agents will exert an active influence at this time is no more impossible than that disease-processes are then at work; that the efficiency of these agents is far greater than when the damage has been perpetrated is not difficult of belief.

This subject is but in its formative state, and is by no means presented as a finished product. It is simply a bit of the scaffolding, of which not a stick may be retained in the final structure.

In preparing the book the author has availed himself of useful materials wherever he found them, and has not attempted to credit these to their various sources, not always possible to trace. But he must call attention to the free use he has made of Anders' fine textbook on Practice, upon which he has drawn freely, especially in the part devoted to pathology. WILLIAM F. WAUGH.

Chicago, April, 1901.

CONTENTS.

PART I.

ACUTE RESPIRATORY DISEASES.

CHAPTER I.

HAY-FEVER.

DEFINITION.—This is a form of acute nasal catarrh occurring in the fall or spring, each victim expecting the onset on a special date, or when some particular plant is discharging its pollen. The golden-rod is especially obnoxious. The affection is more common among men, young or middle-aged, usually of wealth and leisure. This indicates a relationship with uricemia, from full diet and lack of corresponding exercise. Hypertrophies of the nasal mucosa are frequently present.

SYMPTOMS.—The attacks begin abruptly, with symptoms of acute catarrh of the nose, eyes and pharynx. The discharge usually remains clear. The affection is aggravated by exposure to the open air. Sometimes the catarrh extends to the pulmonary tract. The symptoms persist until the flowering season of the obnoxious plant is over or until frost.

DIAGNOSIS.—Hay-fever is distinguished by its recurrence with each season, the persistence of the first-stage symptoms, and its obstinacy in resisting treatment effective against ordinary catarrh.

PROGNOSIS.—As regards a permanent cure the chances are not good.

TREATMENT.—The Hay-Fever Association reports the successful treatment still undiscovered. Patients must get out of reach of the causative element, and immunity is found by some at the seaside, by others in elevated mountainous resorts, by others in northern latitudes. Petoskey, in Northern Michigan, is a favorite resort for Chicago's hay-fever sufferers.

The chances for relief are better if hypertrophy or other removable disease of the nasal mucosa is found. In some instances the cure of such local disease has been followed by a cessation of the attacks, the pollen no longer finding a congenial habitat. The application of formalin or chromic acid, to harden the spongy tissues, has been tried with some success. Begin with a half per cent solution and increase until the desired effect is secured. The objection to all irritant applications is that they require preliminary cocainization, with the great danger of the formation of a drug-habit, the most disastrous of all that afflict humanity. It is better to wash out the nostrils with mild alkaline solutions, such as a quart of warm water with a drachm of soda or salt, and an ounce of hamamelis distillate, and then apply a protective spray of fluid petrolatum.

Some success has ensued from the administration of strychnine arsenate, two milligrams (gr. 1-30), every four hours, increased until the effect

of the strychnine is manifested. This may require four times the above dose, or more. The astringent effect of suprarenal extract has been utilized with some success; three decigrams (gr. v) three or four times a day. Atropine, one-tenth milligram (gr. 1-500) every half-hour till the secretion is checked, is the best palliative, and has no danger back of it like cocaine. Possibly the attack could be prevented if the prospective patient wore a respirator charged with antiseptics or glycerin to prevent the access of the pollen.

CHAPTER II.

ACUTE LARYNGEAL CATARRH.

ETIOLOGY.—The causes are those of acute catarrhs, exposure to cold and wet, inhalation of irritants, and extension from the bronchi below, the pharynx and nose above. Measles, whooping-cough and other acute infections are attended by laryngitis. Smoking and alcohol-drinking occasion an increased liability to it.

SYMPTOMS.—Cough, hoarseness, pain on endeavoring to talk, stiffness and sometimes pain in the larynx, and irritation as if a crumb had lodged in the larynx, are characteristic symptoms. The cough is dry, wheezing and incessant. Swallowing may be painful. Dyspnea follows if there is swelling of the glottis. There may be a little fever, the pulse slightly accelerated. The laryngoscope shows the mucous membrane red and swollen, dry, or covered with a sticky mucus.

DIAGNOSIS.—Dry cough, and interference with the function of the larynx, phonation, are characteristic. The laryngoscope reveals the location and extent of the affection.

TREATMENT.—Confine the patient to a well-warmed room, and let him inhale steam as frequently as possible. Speech must be forbidden

Apply a cold compress to the neck over the larynx. Subdue the fever with aconitine amorphous, half a milligram (gr. 1-134) every ten to thirty minutes for an adult, and stimulate secretion by apomorphine, a milligram (gr. 1-67) at the same intervals, suspending it on the occurrence of nausea. No other remedy equals steam for the cough, and it is unnecessary to add any medicament like benzoin. If the irritative cough persists give syrup of yerba santa, a teaspoonful every hour or two. Great care should be exercised when the patient goes out into the cold air, and a respirator could be worn with advantage, especially if the patient does not breathe exclusively through the nose.

CHAPTER III.

ACUTE CORYZA.

An acute inflammation of the mucous membrane of the nose, sometimes extending to the throat, larynx, bronchi, less frequently to the ears, or the sinuses opening into the nose.

ETIOLOGY.—There is a predisposition to colds in the head, especially in the subjects of chronic nasal catarrh, so that most attacks are simply acute exacerbations of the chronic affection. The nasal mucosa then appears to be the *"locus resistentiae minoris,"* and it has been held to be a safeguard, as colds settle here in preference to more dangerous localities.

The exciting causes are exposure to cold or wet, over-fatigue, excessive drinking, over-eating, the inhalation of irritant dust or gas, extension from pharyngeal or palatal catarrh. The epidemic form is probably due to the influenzal bacillus, or possibly at times to some other micro-organism.

SYMPTOMS.—The attack often begins with itching in the soft palate, or burning in some part of the naso-pharyngeal mucosa, chilliness, tickling, sneezing, and the discharge of a watery fluid that irritates the membrane and skin with which it comes in contact, excoriating the upper lip and

margin of the anterior nares, and extending the inflammation. Headache, weakness, aching of the muscles and tendency to sweating from relaxation of the cutaneous tension, are commonly present. The temperature rises to 100°-104° F., the pulse is accelerated but compressible, thirst is felt, the appetite may be good or impaired, the bowels constipated. The nasal passages are closed by swelling, but when the patient lies down the top nostril opens, the passage of air along it causing burning. When the patient turns over to the other side, in a few moments the under nostril closes and the upper one opens. Taste and smell are lost. Herpes around the anterior nares or lips is common. The secretion becomes turbid, purulent, and large quantities of thick yellow muco-pus are discharged, sometimes tinged with blood. The acute symptoms subside within a week, the discharge gradually drying up.

Lachrymation and conjunctivitis indicate extension to the eyes, deafness and earache to the middle ear by the eustachian tube, cough and hoarseness to the larynx, etc. A rare extension is to the frontal sinuses. Twice I have witnessed this, in both instances delirium and coma supervening, which continued until calomel had been given to salivation. In a third case the symptoms were so alarming that I trephined the right frontal sinus, giving exit to offensive pus, with immediate relief.

DIAGNOSIS.—Influenza is distinguished by the greater severity of the symptoms, especially the pain and debility, by its epidemic prevalence, and by the presence of the characteristic micro-organisms.

Measles may be suspected if the patient is liable and has been exposed to this infection, by the accompanying catarrh of the eyes, pharynx, larynx and bronchi, and by the crimson, punctate eruption on the pharynx; also the higher fever and the "goose-like" odor.

PROGNOSIS.—The gravity lies in the possible extension of the affection to the lungs or the frontal sinuses; young, weakly infants and feeble old men being in some danger. In ordinary cases the patient may be promised return to his business in a week, though neglect or fresh infection may prolong the attack or extend the malady.

TREATMENT.—There are several methods of breaking up a cold at the outset. The most effective is this: Clear out the bowels with a brisk purge, adding an ipecacuanha emetic if the attack is due to over-eating; give

Camphor .....six centigrams (gr. 1)
Quinine sulphate .six centigrams (gr. 1)
Atropine . .half a milligram (gr. 1-134)

repeated every hour until the effect of the latter is manifested by some dryness of the mouth, and then whenever this has subsided. Forbid all food

and drink, to keep the blood-vessels empty and allow the congested capillaries to unload. This may be aided in severe attacks by pilocarpine, a milligram (gr. 1-67) every five minutes till sweating freely; or by amorphous aconitine, half a milligram (gr. 1-134) every five to fifteen minutes, till the pulse is down below 80 and the congestion is subsiding.

The popular remedy of hot toddy is only of benefit by dilating the cutaneous capillaries, and this is better accomplished by atropine, while the sudorific value of alcohol is far below that of pilocarpine. All methods that include the free use of beverages of any sort merely aggravate the malady. Dover's powder gives relief and may break up the attack, but it is less likely to do so than the combination recommended, and is apt to be followed by severe headache.

Locally the most satisfactory remedy is petrolatum. In many persons the application of this substance limits the spread of the inflammation. The best method is to melt cosmoline in a teaspoon, being careful not to get it too hot, and pour into the affected nostril; repeating as soon as the sneezing recommences.

If the attack has become established relief ensues when the nose is washed out with warm salt water, containing an ounce of distilled hamamelis to the quart, through the nasal douche, and

spraying with fluid albolene or vaseline. The inhalation of steam has a soothing effect.

The patient should be induced if possible to remain in a warm room, the air kept moist by evaporation of water. As the attack subsides compound tincture of benzoin may be added to the steam inhaled, or benzoic acid to the petrolatum, one to two grams to 30 (gr. x-xxx to the ounce). Plain fluid petrolatum, applied with an albolene atomizer to the nasal mucosa, is a powerful protective when the patient has to go out in the cold air.

Neither opiates nor cocaine should under any circumstances be employed.

CHAPTER IV.

LARYNGISMUS STRIDULUS.

Spasmodic croup occurs most frequently in children under one year of age; rarely after the fifth year. Rickets frequently coexists. The attacks may be induced by temper, or by the causes of catarrh. The dyspnea is due to adductor spasm from reflex causes. Acute catarrhal laryngitis may coexist.

Symptoms.—A sudden attack of dyspnea occurs, at any hour, with crowing inspiration and cyanosis. There is no fever, cough nor hoarseness. The paroxysm lasts but a few moments, and if severe may induce general convulsions. It may recur at any hour, several times in the same day. The attacks are commonly termed "kinks," and the child believed to hold the breath purposely when crossed.

Occurring in the course of laryngeal catarrh, the child's breathing becomes harsh, it coughs and awakes with dyspnea, the attacks continuing for an hour or more.

Diagnosis.—Membranous croup is continuous, not paroxysmal, and occurs in older children. The characteristic exudation is present in this and in diphtheria.

PROGNOSIS.—The paroxysms are rarely dangerous, though trying to the mother.

TREATMENT. A dash of cold water in the face is effective, or cold applied to the neck while the child is in a warm bath. Pass the finger into the fauces and raise the epiglottis. If the child can swallow, a small dose of glonoin, one-twentieth milligram (gr. 1-1300), repeated every five minutes, is successful. In prolonged spasms this may be administered hypodermically, or a whiff of amyl given. A hypodermic of apomorphine, half a milligram (gr. 1-134), is suitable for the catarrhal form, occurring in older children. The treatment advised for catarrhal laryngitis is indicated in such cases. A sound spanking is effective when the "kink" is due to temper.

CHAPTER V.

MEMBRANOUS CROUP.

Morell Mackenzie demolished the old barriers between diphtheria and membranous croup. He showed that the differences between the two were simply due to the location, diphtheria occuring in the richly vascular structures of the pharynx, with abundant glandular connections, croup in the thinner membrane stretched over the laryngeal cage, with no lymphatics except Luschka's gland. Croup is not followed by paralysis, simply because the little patients do not survive to reach the paralytic stage. The two affections occur coincidentally, and run into each other, diphtheria extending down to the larynx, the croupous membrane up to the pharynx. This has now become the prevailing view, especially since the boards of health, wisely choosing the safer side, have universally required the reporting of all membranous croup as diphtheria, considering it better to permit no possible case of the infectious malady to go at large.

Nevertheless, it is now becoming evident that there are cases of membranous croup that are not laryngeal diphtheria, but rather the highest manifestation of the inflammatory process. In these

the micro-organism of diphtheria cannot be found, and their causation is that of catarrh rather than of diphtherial infection. There is no sharply marked line of difference between catarrhal and membranous croup, but cases occur so near the border that it is impossible to classify them. The older works gave as the diagnostic signs of the graver malady the presence of fever with retraction of the abdomen on inspiration, but such cases occur, even necessitating surgical intervention, without any sign of membranous formation.

Membranous croup affects children between the ages of two and seven, rarely outside of these limits. Exposure to cold winds and damp is the usual exciting cause. "Croupy" children are usually affected by catarrhal laryngitis. Those who are housed too closely, in superheated flats, strangers to cold baths, rarely allowed to breathe the open air and then overloaded with clothing, are the usual victims.

The affection begins usually at night, with a hoarse croupy cough, with dyspnea, the child struggling for breath. The difficulty is most marked with inspiration. Examination of the throat may show a few white flecks on the tonsils, which increase and coalesce into a thin, white pellicle. The hoarseness deepens into complete aphonia, the child is seen to cough, not heard. The temperature rises to 101 to 103 degrees, the

pulse keeping pace. The child lies quiet, the breathing being sufficient until he attempts to move, when the suffocative paroxysm at once comes on; he struggles for breath, clutches his mother, and finally falls back exhausted, when a moment's respite ensues. These symptoms continue until morning, when some moderation usually occurs, but as night comes on the struggle is renewed. The obstacle to the ingress of air is so marked that the abdomen is retracted on inspiration showing a boat-shaped depression. This marks the danger-point. As expiration is less obstructed more air escapes from the lung than enters, the air in the tract becomes rarefied, and the powerful efforts of the child to draw air through the narrowed chink of the glottis causes suction as of an air-pump to be exerted on the air-cells. The result is that blood-serum is drawn through the delicate walls, and begins to accumulate in the air-cells and bronchioles. Its presence is manifested by serous rales, at first fine but growing louder, with cyanosis keeping pace with the effusion. The struggles of the child become less strenuous, it grows quieter, but the quiet is that of approaching death from carbonic acid anesthesia. This is the usual cause of death, and if surgical intervention be delayed till now it will fail to save the patient's life. Even if death does not supervene in this stage there would ensue an

acute broncho-pneumonia, probably resulting fatally.

In the rare cases ending in recovery the symptoms are prolonged for several days, until the membrane is loosened and spit or vomited up. It may be reproduced, but this is rare. In one case of the writer's that recovered, a strong girl near the upper age limit, with a larger glottic aperture than usual, paralysis of phomation remained for weeks.

The diagnosis has been already discussed. Catarrhal croup occurs in "croupy" children, with little or no fever, no exudate on the tonsils, and yields to emetics and other remedies. In diphtheria we may find the characteristic micro-organisms, the malady begins in the throat, extends by preference up to the nose, the glands are early involved and only secondarily attacks the larynx.

The prognosis is of the worst. The older writers refuse to believe recovery from true croup possible.

And this serves to illustrate clearly the shocking barbarity of their treatment. If the child were bound to die, why torture it with emetics of copper, alum, antimony, turpeth, etc.? Why not mercifully let it die in peace if die it must? One only fragment of the old treatment is worthy of retention—the use of morphine. It will be noticed that as long as the child lies quiet the respiration

suffices for his needs, and the paroxysms of dyspnea occur when he attempts to rise. Give him enough morphine to keep him tranquil, but carefully avoid narcotism, which is here certain death. This reduces the violence of the paroxysms and conserves his strength. Then, as death is due to the pulmonary edema produced by suction, just as soon as retraction of the abdomen begins to be manifest during inspiration, intubate. Parents will not object to this at this early stage, as they are apt to if tracheotomy is suggested. But this matter of the parent's consent has been grossly exaggerated. The physician who does not know the necessity for such operation, and knowing this cannot show the parents that necessity, ought, in pursuance of his duty as a saver of life, to turn the case over to some one of sufficient force of character to compel consent to the duty. Parents have no rights that involve the sacrifice of their child's life.

Within a few years a new remedy for membranous croup has been advocated, in a preparation known as iodized lime. It is not a chemical iodide of lime, but a loose combination of lime and iodine, the effects of which closely resemble those of free iodine. In fact, I look upon this iodized lime as simply a handy and agreeable mode of administering iodine. The dose for a child in the croup age is grain ⅓, repeated every five, ten or

fifteen minutes, until the croupal symptoms subside. And this they do, in all cases that have come under my notice during the last two years. I have many letters from experienced physicians who report almost invariable success with this remedy. Its use has also confirmed the views of those who believe some cases of membranous croup are not diphtheritic, for when the malady has originated in the pharynx as true diphtheria and extended then to the larynx, iodized lime has not proved effective, while calcium sulphide has exerted the same powerful control as over manifestations of diphtheria, when pushed to full saturation. Be this as it may, the subsidence of the symptoms of croup, in a few hours while calcium iodized is being administered, is something marvelous to one accustomed to the old method with its invariably fatal ending. Morphine till abdominal retraction during inspiration occurs, then intubation, and calcium iodized from the first, given with a free hand, are the three remedies for membranous croup—and the only three whose effects entitle them to consideration.

CHAPTER VI.

ACUTE BRONCHITIS.

Acute catarrhal inflammation of the mucous membrane of the trachea and bronchi. The affected membrane is red and puffy, exuding a secretion at first watery, then cloudy, opaque, and finally purulent, gradually drying into scabs or crusts. The mucous glands swell, the epithelium is cast off, the submucous layers swell, become succulent, and in them leucocytes are found in numbers proportional to the severity of the attack.

Etiology.—The causes are those of catarrhs; exposure to cold and wet, inhalation of irritant gases, ammonia or ether, vapor, dust, etc. Usually the inflammation begins in the nose or throat and extends to the larynx, trachea and bronchi. Pre-existing chronic catarrh of any part of this mucous tract renders the individual more liable to attacks. The aged and very young, the feeble, uricemics, cachectics, those who are too much housed up in superheated flats or unused to exposure, are apt to take cold readily. Changes in the weather cause more or less extensive prevalences, and these resemble epidemics if they are not so in reality. Many infectious maladies number bronchitis in their symptoms or sequels, and in

nephritis and valvular heart-disease it is often present.

SYMPTOMS.—The early symptoms are those of a cold, chilliness, aching muscles and head, a sense of tightness in the chest, itching in the larynx, dull pain under the sternum, fever usually slight but ranging up to 104°, the breathing somewhat accelerated, especially in children. The cough is at first dry and irritative, perhaps severe enough to cause soreness at the insertions of the diaphragm, and becomes looser as the attack passes the climax and the sputa become purulent and copious. The symptoms closely follow those of coryza as regards the secretion. The laryngoscope shows the mucous membrane to be red and swollen, later covered with the exudate. Children rarely suffer an initial convulsion.

The hand placed upon the chest detects some fremitus. Auscultation discloses sibilant rales or wheezing in the early stages, gradually replaced by mucous and submucous rales, growing larger as the secretion becomes freer, with sonorous bronchi when sticky masses adhere to the sides of the larger bronchi. Rarely there are collections of secretion large enough to cause slight dullness. Coughing may alter the character of the rales.

PROGNOSIS.—Bronchitis is dangerous in infants, aged men and very feeble, cachectic persons. Extension into the smallest bronchi, with dyspnea,

sluggishness or cyanosis, are grave symptoms in such cases. Ordinarily the attack subsides in a week, the cough and expectoration continuing indefinitely. Cachectic patients suffer severely and then the malady tends to chronicity. The low grade of sensation in the mucous membrane of young infants and aged persons permits the accumulation of secretion to a dangerous extent, so that such patients may actually drown in their own sputa.

DIAGNOSIS.—The slight fever, absence of crepitus and dullness, distinguish bronchitis from pneumonia. The former is bilateral. Pleurisy has a history of acute pain on inspiration, dullness on percussion, with bulging intercostals and loss of respiratory movement. In broncho-pneumonia the rales are finer, the dyspnea worse, respiration rapid, fever higher, and dullness may be found in spots. Whooping-cough may be inferred even before the characteristic whoop, from the cough recurring in paroxysms that grow more severe as the catarrhal stage nears its end, the cough awaking the child from sleep and continuing until vomiting occurs. Measles presents a red, punctate eruption on the fauces and the fever is much higher.

TREATMENT.—As with nasal catarrh, it is possible to break up an acute bronchitis if seen early. Confine the patient to a warm, equably heated

room, the air moistened by water continually evaporating in it. Administer a cathartic, forbid the use of fluids as strictly as possible, and give one of the following:

1. Aconitine amorphous half a milligram (gr. 1-134), atropine $\frac{1}{8}$ milligram (gr. 1-500), morphine one milligram (gr. 1-67); given together, and repeated every ten minutes until the physiologic effect of one or other of the constituents begins to be felt. Generally it is the atropine, which manifests its commencing toxic action by dryness of the mouth. As soon as this is felt the frequency of the doses must be diminished to one-half hour, one hour or two hours, the object being to keep up the effect but not to exceed it. This has proved most effective for anemic, slender persons, but should not be used for uricemic individuals.

2. Atropine sulphate $\frac{1}{8}$ milligram (gr. 1-500), quinine sulphate one centigram (gr. 1-6), camphor one centigram (gr. 1-6); taken together every ten minutes till the atropine effect is slightly felt, then less frequently so as to keep up this effect but not to exceed it; that is, slight dryness of the mouth. In some individuals the first atropine effect noticeable is flushing of the face or dilation of the pupils, but whatever is the first manifestation the drug should not be pushed beyond it, but the endeavor made to hold the patient just at that point. This is good treatment for plethoric, over-fed,

uricemic patients, and those who have weak hearts or a tendency to constipation.

3. Pilocarpine one milligram (gr. 1-67), every five minutes until sweating or salivation begins, then enough to sustain the action just at this point. This is especially useful in stout patients with strong hearts, those given to excessive water-drinking, free sweaters.

In all cases it is necessary to forbid fluids, as, if the veins are gorged with fluid, there is little use in trying to reduce the hyperemia of the affected tract. The diet should for the same reason be spare. Much benefit is experienced in all forms of respiratory catarrhs by keeping the air of the room moistened by evaporating water in it, and by prolonged inhalations of steam frequently repeated. The mucus is softened and brought up, and the inflamed membrane soothed by this procedure.

On the day following, the attack will be broken up but the patient relaxed, and in favorable condition to contract fresh cold. If it be necessary that he should go out this relaxation should first be removed by tonics, such as brucine or berberine one milligram (gr. 1-67) every hour or two, till the toning influence is manifest; and this should be sustained for several days, with restriction of the quantity of food and drink, these being non-stimulating in quality.

If the patient is not seen until too late to abort

the attack, the indication is to hurry it through its stages as rapidly and comfortably as possible. The same hygienic and dietary rules are to be enjoined; the bowels kept somewhat loose by saline laxatives, the hyperemia moderated by the judicious administration of the "dosimetric triad," amorphous aconitine ½ milligram (gr. 1-134), digitalin 1 milligram (gr. 1-67), and strychnine arsenate ½ milligram (gr. 1-134), given together every half-hour to one or two hours as required. Only in pronounced plethorics should the strychnine be replaced by veratrine in like doses. Indeed, the relaxation usually manifest in respiratory catarrhs renders the tonics advisable in most cases from the first.

To promote the mucous secretion we have three excellent remedies, apomorphine, lobelin and emetin. The first is the most powerful and speedy, and suitable to severe forms, in the robust. The dose is one milligram (gr. 1-67) every quarter-hour till faint nausea is experienced, then less frequently. Lobelin is a powerful stimulant to secretion, better suited to croupy and asthmatic or rather dyspneal forms. Emetin is applicable to children and weakly patients, where the more powerfully depressing remedies might be dangerous if given recklessly. The doses and administration of lobelin and of emetin are the same as of apo-

morphine. Either should be continued until the mucous secretion is loose, thin and yellow.

To moderate the cough and bring it into harmony with the excretory needs of the patient we have likewise three excellent remedies. Codeine moderates bronchial irritability more directly than any other drug, with less interference with digestion. It may be given in doses of one-fourth to one centigram (gr. 1-24 to 1-6), repeated as the case demands. The second remedy is the inhalation of steam, of which I have already spoken warmly. The third is patience. To one who has never tried it, it is inconceivable how much benefit accrues in the irritative stages of respiratory catarrhs from persistently restraining the impulse to cough, until the secretion is so loose that slight effort will dislodge it. The cough is largely due to the inflammation, consequently is useless, and does harm by straining the lungs.

Mild counter-irritation to the chest is of value, and the practitioner may choose between ammonia liniment, mustard mitigated with flour or molasses, or the cold compress covered thickly with dry warm flannel. Each has its advocates and each is of value. Cold applications have proved unserviceable with me in treating uricemic, plethoric persons, especially those who catch cold easily.

As the attack progresses through its stages it may run into a bronchorrhea, with free serous se-

cretion. It is probable that in these cases the pulmonary tract has been invaded by a swarm of micro-organisms, and the thin, watery secretion is a culture-fluid of these. The remedies for this condition are the inhalation or atomization of tar-water, and cubebs, myrrh, copaiba, balsam of tolu or Peru, benzoic acid and its salts. Benzoic acid and cubebin, a centigram (gr. 1-6) each every ten to sixty minutes, are as useful as any, unless it is copaiba, which may be given in capsules, three decigrams (m. v.) every two hours in obstinate cases. Strychnine, two milligrams (gr. 1-30) every two to four hours, is also advisable to increase the tonicity and resistance of the bronchial tissues. The diet should be the more nutritious as any form of chronic bronchitis threatens to become established. But in every such case the sputa should be repeatedly examined to see if some microbic infection has not occurred.

If the catarrh tends to become dry, with scanty secretion, it may require stimulation with lobelin; or Murrell's advice may be followed, of applying wine of ipecacuanha locally with an atomizer. But if dyspnea attends, with irritative cough and difficult breathing, the sensory respiratory nerve may be sedated by atropine one-eighth milligram (gr. 1-500) every five to sixty minutes till the effect is manifested. This will be hastened by combining glonoin in like doses; or aspidospermine may be

employed, half a centigram (gr. 1-12), every five to thirty minutes, or iodoform, a centigram (gr. 1-6), every ten minutes.

In elderly patients the sensibility of the respiratory mucosa is slight, the tissues relax, and the impulse to cough is not felt. Secretions collect in the bronchi until the patient becomes dull, cool, cyanotic, the rales may be heard before entering the room, and the patient is literally drowning in his own secretions. The remedy is an emetic of seidlitz powder, the acid solution being first swallowed and then the other, which will empty the stomach more quickly than any other emetic and without nausea or depression. Follow this with sanguinarine nitrate a milligram (gr. 1-67) every half to two hours, which will stimulate sensation and make the patient cough harder. Squill, senega, serpentaria and ammonia act similarly, but sanguinarine is best.

Infants with bronchitis also have little sensibility in the mucous membrane, and care must be taken that the secretion is raised. Somnolence, blueness about the lips, pallor, shallow respiration, with little or no cough, should excite uneasiness but are apt to be overlooked by an inexperienced mother. An emetic will rid the chest of mucus but further lowers the vitality. Sanguinarine in doses appropriate to the age is of value, also strychnine pushed to the physiologic limit. Place

the babe in a hot bath and dash a little cold water on the chest to excite crying and full respiration. If emetics are given it should only be at night, that the respiratory tract may be freed from mucus before the parents settle for sleep. Opiates should rarely be administered to infants and never when subject to bronchitis. Uricemics, cachectics, and persons addicted to the immoderate use of beverages, are especially subject to bronchitis and other respiratory catarrhs. Ice-water fiends are especially liable, as their constant perspiration renders them susceptible to every draft. This should be taken into account in seeking to lessen the vulnerability to colds.

Patients should be restricted to their rooms until well over the attack, and be well protected when they go out.

CHAPTER VII.

FIBRINOUS BRONCHITIS.

This is a rare malady in which fibrinous casts of the bronchi are formed, and expelled with difficulty. The casts form molds of the bronchial tree. The larger ones are hollow. The epithelium is shed with the cast. Anders found the casts identical in structure with ordinary croupal exudates.

The cause is not known. Streptococci have been found in the casts. The malady is more frequent in males, between 20 and 40, in spring, sometimes seems epidemic and may be hereditary. Tubercle, pleurisy, herpes, impetigo and pemphigus have been noted as complications.

The rare acute form begins with rigors, followed by fever, dyspnea and severe cough. The expulsion of the casts may be followed by hemorrhage. Free expectoration gives relief. Urgent dyspnea and severe dry cough may precede fatal asphyxia.

In the chronic or recurrent form paroxysms occur at intervals of a week to a year, regular or not, the onset resembling that of bronchitis, cough severe and paroxysmal, and the white or gray casts appear. They consist usually of mucin, some of fibrin.

Physical examination shows the affected lung to

be airless; fremitus, expansion and vesicular murmur lessened, percussion normal or hyper-resonant, dull if collapsed, the ejection of the casts restoring the normal murmur.

The diagnosis is made by the casts, the history differentiating them from croup and diphtheria. Doubtful cases may be settled by a search for the Klebs-Lœffler bacillus of diphtheria.

In the acute form the prognosis is grave. The chronic form is obstinate but rarely fatal.

The treatment is as yet unsettled. Anders obtained good results from pilocarpine in one case. Cyanosis calls for emetics. Steam inhalations and the treatment for bronchitis are advised. If pilocarpine is given it should be in doses sufficient to cause free sweating—three milligrams (gr. 1-20) every ten to thirty minutes till effect. Potassium bichromate may be tried—two milligrams (gr. 1-30) every half-hour; or brown iodized lime, two centigrams (gr. 1-3) every five minutes.

CHAPTER VIII.

ASTHMA.

A neurosis, consisting of paroxysms of spasmodic contraction of the bronchioles, causing dyspnea. This is pure asthma, but we often find hyperemia, mucous exudations, affections of the nose or throat, emphysema, enlargement of the right ventricle and other cardiac lesions, gout, rheumatism, syphilis, nephritis, and medullary lesions accompanying asthmatic seizures.

ETIOLOGY.—A peculiar predisposition exists, as many with similar lesions are not asthmatic. This malady is often hereditary. Among exciting causes may be named bronchitis (cause or effect), the inhalation of irritants, vapors, dusts, fogs, animal or plant exhalations, and all sorts of emotional excitement. Asthma is more common in males and the paroxysms occur more frequently in cold weather.

SYMPTOMS.—Prodromes occurred in one-half of Salter's cases, such as emotional vagaries, headache, neuralgia, vertigo, somnolence, vasomotor tension with diuresis and digestive disorders. Probably uricemia may account for many of these. The attack usually occurs during sleep, tending to recur at the same hour. The symptom is dysp-

nea, wheezing for breath, the patient feeling as if the air entered the lungs just so far and then stopped. He struggles for breath, becomes pale or cyanotic, livid, with temperature subnormal, pulse weak and fast, cold sweat, great depression, feels as if about to die, but never does so in simple asthma.

The chest becomes rounded, the respiration falls to 12, its rhythm is disturbed, the inspiration short, the expiration prolonged. The diaphragm is lowered and expansion limited. Palpation gives normal results and percussion shows the chest to be hyperresonant, especially if emphysema is present. The wheezing expiration is audible at a distance, with dry rales until near the close of the paroxysm, when serous rales are heard.

The paroxysms last minutes, hours, days or weeks, with diurnal remissions. They end abruptly with expectoration of mucinous molds of the small tubes, known as Cushmann's spirals. Leyden's octahedral crystals are often present in the sputa, and very large numbers of eosinophile leucocytes. These are also found in excess in the blood during the attacks. Later the sputa contains pus.

Diagnosis.—The history of previous attacks, absence of evidences of structural disease, abrupt cessation of the paroxysms, inspiratory dyspnea, and the presence of the spirals in the sputa, are clearly diagnostic.

PROGNOSIS.—Death rarely if ever occurs from pure asthma. The paroxysms recur at regular intervals, a group of nightly attacks being followed by long exemption. Chronic bronchitis and emphysema are in time developed, when the malady may become practically continuous. Complete recovery is also rare, unless the patient removes to a suitable climate.

TREATMENT.—The Paroxysm. An emetic or cathartic may relieve by removing the cause of the attack. The most speedy relief ensues from a counter-irritant or ice, applied over the pneumogastric nerve in the neck; or from glonoin one-fourth milligram (gr. 1-250), atropine one-eighth milligram (gr. 1-500), and strychnine arsenate one-half milligram (gr. 1-134), given together every fifteen minutes till relief ensues. Very many other remedies have proved effective in relieving the paroxysms, including nauseants, antispasmodics, stimulants, anesthetics, analgesics and others, many acting through suggestion. The use of chloroform, alcohol, morphine and other habit-drugs, affords prompt relief, and as the paroxysms surely recur causes dangers infinitely greater than the asthma. They are unnecessary and should never be used.

When the paroxysms are prolonged, continuous or quickly recurrent, the patient should be brought under the full influence of strychnine arsenate.

This may require doses of two milligrams (gr. 1-30), repeated three to ten times a day, till the full effect is manifest and the malady controlled; and this effect should be sustained until it is found that the doses can be gradually lowered without recurrence of the paroxysms. Maximal dosage has been sustained for weeks with the best results. The use of this remedy in moderate doses, increased carefully but fearlessly, offers the best known means of breaking up the disease and effecting a permanent cure. Of course this does not refer to accompanying organic maladies, each of which requires its own treatment. The bowels, kidneys, diet, personal and domestic hygiene, should also be regulated. I am far from advocating this method of treating asthma to the neglect or exclusion of the common duties of the physician, which might nevertheless be allowed to go by default if not mentioned.

When the causes of the paroxysms are known they must be avoided, for habit is potent here as elsewhere. If any climate is asthmatic for an individual, he may have to choose between continuing to be asthmatic, and finding a climate where he will be free. Individual idiosyncrasy rules here. The smoky air of Pittsburg may even be better for some persons than the pure air of Chicago.

Emphysematous cases and those accompanied by

heart-disease are greatly benefited by potassium iodide in full doses, three grams (gr. xlv) or more daily.

CHAPTER IX.

PULMONARY HYPEREMIA.

Collateral hyperemia exists in the unaffected lobes during pneumonia. The bloodvessels of the lungs are acutely congested, the epithelium swollen and granular. It is the first stage of pulmonary inflammation and may be excited by the inhalation of hot air, irritant gases, violent exercise or emotion, or the excessive ingestion of liquids, especially alcohol.

There is a sense of oppression, of a lack of air, with cough, frothy, bloody sputa and some soreness in the chest. Examination shows both lungs usually affected, with increased tactile fremitus, some little decrease in the clearness of the percussion resonance, diminished vesicular respiration, some bronchial breathing, and moist rales varying with the quantity and consistence of the fluid present. Respiration is markedly increased in rapidity, and there is apt to be some fever, the pulse corresponding with the fever present.

The diagnosis is made by the oppressed breathing, cough, frothy expectoration and the absence of the signs of pneumonia.

The prognosis is rendered grave by the supervention of pulmonary edema.

The treatment is very simple. The patient is put to bed, the bowels emptied, free perspiration is induced by the use of pilocarpine, two milligrams (gr. 1-30) every five minutes till full action is manifested, and the pulse is brought down to 60 by the administration of veratrine and amorphous aconitine, half a milligram (gr. 1-134) each with a milligram of digitalin (gr. 1-67) to contract the dilated pulmonary vessels, given together every quarter to one hour according to the urgency of the case. If the patient is weakly strychnine arsenate in like doses should be substituted for the veratrine. Meanwhile the irritating, racking cough may be checked by codeine and emetin, one to three milligrams (gr. 1-67 to 1-20) each, every half to one hour. If the volume of the blood is reduced by the purge and sudorific, and the patient is not permitted to restore the congestion by the free use of beverages, it will not be necessary to bleed, locally or generally. But if edema of the lung is imminent—*bleed*—BLEED—BLEED! Nothing else will act as quickly to save life. The fear our fathers felt in regard to the loss of a little blood was preposterous.

Arterial tension may require a few small doses of glonoin at first, to let in the veratrine more speedily, and let out the blood from the hyperemic area.

CHAPTER X.

PULMONARY EDEMA.

In many morbid conditions blood-serum is effused into the air-cells and pulmonary tissues. It forms a zone around pneumonic, purulent apoplectic and tubercular masses. It is an incident in the history of nephritis, anemia, apoplexy, acute septic fevers and many cardiac maladies. In pneumonia collateral hyperemia and edema of the lobes not pneumonic form a serious element of danger. In true croup edema is the cause of death. The occurrence of edema is favored by any agent that causes abnormal fluidity of the blood, overfilling of the pulmonary capillaries, increase or decrease of the tension of the pulmonary bloodvessels, or innutrition of their walls.

Dyspnea is the first symptom, and is severe in proportion to the extent of the malady. Cough, frothy sero-sanguineous expectoration, cyanosis with sluggishness, somnolence and finally death by carbonic acid poisoning, are the steps in general pulmonary edema. The pulse is weak and rapid, skin cool and livid, the degree of fever depends on the causal malady. The percussion note is dull if the edema is marked; auscultation discloses moist rales of varying degree, beginning in the

finest bronchi and becoming coarser as the serum invades larger ones, while the vesicular sound is weak or absent.

The condition is diagnosed from the history, incomplete dullness beginning in dependent parts, the progressively larger moist rales, frothy bloody sputa, absence of fever and supervention of cyanosis if extensive. In hydrothorax the level of the dullness changes at once with change of posture, and there are no rales. Broncho-penumonia begins with fever, sticky gray sputa, and the dullness is marked, limited and stationary.

The prognosis depends on the primary disease. Collateral edema is a condition of imminent danger. In croup it is a herald of death.

TREATMENT.—Treat the primary malady. Change the patient's posture frequently to avoid hypostasis. Bleed for collateral edema in pneumonia. Intubate to prevent edema in croup. Feed up, stimulate, and neglect not the blood-pressure.

CHAPTER XI.

HEMOPTYSIS.

Blood coughed up comes usually from the bronchi; rarely in advanced phthisis it is from eroded vessels. At the post-mortem we find the latter, or ruptured capillaries, swollen mucosa, or a ruptured aneurism the affected lung-tissue pale.

ETIOLOGY.—The causes may be pulmonary hyperemia or congestion from any cause (heart-disease, pneumonia, inhalation of hot air, violent exercise, etc.), infarction, pneumonia, tubercle, ulcer of larynx, trachea or bronchi, fibrinous bronchitis, cancer and gangrene. Blood may come from the nose or from other sources, enter the larynx during sleep and be coughed up to frighten the patient and mislead the doctor.

A free hemorrhage may first attract attention to a localized deposit of miliary tubercle. Much more frequently children who bleed at the nose during early life, after reaching puberty have bronchial hemorrhages instead. The effused blood, decomposing in the bronchi, excites inflammation there, and this may form a suitable nidus for the tubercle bacillus. Too many young people have repeated bronchial hemorrhages, and yet live to old age without becoming phthisical, to permit of

the gloomy prognosis of Laënnec in similar cases.

Rarely hemoptysis represents a vicarious menstruation. Purpura hemorrhagica, scurvy, ptyalism, anemia, hemophilia yellow fever and malignant malarial fever, may cause hemoptysis. Clarke found recurrent hemorrhages in aged persons from gouty endarteritis.

SYMPTOMS.—In bronchial hemorrhages the patient feels a warm salty taste and blood wells up into his mouth, the quantity varying from an ounce to a pint. This is generally preceded, perhaps for days, by a sense of stuffiness in the chest, with pain or tenderness in the second right intercostal space, near the sternum. The patient is frightened, the pulse excited, full and rapid, perhaps tumultuous. Each new gulp of blood adds to the terror. During the day a second hemorrhage usually occurs, and if this is foretold by the doctor, with the assurance of its harmlessness, faith and composure follow. Otherwise another attendant is usually summoned. Blood is brought up for a few days, while the patient shows by fever the degree of damage excited by the dead blood in the fragile lung-tissues. If oppression has preceded, a feeling of relief and sense of well-being follows the hemorrhage. Rarely is the loss of blood sufficient to induce syncope and collapse. The assumption of latent tubercular foci is totally unnecessary

here, and contrary to the observations I have made of the future history of many such cases.

When tuberculosis is advancing rapidly a large vessel may be eroded, in which case the succeeding hemorrhage is apt to be fatal. The blood in the above cases is arterial and frothy, not clotted. Bubbling rales may be heard on auscultation.

Similar hemorrhages may occur in passive congestions from obstructive heart-disease, etc., and spitting of blood or bloody sputa is common in any destructive pulmonary affection.

Small hemoptyses precede for weeks the rupture of thoracic aneurism, the latter causing sudden death.

Gouty hemoptysis occurs after 50, most commonly when bronchitis is present. Small hemorrhages occur in emphysema also, probably from ulcer.

Small hemoptyses occur in weak, hysterical women, others follow thoracic injuries, strains and violent emotions. Persons predisposed to tuberculosis are apt to have hemorrhages if they go to the seashore, and almost any one may suffer similarly on ascending to elevated regions or in balloons.

The diagnosis of pulmonary hemorrhage is made by ascertaining that the blood is coughed up, frothy, bright-red, the nose, mouth and throat showing no source of bleeding, the lung revealing it.

The prognosis is good as to life. Very rarely does any one die from pulmonary hemorrhage, except from erosion of an artery or bursting of an aneurism. But any discharge of blood from the lung demands the most thorough search for evidence of tuberculosis. If not found, if the week following shows little fever and the sputa are free from pathogenic microbes, the hemorrhage is still evidence of a fragility of tissue demanding instant attention. The immediate effect of a hemorrhage on the course of an acknowledged tubercular malady is beneficial. Simple blood-spitting is rather diagnostic than prognostic.

TREATMENT.—Place the patient at ease, the head somewhat elevated, with cold to the chest. Reassure him as to immediate danger, announce the return of another hemorrhage later in the day, administer a full dose of atropine, a milligram (gr. 1-67), turn the people out of the room and order the patient to be kept cool and quiet. Forbid the patient's talking. If the sense of oppression is still present, apply a leech or cup over the second right intercostal space, close to the sternum, and subdue the bounding heart with aconitine or veratrine, "dose enough" to do the work. Keep the patient very quiet as long as any fever is present, feeding on small doses of ice-cream and the most concentrated nutriment, predigested if necessary. Forbid all fluid but what is absolutely unavoidable.

For thirst allow pellets of ice, or chewing-gum. Examine the chest thoroughly. If a tubercular lesion is found treat that disease. Heart-disease, aneurism, etc., require their own treatment. In case of aneurism ice to the chest may delay death for a paltry period. In vicarious menstruation anticipate the next monthly epoch by active emmenagogues, and repeat this each month till it is no longer necessary.

If the most vigorous search fails to disclose evidence of pulmonary tuberculosis, while the history and aspect of the patient show the case to be one of tissue-fragility, predisposition to phthisis, the question is of prophylaxis. If a youth of proper age, a long sea-voyage, a year or more, is advisable. Calcium lactophosphate should be given, half a gram (gr. 7½) daily for a year or more; the bowels regulated, the digestion scientifically built up, the body invigorated and toughened by suitable exercise, cold baths, salt rubs, pneumonic gymnastics, cod-liver oil inunctions, the climate suitable to the case, etc.

Whenever there is the warning sense of oppression the heart should be sedated by veratrine and a dry cup placed over the danger-point. If the symptoms recur quickly, introduce a seton wherever pain or fullness is felt.

The diet must be carefully suited to the case. A flood of hot soup or alcoholic beverages may

bring on hemorrhage. All excesses that impair the vitality must be prevented. An out-door life, in an equable climate, as high up the mountains as the patient can comfortably endure, is the ideal. While emphatic in my view that these cases are not necessarily tuberculous, I grant freely their liability to become so, and the regime enjoined is that employed to prevent the development of tuberculosis. This point is of the utmost importance, for many a doctor and patient, convinced by the hemorrhage of the preëxistence of tuberculosis, have allowed the cases to go by default that might otherwise have lived to a healthy old age.

I have dropped all the old hemostatics for atropine. By forcibly dilating the cutaneous capillaries this drug attracts the blood to the surface and reduces the congestion of the internal organs. If the blood is safely held at the periphery it cannot at the same time be escaping from engorged vessels in the lungs. Besides this, atropine sedates the pneumogastric and checks the cough. While it is in a sense antagonistic to the arterial sedatives recommended, aconitine and veratrine, actual trial has confirmed the apparently paradoxic claim that such antagonists will act in the same body at the same time, each exerting its special force where needed. It is well to accompany the atropine with a few doses of glonoin, $\frac{1}{4}$ milligram (gr. 1-250) every ten minutes, to relax arterial tension, open

the vessels for speedier action of the other drugs, combat the tendency to syncope and attract the blood to the head, where it is held by the slower but more persistent atropine. The only effect of astringent sprays is upon the mentality of the patient, for by no possibility can they reach the bleeding orifices.

CHAPTER XII.

PULMONARY APOPLEXY.

Sometimes there is an escape of blood into the lung-tissues, similar to a cerebral apoplexy. It occurs from rupture of an adherent aneurism, from wounds, and in some cerebral and septic maladies.

There is profuse hemoptysis, great dyspnea, cyanosis, collapse and signs of consolidation suddenly following the causal lesion. It ends in death at once, or after abscess or gangrene has supervened.

The treatment is absolute rest, cold locally, and atropine in full doses hypodermically, one milligram (gr. 1-67) at once.

CHAPTER XIII.

PULMONARY EMBOLISM.

A pulmonary artery is blocked by an embolus. The lung supplied becomes engorged with blood, airless, dark, the pleura covering the base of the wedge inflamed, and a zone of edema surrounds it. If the embolus consisted of septic matter the part breaks down into an abscess. In leucocythemia plugs composed of leucocytic masses form small emboli. Vegetations loosening from the valves of the heart sometimes enter the lungs.

Small non-septic emboli may occasion no symptoms; large ones may cause speedy death with symptoms of pulmonary apoplexy. The usual symptoms are dyspnea, syncope, pleuritic pain, spasms and coma. The dyspnea occasions great distress and struggling for breath. Bloody expectoration occurs early. If a cardiac murmur ceases, with the sudden development of localized pneumonia, hemoptysis, pleuritic pains, preceded by convulsions and unconsciousness, the diagnosis is clear. Small infarctions may not cause dullness; large ones do, with moist rales, increased fremitus and bronchial respiration, with pleuritic friction. The pulse is weak and rapid,

skin cool, the forces prostrated. Fever follows reaction in large infarctions.

The prognosis depends on the nature of the embolus and the importance of the vessel occluded. If abscess or gangrene occur death quickly follows. In case of recovery the affected part shrinks, forming scar-tissue, or calcifies.

The treatment consists of rest, careful feeding to support the strength, and anodynes to ease the pain. Atropine may be given for this purpose, with codeine enough to prevent painful cough, and anodyne applications to the skin.

CHAPTER XIV.

BRONCHO-PNEUMONIA

In capillary bronchitis we find evidences of inflammation of the smallest bronchi and the air-cells. Dark patches are found, surrounded by healthy tissue, the one exuding muco-pus when cut, the other serum. The large bronchi are healthy, the smaller contain secretions, the walls thick, dilated, the cut surfaces nodular. Large areas may be almost wholly consolidated, airless, at first reddish, later gray. Both lungs are affected in parts. The bronchial glands are inflamed, the pleura somewhat also, the air-cells of other parts of the lungs dilated. The malady begins as an inflammation of the cells and bronchioles constituting a lobule, new tissue being formed therein, the malady tending to chromicity. The exudate consists of serum, mucus, alveolar cells, leucocytes, and a few red blood-cells. The leucocytes in the blood multiply, except in fatal cases. Concomitants are bronchial catarrh and exudative inflammation of the air-cells.

Etiology.—The malady is most frequent among children, and with measles, rickets, scarlatina, whooping-cough and diphtheria. Excitants are exposure to cold and wet, bad air, bad hygiene

and digestive derangements. A form of broncho-pneumonia also prevails among the aged, enfeebled by disease. It is most prevalent in cold, wet seasons, occurs with influenza, typhoid fever, erysipelas and smallpox. The inhalation of irritants seems to excite attacks, as does the tubercle bacillus.

Streptococci are frequently found in the sputa, also pneumococci, staphylococci aurei, the influenza bacilli and numerous other micro-organisms.

SYMPTOMS.—Primary forms, occurring usually in adults, present symptoms of severe acute bronchitis. In weak patients the onset may be gradual. The sputa is scanty and sticky, gray or blood stained, fever 101° to 104° F.; irregular but higher in evenings, ending by lysis in two to four weeks.

More common is the secondary form, the early symptoms masked by the previous affection. The malady extends down from the larger bronchi and is marked by a sudden rapidity of respiration, with higher fever, harassing cough and expectoration. The pulse grows rapid, feeble and irregular.

Capillary bronchitis is indicated by subcrepitant rales, followed by some dullness, not limited to single lobes, but more marked in the back between the shoulder-blades. Dyspnea and duskiness of the lips are noted, the hurry of respiration is extreme, the eyes and finger-nails are blue. The respirations

are shallow. The fremitus is increased, breathing is bronchial, yet the consolidation is rarely as complete as in lobar pneumonia.

Unless death comes sooner the attacks last from one to several weeks.

In the cerebral form there are at the outset restlessness, convulsions and delirium or stupor, early high fever, followed by prostration. Some days later the pulmonary symptoms replace the cerebral. There may be gastro-intestinal disorders in any form. Some cases run on for many weeks, the consolidation remaining. In fact, the affected areas may remain permanently solidified. The fever may be irregular. Other cases develop like lobar pneumonia, with chills, high fever, pain in head, chest and back, marked prostration following, with the usual symptoms in aggravated form. In another group the onset is insidious, the course chronic, hectic fever and night-sweats following.

The diagnosis between this affection and lobar pneumonia is not as a rule difficult. Lobar pneumonia begins abruptly with a chill, there is crepitation, followed by dullness limited to one or more lobes, rusty sputa, typical fever, ending in crisis; it is often unilateral, without bronchial catarrh or severe dyspnea; the pneumococcus is present. Broncho-pneumonia develops usually out of one of the maladies named; begins gradually with bronchitis preceding; the dullness is bilaterial, not ab-

solute, not limited to the lobes, but most marked between the scapulæ; subcrepitant rales, respiration hurried, great dyspnea and cyanosis, fever irregular, ending by lysis, course prolonged, sputa glairy, in adults blood-spotted; often ends in tuberculosis; streptococci and other micro-organisms than pneumococcus are present.

Pleurisy has dullness at the base of one or both lungs. In tuberculosis the bacillus is present.

The prognosis is grave in proportion to the weakness of the patient and the extent of the disease. The mortality varies from 25 to 50 per cent.

TREATMENT.—Attacks may be prevented by guarding against colds during and after the affections above named. The mouth should be regularly cleansed with antiseptic lotions during all septic fevers.

Perhaps no other remedy counts for so much in this malady as the constant inhalation of steam. The chest should be painted with tincture of iodine and enveloped in a mush-jacket, covered thickly with dry flannels. The more acute cases require veratrine, aconitine and digitalin for the fever, changing the veratrine to strychnine arsenate at the first indication of debility. The adult dose is half a milligram of each, except of digitalin, which is a milligram every half, one or two hours, according to the pulse and the fever. For children under ten Shaller's rule is applicable: Put in a

glass one adult dose for each year of the child's age, add one more, and 24 teaspoonfuls of water; then give a teaspoonful as often as required. Thus, a child one year old would take two-twenty-fourths of the adult dose, a child 8 years old nine-twenty-fourths.

The bowels must be emptied and kept soluble, the strength supported by judicious feeding, the alimentary canal aseptic.

Will any agent favor resolution and fluidify the exudate? I am uncertain. Calomel, ipecac, ammonium chloride, apomorphine, lobelia, potassium bichromate, each has been faithfully tried without giving convincing proof of its utility. One case responded promptly to ammonium iodide, another to strychnine in desperate doses; and I would to-day prefer the latter to any other remedy. Opiates in all forms are deadly. The cough will be better relieved by steam. The inhalation of oxygen may tide over a case. Injections of normal salt solution may be of value.

CHAPTER XV.

PULMONARY GANGRENE.

Diffuse gangrene in the lungs is rarely met in pneumonia. As a consequence of occlusion of a large artery a whole lobe or lung may be affected, the tissues becoming black, soft and putrid. Emboli cause circumscribed gangrene, more frequent in the right lung, and in the lower lobes close to the pleura. The tissues turn greenish brown, softening at the center into a cavity. A zone of inflamed tissue surrounds it and the discharge inflames the air-passages it reaches. The affection spreads by direct extension to lung and pleura, and secondary embolism may occur in the brain or elsewhere. The gangrenous patch may become encysted and the patient recover with a cavity.

The causes are putrefactive bacteria, staphylococci, lodging on pulmonary tissues whose vitality has been reduced too low for successful resistance. Gangrene occurs in the course of pneumonia, infarctions, bronchiectatic and other cavities, traumatisms, cancer, compression and embolism. Foreign bodies, food, etc., entering the lung are specially liable to cause gangrene. It occurs sometimes in convalescents and in diabetics.

The symptoms are cough, profuse intensely fetid sputa, separable on standing into three layers, an upper-frothy, gray-yellow, a middle clear serous, a lower greenish-brown sediment containing shreds of lung-tissue, blood, bacteria, fat-crystals, muco-pus, amorphous matter and leptothrix. Ciliated monads have been found. If the gangrene does not discharge by the bronchi, neither fetor nor sputa may be present. Fatal hemorrhage may result from erosion of an artery. The physical signs are those of consolidation, with a cavity after evacuation; the usual rales from the bronchi and inflamed layer. There is fever of irregular type, with great prostration and rapid wasting, death advancing rapidly.

The diagnosis is made by the unequalled fetor of the breath, peculiar sputa and rapid sinking.

The prognosis is grave in proportion to the extent and rapidity of the gangrenous process.

TREATMENT.—Spray or atomize with carbolic lotions and volatile oils, as strong as can be borne. Give the latter internally in full doses, with sanguinarine, strychnine and the richest possible diet. Just as soon as there is an opening for surgical intervention it should be embraced.

CHAPTER XVI.

PULMONARY ABSCESS.

Abscess of the lung may be diffuse or circumscribed, of any size up to an entire lobe. If the pleura is reached there may be fibrinous adhesions, emphysema, or pyopneumothorax. Streptococci, pneumococci, Friedlænder's bacilli and other organisms have been found. Abscess has been found to follow pulmonary inflammations (usually diffuse, perforations, embolisms, pyemia, emphysema, and usually attends chronic tuberculosis.

The sputa contain pus, are fetid, but less than in gangrene, containing many elastic fibers. The cavity can be located if large enough. The fever is of the hectic type, with chills, perhaps daily.

Pyemic abscess presents little hope. If the causal affection is amenable to treatment the abscess is a harmful event, not necessarily fatal.

TREATMENT.—Keep up the patient's strength with rich food, strychnine arsenate two milligrams (gr. 1-30), iron and quinine arsenates each a centigram (gr. 1-6) every four, three or two hours; with all the resources of the reconstructive regime. Put a stop to the suppurative process by speedily saturating the body with calcium sulphide, one grain, seven times or more each day till the breath

smells of the drug. Spray with volatile oils, thymol, menthol, eucalyptol and camphor, one gram (gr. xv) each in an ounce of fluid petrolatum, very often. Aspirate or drain large abscesses as early as practicable.

CHAPTER XVII.

PLEURISY.

All inflammations of the pleura are attributable to micro-organisms. In the exudate have been found tubercle and typhoid bacilli, strepto- staphylo- and pneumococci. In emphysema the ordinary forms are micrococcus lanceolatus and streptococcus. Less common are the colon bacillus, proteus vulgaris, gonococcus and Friedlænder's bacillus, with several saprophytic bacteria. In half the cases more than one form is present.

DRY PLEURISY.

In acute plastic pleurisy the inflamed surface is injected, dull, with bloody points, covered with a fibrinous exudate, which thickens from friction, becoming shaggy, yellowish or reddish-gray. Embryonic cells in the exudate develop new vessels and connective tissue. The opposing surfaces adhere in severe forms; in lighter cases the exudate becomes fatty and is absorbed.

This form of pleurisy rarely occurs primarily, from cold, or with a diathesis present. Secondarily it occurs with pneumonia and other pulmonary inflammations, and tuberculosis, when they extend to the pleural limit of the lung. In rheu-

matism, nephritis and alcoholism it is common, and it may also follow other serous inflammations.

The symptoms are of all degrees of severity. The pleuritic stich in the side is noted. The pain is increased by chest-movement, hence breathing is restrained and cough suppressed. When the opposing surfaces have become glued together this is relieved. The fever ranges from 101° to 103° F. —often it is hardly noticeable; the pulse 90 to 100, small and soft. In many cases the disease is "latent," and the patient really never knows he is affected; while in some there is the evidence of a serious malady, fever of 104° F., chills, prostration, and other symptoms of corresponding gravity.

The chest-movements are restricted, percussion note unaltered, but a friction sound is heard in the early stages—the "dry-leather" rubbing, heard most clearly at the end of the inspiration. When exudation occurs fremitus is said to be diminished and some dullness to be detectable, but it must be quite unusual for enough exudation to appear to render this possible. Friction is then heard on expiration and inspiration. If the exudation is abundant enough to compress the lung there may be bronchial breathing, and it may require a delicate diagnosis to determine if this is the case or the adjacent lung is pneumonic.

The diagnosis is made by the friction-sound,

stitch, suppressed dry cough and respiration, with the absence of evidences of pneumonia—crepitus, rusty sputa and dullness. Intercostal neuralgia has tender spots, but no friction sounds or fever.

The attacks run on from a few days up to some weeks, and end in resolution with absorption, permanent adhesion of the opposing pleural surfaces, or death. A predisposition to subsequent attacks remains.

TREATMENT.—Put the patient to bed; limit the pain and spread of inflammation by applying as tightly as possible a bandage or corset to the chest, as in fracture of the ribs; relieve the pain if severe by leeching or cupping over the painful region and reduce the hyperemia to the lowest point by rapidly reducing the bulk of the blood. Our fathers did this by bleeding, and in many cases this is a wise procedure to-day, but not in diathetic or cachectic cases, or in individuals whose vitality is deficient. Better enjoin the dry diet, total abstinence from drink and bulky or watery food give a brisk, quick-acting cathartic, and enough pilocarpine to induce free sweating (two milligrams (gr. 1-30), every ten minutes till full effect). With this, relax the contracted capillaries (vaso-motor spasm) by aconitine amorphous, half a milligram (gr. 1-134), restore contractility to the vessels in the hyperemic area (vasomotor paresis) by strychnine arsenate half a milligram (gr.

1-134), and digitalin a milligram (gr. 1-67), and if needed subdue excessive heart-action and arterial tension by veratrine half a milligram (gr. 1-134), given together every quarter, half, one or two hours, as indicated by the severity of the symptoms, till the desired effect is manifested. Here again we have an illustration of the singular fact that antagonistic remedies may be given together and each be appropriated by the tissues requiring its aid to restore physiologic equilibrium.

During convalescence respiratory gymnastics should be employed, to restore the expansion of the lung and prevent adhesions. A full, long breath or two, taken every two hours, is a useful measure. Iodine and mercury, the great absorbents, should be applied locally and taken internally. The official compound iodine ointment, with a scruple of mercury biniodide to the ounce, may be rubbed into the skin twice a day. Internally iodoform, hydriodic acid, the iodides of iron, mercury, calcium or arsenic, may be given as indicated, alone or combined, the object being to get the greatest possible effect while the exudate is still young and amenable to reason. I usually cover the skin over the affected region with belladonna plaster containing camphor, and have this worn for a month or more on dismissing the case. Bearing in mind the frequency of tuberculosis as a cause or sequence of this malady, I rarely allow a patient

to be beyond observation for a year after such an attack, and employ the measures usual for persons prone to that malady—diet, personal hygiene, occupation, climate, etc.

SEROUS PLEURISY.

While in the affection last treated a portion only of one pleura is affected, in the effusive form the whole of one sac participates in the inflammation. The malady is by that much the more grave. The pathological changes are similar, save that the exudation is more copious and serous, with a fibrinous layer of varying thickness on the surface of the affected membrane. The fluid contains varying amounts of fibrin, and may be but a few ounces, or several quarts, in bulk. It is clear or turbid, water-white, yellowish to brown. At first it settles in the most dependent parts, and if the whole sac is not filled, inflammatory adhesion takes place, confining the fluid there, so that it no longer changes its level with the changes in the patient's posture. This differentiates the malady from hydrothorax. In the fluid are found white and red blood-cells, fibrin, albumin, endothelial cells, sometimes cholesterin and uric acid crystals. Its composition is that of blood-serum, simple or concentrated.

If copious enough, the fluid causes compression of the lung, pushes the heart and mediastinum

towards the opposite side and the diaphragm, liver or stomach downwards.

The causes are similar to those of fibrinous pleurisy. Exposure to cold or wet and traumatisms are excitants. Many cases are due to tuberculosis, primary, or following the same infection in the lungs or elsewhere. Pleurisy also occurs with rheumatism, pneumonia, typhoid fever and pericarditis, or nephritis, cancer and cirrhosis of the liver.

SYMPTOMS.—In secondary pleurisy the attack may be masked by the primary disease. In primary attacks the onset is also often insidious, rarely sudden, with chills and high fever. The stitch in the side follows, becoming worse on exertion or drawing a long breath. Dyspnea follows, with voluntary restraint of breathing and coughing. The sputa are scanty, mucous, sometimes blood-streaked. The fever is of medium intensity, higher in evenings, the pulse rapid and small. In latent forms there may be a decline in health for weeks before the malady is recognized, with anorexia and emaciation, or headache and dyspeptic symptoms. Remissions may occur, with relapses, each leaving the level of the effusion higher, until the whole sac is full of serum, the lung pressed solid.

The stitch is not noted in the insidious form, and disappears when the effusion separates the in-

flamed surfaces. The breathing is restrained before effusion, shallow and somewhat hurried afterwards, intense if the effusion is profuse and rapidly thrown out. But fever has as much to do with the production of dyspnea as has the actual pressure on the lungs. Cyanosis, however, depends solely on the latter. The cough is dry unless bronchitis coexists. The fever is not high, is usually regular in range, and subsides by lysis. On the pleuritic side it is somewhat higher than on the other. The pulse corresponds with the fever; the volume and tension are lowered. Pressure on the heart and great vessels may occasion irregularity. The appetite is poor, the bowels confined. The urine is lessened, the specific gravity high until absorption begins, when diuresis occurs.

The physical signs are the same as in plastic pleurisy, except that in the serous form there is dullness corresponding with the effusion, the intercostal spaces bulge, the respiratory movements are absent. Tactile fremitus is lost early. The motion of the affected side on respiration is almost *nil,* while the other side shows the usual expansion. The dullness caused by the effusion is only noted posteriorly in slight effusions, and rises higher there than in front. If not confined by adhesions the fluid changes with change of posture. If it ascends to the lower border of the third rib, the note is tympanitic above it (Skoda's resonance).

In large exudations the cracked-pot sound may be found below the clavicle, and "Williams' tracheal tone" may be obtained. Auscultation reveals dry friction sounds in the first stage.

When effusion occurs this is lost, the vesicular murmur weakens and even disappears, while if the lung is wholly compressed the bronchial sounds may be lost; if not, there is broncho-vesicular breathing above the fluid. The vocal resonance may simulate the bleating of a goat (Laënnec's egophony).

During absorption the distention subsides, and respiratory movement returns. If the lung does not re-expand the intercostal and clavicular spaces sink, the ribs are drawn together, the spine curves laterally, the heart is drawn over, and this perhaps, with bronchiectasis and emphysema, fills up the vacuum. As the fluid recedes, if the lung expands the normal sounds gradually reappear, and displaced organs resume their proper locations. Friction sounds may remain for a long time. The lower part of the lung may remain compressed.

Tubercular pleurisy may be acute, subacute or chronic; primary, or secondary to tubercle in the lungs, peritoneum or elsewhere. The effusion is often sanguineous. Recovery is possible.

Diaphragmatic pleurisy occurs with acute symptoms, moderate effusion, pain along the tenth rib, increased by deep inspiration and by pressure

over the insertion of the diaphragm into the tenth rib, dyspnea, cough, and nausea or vomiting. The fever is unusually high, the anxiety extreme. If the effusion is purulent the lower intercostals bulge, with edema later.

Local pleurisy may occur with a moderate effusion, encysted by adhesions, in any part of the chest. The diagnosis may be assisted by aspirating.

Interlobar pleurisy may cause encapsuled collections between the lobes. It is more frequent in the right lung between the upper and middle lobes. The ailment may be denoted by the appearance of pus in the sputa, the previous symptoms having been indeterminate.

Hemorrhagic pleurisy occurs from tubercular infection, cancer, nephritis, hepatic cirrhosis, septic debility, old age and alcoholism, and perhaps without detectable cause.

DIAGNOSIS.—Pneumonia begins with a chill thoracic ache, rusty sputa (at first gray), intense fever, ending by crisis, marked prostration, flush on one cheek, herpes, pneumococcus in the sputa; signs of increased tactile fremitus, crepitus at first, imperfect dullness in second stage, bronchial breathing, bronchophony, and yields blood on aspiration.

Pleurisy shows a less marked onset, stitch-pain, cough dry and repressed from pain, no

pneumococci in sputa if any are raised, moderate fever, ending by lysis, some debility rather than prostration, face pale, no herpes, thorax distended on affected side, lessened tactile fremitus, dullness absolute over effusion, neighboring organs displaced, dullness may shift on change of posture, breath-sounds absent, vocal resonance less, egophony, friction sounds in first and third stages, aspiration yields serum.

Tubercular consolidation has a different history, more fever, rapid decline, the tubercle bacilli in the sputa.

Hydrothorax has the history and causes of dropsy, and the fluid shifts on change of posture; there is no fever, it is bilateral, no pain or friction-sounds. The specific gravity of the fluid is below 1015, that of pleurisy above 1017.

Tumors distend the thorax partially, not beginning at the most dependent part, the tactile fremitus and vocal resonance are higher, the history differs, there are no friction-sounds except from accompanying pleurisy. Hepatic tumors, cysts or abscesses cause dullness, beginning below but at a limited point, and at all stages there is usually resonance on one or both sides, where in pleurisy there would be dullness. A puncture settles doubtful cases.

Pericardial effusions cause urgent dyspnea, with feeble heart-sounds, the heart is not displaced, the

dullness is in front rather than behind, and the history of rheumatism may be had. The history may separate tuberculosis from other forms of pleurisy, the serum may be examined for the bacillus and guinea-pigs inoculated with it.

There is no definite course to a pleurisy. The inflammation may last one to three weeks. The effusion is usually absorbed fast or slowly, much as it was effused. Large effusions may persist or develop into empyema. The absence of bacteria indicates tuberculosis. The prognosis in simple serous cases is good. Death sometimes occurs from a sudden and copious effusion.

TREATMENT.—The management of this form of pleurisy is identical with that of the fibrinous form, during the first period. We have, however, to deal here with a bulky effusion, which compresses the lung and may permanently destroy its power of expansion. The question arises, how to deal with this effusion. In some instances the compression has been relieved in a few days and yet the lung failed to unfold. In such cases it is probable that there has been an exudation inflammation in the carnified lung-tissues, permanently gluing them together. On the other hand, such profuse exudations have existed for many weeks and still the lung resumed its functions.

Paracentesis thoracis is a simple and harmless operation when aseptically performed, and even

in the febrile period, when the effusion is so bulky as to compress the lung into an airless mass, it seems wise to remove a portion of the fluid. In double pleurisy, or when respiration is seriously embarrassed, or signs of commencing hyperemia appear on the unaffected side, or when syncope, orthopnea, cyanosis or murmurs in the displaced heart occur, enough fluid should be withdrawn to give relief. No attempt should be made to withdraw all the effusion, as this would bring inflamed pleura together and increase the pain and fever.

When the fever has subsided, the sooner the fluid is aspirated the better. No good object is obtained by its presence, and every day the lung remains compressed adds to the danger of permanent disability. When a goodly portion has been removed and the pressure relieved, absorption usually sets in. If the lung does not at once expand some danger would ensue by removal of its support. The fluid should therefore be allowed to drain away slowly and spontaneously, not solicited or forced. If dyspnea, incessant cough, sharp pain or a sense of oppression occur, the needle must be at once withdrawn.

The aspirator must be aseptic, the skin washed with soap, ether and bichloride solution 1 to 1000. Raise the arm so as to separate the ribs and insert the needle close to the upper border of the rib. The best places are the sixth interspace on the

right, the seventh on the left, under the middle of the axilla; or just below the outer angle of the scapula in the seventh right or eighth left spaces. If the pleura is very thick or a mass of lymph is struck the fluid may not be found at the first puncture. Larger needles are required as the fluid becomes thicker. From four to twenty-four ounces may be taken at one time, more during the febrile stages than later.

CHAPTER XVIII.

EMPYEMA.

Sometimes the pleuritic exudate contains pus; similar to ordinary pus unless pulmonary gangrene is present, when the fluid is exceedingly fetid. The inflammation is more intense than in common pleurisies, and the tissues are thickened, granular, perforated or eroded. The altered membranes consist of new connective tissue, blood-vessels and leucocytes. Empyema may follow ordinary pleurisy. In children it occurs early or from the first; it may be secondary to septic fevers, result from invasion of the pleura by cancer or tubercle, or follow penetrating wounds. The organisms most frequently met are micrococcus lanceolatus, streptococcus, staphylococcus and tubercle bacillus. Pneumococcus cases are milder. Leptothrix occurs in putrid effusions.

Symptoms.—There may be an acute onset, chills, fever, prostration, severe pain made worse by breathing or exercise. If gangrenous, the prostration soon becomes extreme and death occurs in a few weeks. Often the acute symptoms subside in a week and chronic symptoms arise. Dyspnea is apt to be more prominent than pain and cough; but the evidences of sepsis—irregular chills, fever

and sweating, rapid wasting, etc.—soon predominate. Peptonuria is a diagnostic evidence of value, though simply indicative of suppuration, not excluding tubercle, etc. The same may be said of indicanuria. Leucocytosis is always present.

The pus may discharge through the lung, causing pneumopyothorax; less often through the skin, esophagus, pericardium, stomach or peritoneum.

The signs are those of ordinary pleurisy. The chest-wall may become edematous, the pus pointing and discharging externally. The pus does not change level with posture as readily as a serous effusion. Baccelli's sign is the transmission of the whispered voice through a serous collection, not through pus. The cardiac pulsations are sometimes transmitted through empyema, rarely through a sero-fibrinous exudation. The necessary elements are a copious effusion, relaxed thoracic wall, and a strong heart-beat. It is usually on the left, front and side.

Empyema is diagnosed from ordinary pleurisy by the rapid decline and other evidences of sepsis, and by the aspirator. Pulsating empyema does not appear in the location of aortic aneurism, there is neither heave nor bruit, and the constitutional symptoms differ totally.

The prognosis depends first on the cause, second on the treatment, third on luck. Death may occur

from the discharge of pus in a fatal way, from exhaustion, or from intercurrent or complicating disease. Children recover better than adults. Recovery occurs only with gradual adhesion of the pleura, obliterating the cavity, and subsequent retraction.

TREATMENT.—In children it may be allowed three weeks for nature's cure. In adults a large empyema should be aspirated at once. Following pneumonia, it is best to make a free incision and drain. Open in the fifth or sixth intercostal space, outside the nipple, the incision being an inch long. Estlander's rib resection is not necessary if free drainage can be secured without it. If the pus is offensive the cavity should be irrigated antiseptically; otherwise insert iodoform gauze. Expansion of the lung is favored by systematic exercise. James' method is to have the patient force water from one bottle to another by means of tubes, the effort being gradually increased. It is best to use boric acid, permanganate or aromatic antiseptic solutions for irrigation, as bichloride, carbolic acid and peroxide are unsafe.

Every effort should be taken to keep up the strength, by rich feeding, etc. The arsenates of iron and quinine each one centigram (gr. 1-6), and of strychnine two milligrams (gr. 1-30), should be given every two to four hours, with calcium sulphide six centigrams (gr. 1) seven

times a day to restrain suppuration. Whether the latter would cure without operation I am not prepared to say, but it is the most effective antagonist of suppuration-germs yet produced.

CHAPTER XIX.

PNEUMOTHORAX.

If air be admitted to the pleura the lung collapses into a firm mass, attaches to the bronchus, the air fills the sac, obliterating the intercostal depressions, and giving a clear, tympanic percussion note over the entire side, with no respiratory sounds whatever. If the admitted air is sterile, it is rapidly absorbed; if it carries the germs of suppuration, pyopneumothorax develops.

The causes of pneumothorax are: Perforation from a tuberculous cavity; gangrene; bronchopneumonia; glandular suppuration; abscess; cysts; rupture of air-cells by strain; perforating empyema; cancer or esophageal abscess; bronchiectasis; cancer or ulcer of stomach or colon. Gases may be developed in the pleura by certain organisms. Wounds may penetrate the pleura.

The occurrence of pneumothorax is attended by sudden and intense dyspnea and pain, sometimes cyanosis, hurried breathing, the pulse weak and fast, cold sweat, and collapse, in which death may occur. The temperature falls below normal and then rapidly rises as pleurisy develops. It is usually hectic, as suppuration ensues edema of the hand on the affected side sometimes occurs, soon disappear-

ing. As fluid collects in the pleura, when the patient shakes the chest splashing is heard, the "Hippocratic succussion," or "metallic tinkling," from drops falling into the fluid. "Wintrich's sign" is a change in the pitch of the percussion sound as the mouth is open or closed. The "coin-test" is considered pathognomonic. A coin is held on the front of the chest and tapped with another coin, while the examiner's ear is applied to the back of the thorax, when he hears the intensified echo of the sound produced. The cracked-pot sound and Wintrich's sign are more frequent in a large pulmonary cavity than in pneumothorax. The former does not dislocate the organs and has no response to the coin test or succussion.

Gastric flatulence has been mistaken for pneumothorax. Subphrenic abscesses containing air occur, mostly on the right side, from gastric ulcer. Diaphragmatic hernia results from injury or congenitally, and is recognized by its cause, rumbling, and possible reduction. Emphysema is slow in development and has none of the specific signs mentioned.

The prognosis depends on the cause.

TREATMENT.—Combat shock and collapse with glonoin and atropine, one-fourth milligram (gr. 1-250) each, every fifteen minutes till reaction occurs; relieve pain by morphine, if necessary. Great dyspnea may indicate the wisdom of draw-

ing off the air with an aspirator, but if the malady is due to a wound that is capable of healing it is better to leave the lung collapsed till this has taken place. Murphy's experiments have shown that sterile gases are rapidly absorbed from the pleura. If suppuration occurs the treatment is that of empyema.

CHAPTER XX.

PNEUMONIA.

A specific fever caused by the invasion of the lung by the pneumococcus, or micrococcus lanceolatus. The disease affects one or more lobes, in one or both lungs, commencing at the apex of each lobe and extending toward the pleural surface, with variable rapidity. There are three stages.

Hyperemia—The tissue is dark-red, firm, heavy, but floats in water, the air-cells distended, and if any lobules are collapsed they can be inflated by the bronchus. Extravasation may occur near the pleura surface. The epithelium is swollen, capillaries engorged, air-cells and bronchioles filled with epithelium, red cells and some leucocytes.

Red Hepatization—The lung is solid, airless; liver-like, mahogany color, dry, mottled, swollen, too heavy to float, not inflatable, friable, the air-cells and bronchioles filled with fibrinous plugs that give the cut surface a granular appearance. The pleural surface is covered with fibrin. The fibrinous plugs contain red pus, and epithelial cells. The connective tissue is sometimes filled with leucocytes and fibrils, the vessels are pervious and pneumococci are to be found—sometimes streptococci and staphylococci.

Gray Hepatization—As the exudate becomes fatty the color pales, the tissue softens, the exudate liquefies, and numerous leucocytes invade the air-cells. Resolution sets in and the exudate is largely removed by the lymphatics. But the attack may not terminate so favorably. Suppuration may occur, pus cells infiltrating the tissues and air-cells, possibly ending in abscess from streptococcal conquest of the enfeebled tissues. The abscess may discharge or caseate. (See Pulmonary Abscess.) Gangrene is a rare ending. Induration sometimes ensues, the alveoli filled with new connective tissue.

The heart-muscle is pale, the blood highly coagulable; pericarditis, endocarditis, desquamative and interstitial nephritis, and rarely meningitis, may complicate.

The spleen is congested, the stomach and bowels catarrhal.

Etiology.—The pneumococcus of Frænkel is lance-shaped, occurs in pairs, is often found in the nose and mouth of healthy persons and especially in those who have had pneumonia. It may be demonstrated in the sputa by treating a cover-slip preparation with glacial acetic acid, washing off the acid, and adding anilin oil and gentian violet, poured off and renewed several times. Other organisms are found in the sputa, such as Friedlænder's and Eberth's bacilli, influenza bacilli,

streptococci, etc., and it is probable that they also cause the disease we term pneumonia, alone or with the pneumococcus.

Infection occurs by inhalation of the causal micro-organisms, the pneumococcus perhaps opening the way for the others. Predisposing causes are, 1, endemic influence, certain buildings becoming infected; 2, epidemic influence, possibly direct contagion; 3, season, the cold and wet of winter; 4, exposure to cold, lowering the vitality of the tissues to a point when the ever-present pneumococcus can successfully attack them; 5, age, the extremes of life being most liable; 6, sex, whose only influence is as to relative exposure, males being most frequently attacked; 7, bad hygiene, the crowded city slums showing the most and worst cases; 8, alcoholism; 9, typhoid, measles and other septic fevers are sometimes complicated with pneumonia; 10, it occurs as a terminal malady to finish off sufferers in the last stages of chronic nephritis, diabetes, cancer, heart-disease, etc.

Climate has some influence on pneumonia, it being somewhat more fatal in the south, where the vital resistance is less than in those who have been toughened by exposure to the northern winters. But in every part of our country, north and south, in the hot moist air of Florida and the thin dry atmosphere of the Rockies, the bleak barrens of Canada and the rich jungles of the Mexican coast,

TABLE OF DIFFERENTIAL DIAGNOSIS.

	PNEUMOCOCCUS PNEUMONIA.	TUBERCULOUS PNEUMONIA.	ACUTE PLEURISY.
Previous history.	Exposure to cold or infection; may have had pneumonia before.	Inherited tendency or prior tuberculoses. Exposure to infection.	Traumatism. Exposure to cold.
Onset.	Abrupt chill, followed by fever quickly rising high, convulsions in children.	Gradual, as if catching cold, repeated rigors.	Chilliness for days.
Febrile type.	Continuous; ends by crisis.	Remittent, moderating or ending by lysis.	Continuous, moderate, ceas ing by lysis.
Sweating.	None, until profuse at crisis.	Free, repeated whenever fever falls.	
Herpes.	Common.	None.	None.
Wasting.	Not marked.	Rapid and great.	
Pain.	Diffuse aching.	Stitch comes late.	Acute stitch localized.
Relation, pulse respiration.	Much disturbed.	Less modified.	
Cough.	Severe.	Severe.	Dry, painful, suppressed.
Sputa.	Gray and adhesive, then rusty; prune-juice later in bad cases.	Streaked or stained with blood, purulent, freer: when lung is breaking down contain branched elastic fibers.	None, or catarrhal.
Bacteriology.	Pneumonia diplococci.	Tubercle bacilli.	None.
Aspirator.	Thick blood.	Blood, later debris.	Serum.
Duration of fever.	A week, more or less.	Longer, indefinite.	Indefinite, may be none, or subside on effusion.
Prostration.	Little.	Marked.	Moderate.
Location.	Base of lung usually.	Apex usually.	Lower posterior part of one pleura.
Face.	Flushed cheek on affected side, congested.	Hectic towards evening.	Pale and anxious.
Extension.	Rapidly to next lobes.	In time to base and other apex.	May fill up pleura from below.
Percussion.	Lobe consolidation, subsiding after crisis; dullness not absolute.	Consolidation, part of lobe, followed by cavity.	Flatness, heart displaced; line of dullness changes with position.
Auscultation.	Crepitus, then bronchial breathing, after crisis rale redux (subcrepitant).	Fine crepitus, becoming coarser; variety of rales; cavity-gurgling.	Bronchial breathing, sound remote, no rales.*
Sequences.	Not tubercular.	Tuberculosis elsewhere.	Little or none.
Vocal resonance.	Bronchophony.		Oegophony.
Leucocytosis.	Pronounced.	Slight, until suppuration.	
Inspection.	Not as in pleurisy.	Not as in Pleurisy.	Thorax distended, no respiratory movement over effusion.
Palpation.	Tactile fremitus marked.		Little or no fremitus.

*Friction rub in first stage and late.

pneumonia prevails as one of the principal causes of death. The causal agencies are omnipresent. One attack predisposes to another, and this is easily comprehended when we find the pneumococcus a life-long guest in the mouth, ready at any time to attack its host again, when his vitality is low.

Pasteur found it impossible to inoculate the cock successfully with the pneumococcus, the bird's normal temperature being higher than man's. But when he was placed in a refrigerator till his temperature fell to 98, the pneumonic infection took effect. This throws light on the attacks following exposure to cold, especially when the vital resistance is paralyzed and the body heat reduced by alcohol.

The serum from the blood of convalescents contains an antitoxin which cuts short the disease in others, inducing crisis. The pneumococcus generates pneumotoxin, which causes fever, and acting on the body albumin generates an antipneumotoxin, which neutralizes the toxin in the blood as it is formed. It has not yet been isolated.

Symptoms.—Sometimes when one has "taken cold" from exposure there are several days of malaise, illness without demonstrable disease of the lung. The patient knows he has contracted a malady, but apparently it has not yet established itself at any one locality. In such cases it is probable that a slight pneumococcus invasion has

TABLE OF DIFFERENTIAL DIAGNOSIS.

PNEUMONIA.	TYPHOID FEVER.	TUBERCULAR MENINGITIS.	DELIRIUM TREMENS.
History of exposure.	Failing health and strength.	Tubercles elsewhere, or by heredity ear suppuration or trauma.	Alcoholism.
No prodromes.	Incoherent dreams, aching bones, disturbed digestion, sweating after meals.	Prodromes a week, headache, photophobia, fretful, grinding teeth.	Ceasing to eat, insomnia, nervous phenomena.
Onset abrupt; chill; spasm in children.	Onset gradual, no chill or spasm.	Onset less abrupt, vomiting, chills, spasms late.	Onset not abrupt, no chill or spasm.
Headache, frontal if any; aching in chest.	Headache general, dull, aching in bones laid on.	Headache violent, occipital, early; neck stiff, head retracted, exaggerated reflexes; hyperesthesia.	No headache mentioned, terrors.
Fever quickly rises high, reaches 104° first day, remains high till crisis.	Fever slowly rises, reaches 104° by fourth day, regular course.	Fever slowly rises to 102.5°, irregular, no crisis. In acute may go very high.	No fever.
Vomits if over-fed.	No vomiting.	Vomits independent of condition of stomach.	Vomits everything taken.
Delirium late if any; form depends on condition. May simulate delirium tremens in alcoholics.	Low muttering delirium, stupidity, coma vigil in late stages, rarely acute delirium at onset.	Irritability or drowsiness, intolerant of light or sound, encephalic cry, vertigo, wandering at night.*	Sees snakes, bugs, rats, goblins; sleepless, active delirium, tremors.
Respiration hurried, in excess as related to pulse-rise.	Respiration slow in ratio to pulse-rise.	Respiration unaffected; pulse variable.	Respiration unaffected, breath fetid.
Pupils unaffected.	Eyes injected, pupils sluggish, dilate before death.	Pupils contracted at first, on effusion dilated.†	Pupils unaffected.
Prominent cough, sputa and physical signs present.	Some cough, no physical signs.	No cough.	Pharyngeal cough.
Leucocytosis.	Hypoleucocytosis.	Leucocytosis.	No leucocytosis.
Pneumonia diplococci.	Typhoid bacilli; Widal's agglutination.	Choroid tubercles.	No bacteria.
Constipation or diarrhea.	Diarrhea and other abdominal symptoms.	Obstinate constipation.	Constipation.

*Acute delirium in non-tubercular; all end in coma.

† Ptosis or unequal pupils in some cases.

taken place at the apex of one lobe, the micro-organisms being so few in number that repeated hatchings of new broods are necessary before they can produce typical symptoms. Meanwhile the infection is spreading slowly up the lobe, and in due time the identity of the disease is established.

In other cases the attack opens abruptly with a chill, followed by fever up to 104° F., oppression of the chest, substernal soreness, rapid pulse, the skin hot and dry, the cheek on the affected side showing a curious red flush, headache, weakness, anorexia, third, very often delirium. Deep inspirations do not cause acute stitching pain until the disease has spread through the entire lobe to the pleura. Respirations are hurried and shallow, 30 or more per minute. Cough is irritative, dry, painful, the sputa at first scanty, gray and sticky, soon becoming rusty, and stained with bright blood when collateral hyperemia develops. Little children have a peculiar catch in the breathing, just before expiration, which is quite characteristic. There may be gastro-intestinal catarrh, at first or at any time later, with anorexia, nausea, vomiting or diarrhea. If marked, this is a dangerous element.

The patient lies on the affected side, mouth open, lips stained, eyes bright, speech restrained by the painful and rapid breathing. In alcoholics the delirium may simulate delirium tremens. An

eruption of herpes often appears about the nose or lips. The fever rises as night approaches, the daily range being about one degree. The pulse runs to 100, being slow in comparison to the fever.

The malady continues in this manner until the fifth, seventh or ninth day, when in favorable cases crisis occurs, with a sudden fall of temperature below normal, profuse sweating or diarrhea, great, sometimes fatal prostration, and relief from the dyspnea, cough and other distress. Convalescence goes on rapidly, but the evidences of consolidation may be detected for weeks after the crisis.

In other cases crisis does not occur, but purulent infiltration supervenes, the symptoms decline by lysis, convalescence is protracted, and the patient recovers with more or less damage to the lung; perhaps none, perhaps some fibrosis or atrophy.

Respiration—The patient breathes from 24 to 60, children 90 or more, times per minute. He pants, restrains the thoracic movement, and suffers dyspnea in proportion to the fever. When several lobes are affected the collateral fluxion in the remainder renders the oppression almost unbearable. Bronchial catarrh coexists to some extent. The rate of the respiration to the pulse is 1 to 1.5 or 2, instead of 1 to 4 as in health. The pain develops with pleural involvement, in several

hours or more, and lasts three days. It is made worse by coughing. The cough is dry, harsh and constant, repressed after pleurisy develops, but may be much less annoying in the aged, in alcoholics and when delirium is marked.

The sputa are at first gray and adhesive, becoming blood-stained or rusty in a few hours, and muco-purulent, abundant and thinner at the crisis. In aged and prostrate subjects it resembles prune-juice. If the collateral fluxion is marked it is frothy and bright bloody; if edema develops it becomes serous. Aged patients are apt to swallow it and have to be compelled to cough up "from the bottom of the lungs" to obtain enough for inspection. Red cells, pus cells, epithelium, fibrin casts and the pneumococcus, may be found by the microscope.

Fever—The temperature rapidly rises to 104° or more, fluctuates a degree daily, and drops rapidly to below normal at crisis. Children may have an initial convulsion instead of a chill. Aged and weakly persons may have lower fever. An attempt at crisis (pseudo-crisis) may precede the true crisis a day or more. Hyperpyrexia, 105° to 107°, may precede crisis, which is more apt to come by night. Febrile rises may occur during convalescence, from slight causes, such as an unpleasant visitor, too heavy a meal, etc. Failure of crisis to appear on

time may indicate a complication, or purulent infiltration.

Circulation—The pulse runs about 100 and if above 120 indicates danger, as threatened heart-failure. This is due to the fever, to the increased task of the heart in driving the blood through the lessened number of capillaries in the non-pneumonic lobes, themselves engorged by the collateral hyperemia, and to the decreased nutrition of the heart from the abstraction of fibrin from the blood and from the interference with nutrition. Pericarditis sometimes occurs, and this, or previously existent heart-disease, increases the danger. A small rapid pulse, with irregularity and dicrotism, betoken danger. If full and bounding the tension is low. Increased tension in the pulmonary vessels accentuates the pulmonary sound (second sound, heard in the left second intercostal space, an inch from the sternum). If the right ventricle weakens, dilatation results.

Leucocytosis is marked, continuing until the true crisis. Polynuclear forms of white cells prevail during fever, diminishing as the eosinophiles multiply. The red cells and hemoglobin decrease rapidly after the crisis. The blood-plates increase.

Nervous System—Headache occurs at the start and may persist. Convulsions may be present in children. Delirium is common. If the fever is high it is of maniacal type, while in septic states

it is low, muttering, with a tendency to coma. Drunkards exhibit typical *mania a potu,* getting out of bed to kill rats, roaches, etc. When fever rules very high the symptoms may simulate meningitis.

Skin—Herpes of the nose or lips is of some importance in diagnosis. Profuse sweats mark the crisis. The well-defined flush on the cheek of the affected side has been noted. Urticaria occurs sometimes.

Digestive System—The tongue is dry and brown in high fever and great debility, covered with a uniformly yellowish-white coating ordinarily. Marked vomiting or diarrhea may indicate infection of the alimentary canal, and such cases are apt to prove fatal. The spleen is enlarged, not the liver.

The Urine—The urine is scanty, red, of high specific gravity, urea and uric acid in excess, chlorids deficient. Some albumin is often to be found.

Physical Signs—First stage. Expansion lessened; costo-abdominal breathing in double pneumonia; tactile fremitus slightly increased; percussion normal or briefer, higher pitched or tympanitic; crepitant rales, vesicular sounds weak over affected lobe, exaggerated over healthy lobes.

Second stage. Little expansion over affected side, increased on unaffected; vocal fremitus in-

creased usually, friction sounds often; percussion dullness over affected lobes posteriorly, tympanitic anteriorly, Skoda's resonance above affected lobe; bronchial breathing, bronchophony, somethimes egophony, subcrepitant rales from bronchitis, friction from pleurisy.

Third stage. Expansion returning, fremitus les-

LOBAR PNEUMONIA.	BRONCHO-PNEUMONIA, OR CAPILLARY BRONCHITIS.
Diplococcus pneumoniæ.	Streptococci and many other organisms.
Primary.	Follows bronchitis, measles, pertussis.
Onset abrupt: in good health.	Gradual onset from cold.
High fever, continuous; crisis from fifth to ninth day.	Fever less, irregular, ends by lysis, no set duration.
Sputa gray, then rusty, sticky; later in bad cases, prune-juice.	Sputa gray, sticky, blood-stained.
Rapid breathing, moderate dyspnea and cyanosis.	Dyspnea and cyanosis marked, breathing shallow.
Signs of consolidation, catarrh secondary.	Catarrhal signs predominate.
Unilateral, usually lobar circumscribed.	Bilateral; not limited to lobes; diffuse.
Definite course, convalescence follows, crisis usually complete.	Indefinite, atelectasis may remain permanently.
Not apt to become tubercular.	Apt to become tubercular, may be so from start; bacilli and later elastic fibers then appear in the sputa.

sening, dullness slowly disappearing, crepitant rale redux, coarser than in the first stage as the exudate is softening; bronchial breathing, gradually replaced by vesicular sounds.

Complications.—Pleurisy, usually fibrinous, is always present when the pneumonia reaches the

pleura. If the pleuritic symptoms are prominent the malady is termed pleuro-pneumonia. Empyema may supervene. Acute bronchitis may coexist. Collateral fluxion may occasion edema, the dyspnea reaching its highest point and the patient dying if not promptly relieved. Pericarditis may result from extension in left pneumonias. It is

TYPHOID FEVER.	PNEUMONIA.	CEREBRO-SPINAL MENINGITIS.
Prodromes.	Exposure to cold and wet.	Slower onset.
Onset gradual.	Abrupt onset.	Exposure to cause.
Little pain.	Little pain.	Intense headache, backache.
Depression progressive.	Little depression.	Photophobia.
Typical fever course, yielding slowly.	Fever obstinate.	Fever.
Nervous symptoms of debility.	Nervous phenomena slight.	Debility, delirium.
Little catarrh.	Catarrhs secondary.	No catarrh.
Eruption like flea-bites.	Unilateral, physical signs.	Various eruptions.
Muscle aches.	No muscle pain or neuralgias.	Stiff neck, head retracted.
Typhoid bacilli.	Pneumonia Diplococci.	These may be simulated by influenza; diagnosis made only by finding bacillus cellularis in cephalo-rachidian fluid.

more frequent in children. Endocarditis is more frequent, especially the ulcerative form; it is betokened by septic fever, chills and sweating, with embolism and meningitis. It is due to infection of the endocardium by the pneumococcus. Heart-clot, venous thrombosis and arterial embolism, and

cerebral embolism occur rarely. Acute suppurative meningitis is rare but grave with intense headache, stiff neck, wild delirium, gradually subsiding in coma. Peripheral neuritis, parotitis, real rheumatism and pneumococcal arthritis have been noted. Croupous gastritis is rare, croupous colitis more common. Jaundice is frequent in severe forms. Peritonitis is rare, as in acute nephritis of a mild grade.

VARIETIES.—Typhoid pneumonia is a form characterized by the typhoid state, not true typhoid fever. There is profound prostration, low delirium, stupor or coma vigil, heart feeble, tongue brown, fever moderate, skin dusky or yellowish.

Epidemic pneumonia is often malignant. In "larval pneumonia" the general symptoms are mild, the signs obscure.

Latent pneumonias begin at the lobar apex and never reach the pleura. In emphysematous subjects the signs may be masked.

Migratory pneumonia extends to other lobes as each recovers, so that crisis is lost.

Bilious or malarial pneumonia has prolonged chills and paroxysmal fever, jaundice and vomiting.

In the aged the onset is insidious, gastro-intestinal symptoms marked, prostration profound, fever low and irregular, local symptoms inconspicuous. Dullness, shallow bronchial breathing

and subcrepitant or serous rales are to be detected. The cough may be wanting. The malady is very fatal.

The inhalation of ether in cold weather, especially in abdominal operations, is often followed by pneumonia.

Relapses are very rare.

The course runs from three days to as many weeks or more, the average duration, according to Osler, being ten days. Resolution may be postponed to the tenth week. It may leave the lung-tissues normal, or there may be cirrhosis, abscess or gangrene.

DIAGNOSIS.—The principal points in the diagnosis are the sudden onset, single initial chill with rapid development of high continued fever, rapid respiration with moderate pulse, facial herpes, sticky gray sputa soon becoming rusty, crepitation in first stage only, then dullness limited to one or more lobes, crisis followed by rale redux.

In acute phthisis the onset is gradual, with repeated chilliness, remittent or intermittent fever not ending in crisis, repeated night-sweats, no herpes, rapid loss of flesh, bloody purulent sputa containing elastic tissue and tubercle bacilli; it begins at the apex, a cavity follows consolidation, the other lung is invaded in time and tuberculosis follows elsewhere.

In typhoid fever there is no leucocytosis, the

typhoid bacillus is to be found, and Widal's test is available; a drop of blood, if from a typhoid case, added to a pure culture of the typhoid bacillus, stops the movements of the bacilli and induces their collection into clumps.

In children meningitis may be mistaken for pneumonia; or more likely, *vice versa*. Headache in pneumonia is frontal, in meningitis occipital, with stiff neck, restlessness, ugly temper, heightened reflexes and hyperesthesia, low variable fever, no crisis, pulse irregular.

PROGNOSIS.—Pneumonia is more dangerous to the aged, alcoholic, debilitated and cachectic. Hemorrhagic cases are dangerous. Bad symptoms are the absence of leucocytosis, prolonged high temperature, rapidity and weakness of the pulse, early active delirium, prune-juice expectoration, implication of more than one lobe, and the presence of complications. Death generally occurs from heart-failure, due to overwork and sedation by the pneumotoxin. Severe collateral fluxion is a condition of imminent danger.

TREATMENT.—The treatment of pneumonia has been the battle-ground of centuries. Two diametrically opposite ideas as to the nature of the danger have led to the antagonistic principles of treatment by sedation and by stimulation. The ancient classical method consisted in a prompt venesection, followed by leeches, cups, cathartics, arterial seda-

tives, and calomel as an aplastic agent, with blisters and iodine to promote absorption following crisis. The modern expression of this theory is found in the administration of veratrum viride and aconitine, acetanilid, and local applications of cold.

The reaction against the antiphlogistic practice led to the stimulant treatment, which has been urged with matchless force by Juergenson. Basing his arguement on the mechanical difficulties of the circulation, he shows that every important element increases the work of the heart or subtracts from its power; and deduces a treatment by antipyretic doses of quinine, red wine, raw beef and cold baths. Petrescu gives digitalis by hundreds of grains, Wood relies on strychnine and cocaine, others on quinine, Bourbon whisky and other supposed stimulants. And as both parties support their theories by long lists of cases treated, with a notable scarcity of deaths, others drop all attempts at dominant therapeutics, concluding that such good results from discordant methods argue the comparative harmlessness of the disease, since, whichever is right, the patients of the others must recover in spite of the treatment.

But pneumonia is not a notably innocuous malady. Anders gives the mortality in hospitals as 25 per cent, in private practice 15, and quotes Wells' collection of 223,730 cases with a mortality

of 18.1 per cent. Furthermore, it is to be observed that the results of expectant or nihilistic treatment are not as good as those secured by the use of either stimulants or sedatives.

Nevertheless, these contradictions are only apparent, and can be reconciled by considering a few points in the pathology. It may be admitted that, the quantity of blood in the body remaining the same, an excess in one part necessitates a deficiency in another. If the pulmonary capillaries are abnormally engorged, other capillaries are abnormally empty; or, in other words, if there is paresis of the pulmonary vasomotors, there is spasm of some other section of the vasomotors. Therefore, while one party relaxed the spasmodic contraction in one place and permitted the blood to flow back out of the hyperemic area, the others restored the tonicity of the paretic pulmonary capillaries and forced out the excess of blood. Each did good, though acting on different parts of the body, for each employed methods tending to restore that state of circulatory equilibrium we term health.

But if two antagonistic pathologic conditions can exist in the human body at the same time, may we not act on both at once? If vasomotor toners and vasomotor relaxants are administered together, will there be an exact balancing of the effects and no results follow? Or will each remedial agent be taken up by the tissue requiring its

aid for the restoration of the physiologic balance, as the blood brings it to the affected part? Whether the site of the action be actually the affected tissues or the centers of the nervous system controlling them, is not material to the question—it is but restating the problem in other terms.

The solution rests in experiment, not in argument; and the following formula results: Aconitine amorphous half a milligram (gr. 1-134); veratrine the same dose, and digitalin one milligram (gr. 1-67), given together every quarter, half, one or two hours, according to the predominance of the acute sthenic symptoms; substituting strychnine arsenate half a milligram (gr. 1-134) for the veratrine as asthenic conditions are manifested. Aconitine relaxes vasomotor spasm; so does veratrine, and loosens the excretory apparatus; digitalin restores vasomotor tonicity, supports and steadies the heart and checks the dangerous tendency to hemorrhage; stychnine still more powerfully does this, and energizes all the vital functions, while arsenic improves the nutrition of the heart.

This method of treatment has been put to the test of clinical trial by thousands of physicians, not those leaders whose mastery of the art would carry their patients through with almost any method, but the rank and file of the profession, in city and country alike. The results have been so

satisfactory that I feel fully warranted in claiming that the average mortality in their hands is much less than that reported by Wells. The system has the requisite flexibility, as it is suited to sthenic and asthenic forms alike, and can be changed from one to the other in a moment.

The dose is to be repeated frequently until the effect is manifest, the pulse and fever down, the skin moist, the patient comfortable. The number of abortive cases met after the adoption of this method is remarkable—cases the physician diagnoses as pneumonia, but in a day or two the symptoms subside, so that he is at a loss to know just what has been the malady he has treated.

While this is the dominant treatment of pneumonia, there are important adjuncts. Chief among these are the intestinal antiseptics. In all fevers there is a suspension of the secretion of bile, gastric, pancreatic and intestinal fluids, the natural antiseptics of the alimentary canal. Add to this the increased heat, and we have in the bowels an ideal place for the unrestricted activity of micro-organisms, their multiplication and the production of toxins; while the rapid loss of fluids from the skin favors reabsorption from the bowel. Consequently we have in every fever autotoxemia as a necessary element, and a certain proportion of the symptoms of the attack may be credited to that element. Numerous observations have led me

to the belief that from twenty to fifty per cent of the symptoms in gross are due to this autotoxemia, and are to be obviated by clearing out the alimentary canal and rendering it aseptic. For this purpose I administer a few doses of calomel, gr. 1-6 every hour for six doses, with saline laxatives enough to empty the bowels completely and keep them open thereafter. Then I administer zinc sulphocarbolate two to four decigrams (gr. iij-vj), every two to four hours until the stools are odorless, then just enough to keep them so. There will be no gastro-intestinal complications.

As collateral fluxion is one of the most serious conditions, it is well to accept the fact that a reduction of the bulk of the blood gives instant relief. Imminent danger of suffocation demands venesection, prompt and free enough to give relief. Even if the loss of blood were to be felt severely in the later stages, the urgency of the present overweighs that consideration. But we have been too much under the influence of the reaction against blood-letting, and have ignored the ease with which such a loss is recouped by the body. Cases are exceptional in which the withdrawal of a quart of blood is seriously felt thereafter. The emergency may, however, be in some measure prevented by reducing the bulk of the food, and thus the bulk of the blood. Let the food be highly concentrated and nutritious, easily digestible or

predigested, with the smallest quantity of water. Thirst may be relieved by chewing gum, or by small pellets of ice, repeated not oftener than every half-hour. If left to himself the patient will want it every half-minute. Raw white of egg, scraped beef or grated oysters, and the beef concentrations, with small portions of junket and fresh fruit-juices, constitute the best diet.

As a rule I prefer hot applications to the chest rather than cold. The hot mush-jacket, paste of mustard and hot molasses, hot larded flannels, "slap-jacks," etc., may sound crude to modern ears, but their efficacy is believed in by many excellent practitioners, and they are invariably declared to be a comfort by the patients. When hyperpyrexia is present I have been compelled to apply cold cloths, because there was no time for the action of antipyretics. I then use Anderson's method: Wring a towel out of ice-water, apply it to the chest, or better to the abdomen, and cover with dry flannels. In one minute whip off the towel and replace it with a fresh one. Repeat this for half an hour, making thirty changes, then cover with warm flannels and leave an hour and a half, when, if the temperature is above 105°, repeat. I have kept up these half-hour applications of cold every two hours for five days, before the fever subsided enough to allow their discontinuance. The application is designed as a means of

reducing the general fever rather than as a local remedy. It is far easier than the usual cold bath and fully as effective.

As the failure of leucocytosis coincides with the worst prognosis, it is an interesting question if we should not induce leucocytosis by administering nuclein solution. The dose is a gram and one-third each twenty-four hours (m. xx).

This constitutes the treatment of pneumonia *per se*,—the "dominant" treatment. Certain symptoms and conditions demand the application of variant remedies.

The temperature of the sick room should be kept at 65, higher with children, and the patient must keep his bed as long as fever lasts. Care must be taken to avoid any emotion or exertion capable of throwing a strain on the heart. One of my patients got out of bed, walked upstairs, and fell dead at the top step. "Heart-failure!"

Like many doctors, I began to treat pneumonia with whisky, gradually using less, and now for many years I have used none. It is a delusion, and does nothing but harm. When treating a man accustomed to its daily use, I do not entirely cut off the supply, for obvious reasons.

The heart will not fail if the fever is kept down, the blood deprived of superfluous water, the alimentary canal asepticized, and the nutrition kept up. But the matter is so vital as to justify the

routine administration of digitalin as advised, with strychnin when indicated, to prevent cardiac debility. The method of small and frequent dosage has only to be tried to convince one of its great superiority to Wood's method of giving strychnine in a full dose, three milligrams (gr. 1-20) every four hours; with over-stimulus as a result followed by depression, which is by no means obviated by alternating doses of cocain. By the dosage recommended a minimum dose is repeated at short intervals until the experienced finger on the pulse shows that the point of "dose enough" has been reached, and then enough is given to exactly keep up that effect.

Of the remedies for collapse the best is the intravenous or subcutaneous injection of normal salt solution, one to three pints, repeated if necessary.

Respiratory failure may be met by adding atropine sulphate to the regular medicine, until the pupil begins to dilate, the skin to flush or the mouth to become dry. The inhalation of oxygen is indicated by cyanosis, continued and repeated simply as needed, without regard to the quantity used. As cyanosis is usually due to collateral fluxion, in young adults venesection is the remedy. But in the aged and very feeble it is apt to be due to the retention of secretions, the patient "drowning in his own sputa" literally, and it then calls

for sanguinarine nitrate, three milligrams (gr. 1-20) every hour till relieved, with coffee and strychnine in full doses.

Nothing relieves the pleuritic pain so completely as a leech or cup, applied over the painful spot. A blister is a poor substitute.

If cerebral symptoms are marked, elimination by the kidneys should be carefully maintained, with gelsemine, one milligram (gr. 1-67) added to each dose of the regular medicine, and ice to the head if required.

Cough may require codeine and emetine, one to five milligrams (gr. 1-67 to 1-12) each as needed, but is best relieved by inhalations of steam to soothe the inflamed tissues. Counter-irritants over the course of the pneumogastric nerve in the neck are also of great value. After the crisis, expectoration may be facilitated by emetin, ammonium iodide or scillitine, in small doses, with mildly stimulant liniments or hot salt rubs to the chest.

CHAPTER XXI.

INFLUENZA.

Although this ranks as an epidemic, communicable fever, its attacks are so frequently directed against the lungs that its consideration is necessary in this work. Since the epidemic of 1889-90 it has been endemic in America, and no year since has been free from its prevalence in some parts of the United States.

The lesions found on autopsy are those of the accompanying maladies, with respiratory, gastro-intestinal or genito-urinary catarrhs.

Etiology.—The cause of influenza is the bacillus discovered by Pfeiffer. Stained with carbol-fuchsin it is of a dumb-bell shape. It is found in the sputa, blood and tissues, and can be cultivated in agar but not in gelatin. The cultures become larger if inoculated with staphylococcus aureus. It is communicated by contagion, is carried by the air or on clothes, and evidence is not wanting to show that it is carried from city to city by persons. Outbreaks have followed the receipt of letters written by members of a family where the disease prevailed. The bacilli enter the body by the respiratory mucosa, probably by the conjunctiva, possibly by the alimentary tract.

As predisposing causes we may name age (the malady being most common between 20 and 30, and in old age), debility, chronic diseases, alcoholism, and exposure to the causes of catching cold. One attack leaves an increased liability to subsequent seizures, with no known limit. Anders believes that malaria subsides during epidemics of influenza, while pneumonia and possibly typhoid fever increase. Observations at our laboratory show that the influenza bacillus is often found in the sputa with numerous other micro-organisms.

Symptoms.—The incubation is short, lasting from a few hours to three days. The onset is often sudden and violent, with chills, fever rushing up to 105° or higher, intense pain in the head, back or anywhere else, aching muscles and great prostration. Delirium, insomnia, vomiting, violent cough, or almost any group of symptoms of any local disease, may be present. The fever may be absent, slight or hyperpyretic. Vertigo, apoplexy, eye-pain, epistaxis, shoulder-pain, lumbago, hyperesthesia of the skin or mucosa, dyspnea, cyanosis, sweating and numerous other manifestations have been noted. The pulse is ataxic, rapid, weak, with the fever falling profoundly under moderate doses of antipyretics.

In the respiratory type we have the symptoms of acute catarrh of the nose, eyes, throat, larynx, bronchi and air-vesicles, on any of which locations

the intensity may center. The cough is distressing, with much dyspnea. Pneumonia, lobar or catarrhal, frequently coexists.

Gastro-intestinal, cardiac, typhoid, rheumatoid, neuralgic, and other mixed types, have been described. The malady sometimes but not always seizes on the weak or diseased portions of the victim's anatomy. As the fever declines the prostration becomes more apparent. Pulmonary edema may occur in any form of the malady, usually traceable to exposure. Anders thinks it dependent on the profound prostration of the nervous system, which also annuls largely the phagocytic action of the leucocytes. Lobar pneumonia may occur at any stage, especially during convalescence, with the usual symptoms, rapidly progressing. The bronchial and other glands may become swollen and inflamed. I have seen great numbers of the superficial glands inflamed, with an erythematous eruption, the blood presenting Pfeiffer's bacilli.

Pleurisy, pulmonary gangrene or abscess, cardiac disease, pericarditis, neuroses, gastro-enteritis, meningitis, neuritis and genito-urinary maladies, acompany influenza occasionally. A liability to tuberculosis, and other maladies that stand ready to attack men in moments of weakness, remain after the subsidence of influenza.

The diagnosis is made by the prevalence of the disease, the sudden and violent attack, the intens-

ity of the suffering, the ataxic condition and the profound depresion of the mental and physical forces. Confirmation is secured by finding the bacillus of Pfeiffer in acute conditions, but after the attack is over this micro-organism may be found in the sputa for an undetermined period, possibly for years.

The prognosis depends largely on the previous condition of the patient and on the complications. Few die of influenza alone, but the death-rate is vastly increased by it, the epidemic carrying off many sufferers from chronic maladies of the lungs, heart, kidneys, bowels, diabetics, the aged, etc.; while the number of deaths from pneumonia, typhoid and the eruptive fevers, and the ordinary list of prevalent affections, is largely increased. But as the weakly are thus weeded out, the years following an influenzal epidemic are apt to show a phenomenally small death-rate—unless influenza remains as an endemic.

The attack lasts from two days to many weeks.

Treatment.—Influenza may be avoided in the case of delicate persons by sending them to out-of-the-way, isolated places, where there is little or no communication with infected localities. Those who remain during epidemics should take pains to keep up the health and strength, avoid catching colds and places where infected persons congregate, churches, theaters, street-cars, department

stores, etc. Wearing a respirator impregnated with antiseptics would be of value if one cared to take the trouble, but a better expedient is to wash out the eyes, nostrils, mouth and throat with mild aromatic antiseptics, and spray with a mixture of europhen in fluid petrolatum, one part to twelve. This leaves a bland protective over the most exposed and vulnerable surfaces, and as it can be

INFLUENZA.	ORDINARY CATARRH.
Exposure to contagion.	Exposure to cold and wet.
Violent onset.	Onset mild with rigors.
Excessive pain.	Little pain.
Great depression.	Some depression.
High fever, dropping suddenly before antipyretics.	Little fever.
Nervous phenomena prominent and violent.	Nervous phenomena inconsiderable.
Rapid extension of catarrhs.	Slow extension.
No eruption.	
Muscle pains acute.	
Neuralgias acute.	
Protean and irregular.	
Influenza bacilli.	

applied harmlessly, may be used several times a day. The use of alcohol only renders the user more liable to the attack of influenza, as it relaxes vascular tension and paralyzes the resistant forces.

The student of epidemiology will note that the treatment of influenza shows the following characteristic history: At the beginning of each epidemic the treatment proves useless. Near the

close some remedy appears to be efficacious and acquires a reputation. When the next epidemic recurs the remedy apparently successful in the last one proves useless, but towards the close some other becomes popular, only to be found worthless in turn. Since we know that all epidemic diseases exhibit the greatest virulence in the early part of the visitation, and become progressively milder towards its close, the explanation of these observations is easy. Camphor, quinine, ammonia and the coal-tars have thus won and lost reputations. So far we may say confidently that no remedy has as yet been shown to exert any direct or specific control over the course and termination of influenza.

Nevertheless it seems probable that the true remedy may be found in time, and it is one's duty to take up and put to the test any theory that contains a possibility of truth. If influenza paralyzes the phagocytes, give nuclein, hypodermically, in rising doses till it shows its value or uselessness. If the sulphides really combat all living infectious micro-organisms in the body, give calcium sulphide, a grain seven times a day till the breath exhales the drug's odor, and note the effect. If, as Sir Benjamin Ward Richardson asserted, the true remedy must be one that antagonizes the profound paralysis of tension, we must look for it among the vasomotor tensors of the strychnine group. It

has been assumed that the virtues of these are represented by strychnine alone, but this is unproved and improbable. Brucine, thebaine, laudanine, and the other tetanisant alkaloids, may and probably have variations in their effects, that will yet be utilized in the treatment of disease. I have obtained excellent results from thebain in a case of paraplegia, where strychnin could not be borne

INFLUENZA.	HAY FEVER.	RHINITIS.
Occurs during epidemic.	Recurs at same season.	Occurs at any time.
Duration indefinite.	Persists till frost.	Can be aborted or run regular course.
	Produced by smelling causal flower.	Not affected by any plant.
Onset sudden.	Sudden onset.	Onset less abrupt.
No diathesis.	Neurotic diathesis.	Catarrhal habit.
Great prostration.		
Intense suffering. Muscular pains.		
Protean manifestations.		
Influenza bacilli.		

in any dose capable of beneficial action.

Whichever is employed it should be given in small and frequent doses until the normal tonicity is obtained, and then often enough to sustain this effect. Brucin, half to one milligram (gr. 1-134 to 1-67) every half-hour, would be my present choice, the doses increased if the debility indicated it. Gigantic doses may be needed—a centigram (gr. 1-6) every two hours.

The mildest cases require this tonic medication, and it should not be neglected during convalescence, as relapses and sequels are common and dangerous.

Pain may be relieved by heat or cold, by small and frequent doses of acetanilid or camphor monobromid, a decigram (gr. 1½) each, and half this dose of caffein, every half to two hours. Chloroform liniment, camphor chloral and belladonna plaster, are useful locally. Cannabis Indica in doses of a centigram (gr. 1-6) of a good extract, sometimes gives great relief, especially when there are gastro-intestinal pains.

Fever is best relieved by the combination of aconitine, digitaline and strychnine arsenate, frequently advised in this work. If the coal-tars are employed they should only be given in small doses, with zinc or caffeine valerianate, which are invaluable in all ataxic febrile states.

For the cough I prefer inhalations of europhen with petrolatum spray, and rarely small doses of codeine, half a centigram (gr. 1-12), but for the irritative laryngeal cough of convalescence the best remedy is yerba santa, given *ad libitum*, for effect. Counter-irritation over the right pneumogastric nerve in the neck usually moderates the cough.

Complications and sequels require their own treatment, the tendency to debility and collapse being ever borne in mind.

The diet from the first should be highly digestible and nutritious, given in small doses at frequent intervals, with digestants. It is best to give food every four hours, with an intervening glass of liquid nutriment. Eggs, underdone beef, fish, oysters, chicken, turkey, lamb, venison, quail, squab, squirrel or rabbit broiled, roasted or stewed; stewed terrapin or turtle, with rice and similar farinacea, are well suited for the four-hour meals; while at the two-hour intervals may be given a bowl of clam or other broth, cold consomme, junket, custard, freshly pressed fruit-juices, raw egg, coffee, tea, chocolate or cocoa (made with milk instead of water), are advisable. A dose of one of the papaw derivatives, or of acid and pepsin, or diastase, is usually required at each feeding.

The patient must be kept in bed as long as he has fever or pain, and in his room as long as the heart is markedly weak. The room must, however, be thoroughly and constantly ventilated. Hot salt baths, vinegar sponging if there is profuse sweating, massage of sore muscles and joints with hot oil, and the other means of keeping up the strength, are required.

I have not been able to satisfy myself that quinine is of any use in influenza. I have never known alcohol do aught but harm. It is formally contradicted by the relaxed vascular tension.

CHAPTER XXII

ACUTE PHTHISIS.

Etiology.—In 1881 Robert Koch discovered the true cause of the disease, the tubercle bacillus. This discovery was foretold by Niemeyer, who described clearly the symptoms and lesions of phthisis before and after the advent of the bacillar invasion. His views have been verified by the observations made in my twenty-five years' clinical studies; and though at present not held by the leading teachers, I expect to see them confirmed before many years, and to see the profession swing back to the level of his teachings. At present the bacillus has carried the pendulum too far to one side.

I have indulged in a little prediction myself; and, as I claimed over ten years ago, it has been found that the tubercle bacillus does not monopolize the destruction of the human lung. In examining sputa at the laboratory we find tubercle bacilli, pneumococci, influenza bacilli, strepto-, staphylo-, and gonococci, and sometimes typhoid bacilli, variously combined. Until we are able to differentiate the effects of these organisms we must treat of phthisis as a simply tubercular or as a mixed infection.

Phthisis prevails in every inhabited country of the globe, from the poles to the equator. It is most prevalent when the population is crowded, poor and dirty; less frequent as we approach the poles or ascend above the sea-level, for the simple reason that population there becomes sparser. Statistics showing a less prevalence of this malady at 5,000 feet above the sea-level, and almost a total absence of it at 10,000 feet elevation, must be read with the knowledge that the vast bulk of the world's inhabitants live less than 5,000 feet above sea-level, and very few above 10,000 feet. If among the few scattered thousands, out of a billion and a half, there are still some tuberculous individuals, it speaks strongly for the universality of this dreaded microbe. There are reasons, however, for some degree of immunity in mountaineers. The thin air causes unusual development of the lungs, as their swelling chests testify; the pure air is free from bacteria, and the sparse population renders successive infections unlikely. The outdoor life, the rude exercise, the absence of city dissipations, conduce to health in those not killed off by the privations.

Pathology.—The entrance of the tubercle bacillus into lung-tissue is followed by proliferation of the connective tissue and epithelium, formation of giant cells and influx of leucocytes, both possibly for phagocytic defense. A netting of connective

tissue surrounds the tubercle and shuts it off more or less effectually from the surrounding tissues. The tubercle undergoes either caseation or sclerosis. In the former case the cells become yellowish, amorphous, growing at the margins till they unite in masses. These either soften and break down into cavities, or are encapsulated, the cheesy contents becoming chalky, the tubercular process extinct.

In sclerosis the hyaline transformation of the mass occurs with the formation of fibrous tissue, the process extending into the surrounding pulmonary structures. Contraction follows as in other cirrhotic affections. Caseation and sclerosis often coexist. Calcification and sclerosis are evidences of cure, of the body's success in the battle with the invading bacilli. If the invaders are few and the body well-supplied with the phagocytic leucocytes, producing the defensive proteids in abundance, the victory goes to the defense. The processes may be confined to one or a few points, or may involve a lobe, a lung, or both lungs.

Surrounding the tubercle is a zone of inflammation caused by it, in which fibrosis occurs. Into this the bacilli may penetrate, extending the disease process, or it may become circumscribed, checked or even extinguished. Sometimes the first focus is thus cut off, and in it the bacilli remain, quiet but alive, until at some time, perhaps after

years, circumstances allow their egress into the lung or other parts of the body and the fight is resumed. Various bacteria unite in the struggle, causing destruction of lung-tissue, fever, hectic, sepsis, etc.

Koch's bacillus is a curved rod, in length one-third to one-half the diameter of a red blood-corpuscle, the ends rounded, non-motile, with spots representing vacuoles. Stained bacilli have a beady appearance. They are best grown in blood-serum, at a temperature between 98° and 100°. Heat the serum till coagulated; on cooling rub on it the cut surface of a bit of tuberculosis tissue, leaving it on the surface. In two weeks appear colonies of dry grayish scales. If with these guinea-pigs are inoculated tubercles appear in about three weeks. From cultures an albuminoid substance has been extracted, which causes fever when injected into the body. It is a nuclear proteid, not a toxin. A ptomain and extract have also been separated. Part of the symptoms are due to the production of these toxins. Outside of the body the bacilli live an unknown period, withstanding extreme cold, water or dryness, but killed by a few minutes' boiling or by exposure to the sun's rays. They are believed to be incapable of reproduction except in an animal body.

The liability to tuberculosis is great in those who change from an open air to house-habitation.

The Indians who leave their tepees for houses die off rapidly of tuberculosis.

VARIETIES.—Acute phthisis may be either tubercular or non-tubercular. Of the latter form the following case may serve as an example: The superintendent of a cemetery, a young man of slender build but healthy in person and habits. The body of a woman dead of "consumption" had been placed in a vault. When the vault was opened it was found that the body, which had been enormously swollen at death, had burst and the fluids had covered the floor of the vault. The stench was so great that the employees, men accustomed to such work, refused to enter the vault. Carbolic acid in large quantities was thrown in, and the superintendent to set an example entered first, and remained for some time until the cleaning was done. He was seized with shivering, followed by high fever, violent cough, the sputa remaining liquid after 48 hours from the time they were ejected. The temperature was 105° and over, night-sweats came on, with rapid failure of strength, and emaciation, but a remarkable absence of the comitant symptoms, as the man scarcely kept his bed. The sputa was thin, copious, serous, and pronounced by the bacteriologist to consist of a pure-culture of "bacterium termo," there being no tubercle bacilli. For several days

the patient exhaled the odor of carbolic acid and the urine became dark.

He improved somewhat and was sent to San Antonio, Texas, where he resided for some years, recovering entirely, according to his own report ten years later.

In 1869 a man was brought into the clinic at Charity Hospital, Cleveland, with the diagnosis of acute phthisis. This was questioned by that fine diagnostician, Prof. Scott, on the ground of insufficient evidence. The only symptoms were fever of 104°, rapid respiration, slight cough, and a sensation of oppression in the chest, with just enough gastro-intestinal irritation to arouse the suspicion of typhoid fever. The patient died in four days, and at the autopsy his lungs were literally stuffed with miliary tubercles, in phenomenal numbers, there being not a spot where a pencil-point could be put that was free. Prof. Scott dwelt on the fact that there had been no dullness on percussion.

Four robust, healthy Irishmen, engaged in the particularly healthful occupation of peddling coal about the streets of the city, slept in a room so small that their two beds and a wash-stand filled all but just enough room to open the door, so that they had to climb into bed over the footboard. One contracted tuberculosis, and lived about three months. The second to be attacked

was likewise affected, and died in six weeks. The third was seized while these two were still occupying the room, and he died in four days. The autopsy showed a condition of the lungs closely similar to that of Dr. Scott's patient as detailed above. Here we have all the conditions necessary for the most virulent infection, these illiterate men being confined in a very small room, with no ventilation, spitting on the walls and bedding until the air was fairly saturated with the bacilli.

Several cases of acute tubercular phthisis came under my observation in a paper-box factory. Many girls worked closely crowded in one room, the windows usually closed because the drafts interfered with the gas-jets employed to keep the glue-pots warm. Some among these girls were always consumptive, and the contagion was thus transmitted in concentrated form. The course was from six to twelve weeks.

Symptoms.—The onset is sometimes marked by a chill resembling that of pneumonia, or by a period of depressed health, with dyspnea, bronchial hemorrhage, hard dry cough, fever running very high, rapid wasting, hurried breathing, anorexia, constipation, night-sweats, and inability to breathe comfortably while lying down. The face has a curious smoky look sometimes, or there may be cyanosis. As the malady advances there are symptoms of general broncho-pneumonia, crepitus,

slight dullness or increased resonance, the patient complaining of a stuffy sensation in the chest. The pulse is rapid and weak. The fever in very acute cases is apt to exceed 105° F. Epistaxis sometimes occurs. Debility and wasting progress rapidly. Delirium and other nervous phenomena depend on the fever present.

The diagnosis is often difficult, but the hurry of respiration, rapid development of the fever and its height, cyanosis and other evidences of pulmonary involvement, without physical signs of pneumonia or the abdominal symptoms of typhoid fever, usually indicate the malady, which is confirmed by the presence of numerous tubercle bacilli in the sputa. Examination of the blood shows leucocytosis only if suppuration is going on. Tubercles may be detected in the choroid.

In less acute cases the examination of the sputa for bacilli may be the only means of surely diagnosing the tubercular affection from various pulmonary inflammations. A whole single lobe may be involved in the tubercular affection, the course simulating that of pneumonia with missed crisis. Bronchial hemorrhages more frequently are followed by subacute than by hyperacute attacks. The sputa is usually thin and serous, and if ejected upon a handkerchief remains liquid instead of drying up. If bronchial hemorrhage occurs the sputa thereafter contains blood or its debris, with

the mucus and pus supplied by the consequent inflammation. The physical signs are those due to consolidation of the lung-tissues, and the presence of secretion, varying with its quantity, consistency and location. Death usually occurs before there has been time for consolidation or cavity formation. As usual in tuberculosis, the patient is hopeful to the last. If the case is prolonged till a cavity has formed the sputa contain elastic fibers from the disintegrating lung-tissues. Hemoptysis may occur towards the last from erosion of an artery, and may be fatal.

PROGNOSIS.—The prognosis is bad if the lung is universally affected, the sputa swarming with tubercle bacilli or streptococci, the course rapid, the fever persistently high, and if hemorrhage from erosion occurs. Niemeyer did not consider non-tubercular "galloping consumption" necessarily fatal, and McCall Anderson reported cures. My two cases of non-tubercular broncho-pulmonary mycosis recovered.

TREATMENT.—It is of the utmost importance to subdue the inflammation before it has disorganized the pulmonary parenchyma. For this purpose an effective method is the application of ice-cloths to the abdomen, changing every minute for half an hour, and repeating every two hours while the fever is above 103°. Internally the most satisfactory antithermic is a combination of guaiacol

and piperazin, two to three decigrams (gr. iij to v) each every four hours. Half a gram (gr. vijss) of guaiacol rubbed into the skin over the lung has also shown an efficacy that is remarkable, as this agent is not antipyretic when given internally alone, except as an intestinal antiseptic. For slighter fever the oft-recommended combination of aconitine, digitaline and strychnine arsenate is most useful. The bowels must be kept free by the use of mild, non-depressant saline laxatives, and aseptic by calcium sulphocarbolate, two to four grams daily (gr. xxx to lx). Decided comfort sometimes follows the application of a mush-jacket to the chest. Night-sweats are restrained by atropine or agaricine until the antipyretic measures have had time to act. The diet should be highly nourishing, easily digestible, and free use made of the artificial digestants, Caroid, diastase and acid-pepsin. Milk, eggs, oysters, beef, game, terrapin or turtle, fruit-juices, and the concentrated albuminoids popularized in recent years, are the best foods; though it must not be forgotten that persons differ as to their digestive capacity and tastes, and that each will do best on what he likes best. Beyond this the treatment is symptomatic.

Calcium sulphide has been recommended as a direct antagonist to bacteria, and for its undoubted power of checking suppuration. It should be given in full doses, half a gram (gr. vijss)

daily of the pure salt, continued until the odor of the breath and skin show the body to be saturated with the drug, and then in smaller doses to keep up this effect.

The production of leucocytosis by the administration of nuclein has been also advised. Those who have reported the best results from it gave it in very large doses, four to six grams (gr. lx to xc) daily by the skin or mouth. The idea is too important to be allowed to go by default, and should be tested thoroughly. Too many remedies have been introduced and allowed to fall into oblivion without a true trial.

Whether sprays or vapors ever reach the seat of the disease or not, they are useful in relieving the cough and cleansing the pulmonary tract of secretions. Let the patient steam the lungs by inhaling the fumes of boiling vinegar for ten minutes, and then spray with menthol camphor in albolene, or europhen in fluid petrolatum. This soothes the irritated tissues, and usually permits a good night's sleep, undisturbed by coughing.

The sickroom must be constantly disinfected by the vaporization of volatile oils, eucalyptol or cinnamon, and by thorough ventilation. So important is this that it is a question whether the injury to the patient resulting from the re-inhalation of the floating bacilli is not more dangerous than any possible exposure to the outside air.

Some consumptives bear the fumes of burning sulphur in an astonishing manner, and then this method of purifying the air is to be preferred. But while there is fever the patient should be in bed, and climato-therapy applies rather to the chronic forms of the malady.

PART II.

CHRONIC RESPIRATORY DISEASES.

CHAPTER XXIII.

CHRONIC BRONCHITIS.

Under this term are grouped a number of affections differing as to their causes and as to their pathologic conditions. The mucous membrane may be denuded of its epithelium, thin, the longitudinal elastic fibers hypertrophied, the glands and muscular fibers atrophied, the bronchi dilated into bronchiectases; or the mucous structures may be infiltrated by spurious hypertrophy, the interglandular connective tissue hyperplastic and the surface glandular. Follicular ulceration is not uncommon, while the atrophied tissue may be in part replaced by emphysematous dilation of the air-cells.

Etiology.—Chronic bronchitis may follow repeated acute attacks; underlying it we may find a cachectic or diathetic state, rheumatism, scrofula, uricemia, alcoholism, syphilis, or nephritis. It occurs in the mechanical congestion of the lungs from obstructive disease of the heart. Primarily it occurs from habitual exposure to cold or wet, or the inhalation of irritant vapors or dust. It is common in old age. It is worse in winter, in wet seasons, when sudden changes occur in the weather, and during or after epidemics of

influenza. It tends to subside in the summer, reappearing earlier each fall and lasting later each successive spring.

SYMPTOMS.—A sense of weight may be felt in the chest. If the mucus is adhesive or abundant the cough may be so violent as to cause soreness from straining the insertions of the diaphragm. The accessory muscles of respiration, the sterno-cleido-mastoids, scaleni, etc., in time become hypertrophied by the violent coughing, and stand out plainly from the shrunken tissues around them. Cough is more violent if the secretion is in the larynx or the smaller bronchi. It is less marked in old age when the bronchial sensibility is low and secretions accumulate. When chilling or other causes induce an exacerbation of the malady the cough is worse.

The sputa vary. There may be thick, scanty adhesive mucus, free muco-pus, starchy or gelatinous, dried greenish scabs, decomposed fetid plugs, or the serous discharge of acute mycosis or bronchorrhea. There may be a little fever towards evening, but this symptom usually indicates an acute attack or extension of the inflammation into the lung-tissues. The general health may remain tolerably good for many years, the digestion fair, but the sleep is disturbed more or less by cough. The tendency is for the malady to extend. Dyspnea may be marked, or wanting.

The thorax expands, the respiratory movement is limited in range. The percussion sound is clear while auscultation gives rales of every degree of fineness and coarseness depending on the mucus present. Often loud bubbling is heard over both lungs, the patient coughs up a mass of sputa, and then the sounds cease. The vesicular sound is apt to be weak, rough, expiration prolonged and wheezing. Dullness on percussion indicates edema, pleuritic effusion or invasion of the lung-substance.

In the aged the most common form is the winter-cough, occuring earlier each autumn and staying later each spring. Emphysema, dyspnea worse on exertion, and sometimes but not necessarily cardiac disease or weakness, may be present. The sensibility of the mucosa is dulled, and the sputa may be retained until decomposition occurs, with fetid sputa, toxic inflammation of the bronchi and lung-tissue underneath, fever, somnolence, sapremia, carbonic poisoning and sometimes unexpectedly sudden death.

In bronchorrhea there is a very profuse discharge, of serum if colliquotive or mycotic, of muco-pus in late stages of the malady. Greenish masses of more consistence are discharged from the dilated bronchi.

Fetid bronchitis may develop in any case if the secretions are not coughed out. Acute septic in-

flammation ending in ulceration of the surfaces bathed in the decomposing secretions follows, or pulmonary gangrene may ensue, or empyema from perforation or extension to the pleura. In simple fetid bronchitis the sputa on standing separates into three layers, frothy mucus, a serous liquid and a thick sediment, containing yellowish masses termed "Dittrich's plugs." These contain numerous micro-organisms, especially the *leptothrix pulmonalis*, with fat, margarin crystals and pus-cells. The general symptoms are grave—rigors, chills, septic fever, rapid weak pulse, heavy sweats and rapid prostration of the vital powers follow quickly. If the irritating products reach healthy mucous surfaces great irritation and violent coughing ensue. The result depends entirely on the treatment.

In dry forms of catarrh the secretion is scanty and adhesive, the cough incessant and dyspnea often marked. Emphysema is a common concomitant. The rales are dry, sibilant, and sonorous. This is the most frequent in elderly subjects, the thin, dried-up species.

Elderly women are liable to a chronic bronchitis, beginning early in life with slight symptoms, morning cough, little expectorations, no special physical signs, becoming worse with years. Uricemia or scrofula may underlie. Anders mentions a case where bronchitis and eczema alternated in an arthritic woman.

DIAGNOSIS.—Phthisis is distinguished by the history, the loss of flesh and strength, fever, signs of distress localized (usually at the apex), and the presence of the characteristic tubercle bacilli in the sputa.

In pure emphysema there is increased clearness on percussion, weak vesicular sounds, dyspnea increased on exertion, obstruction of the pulmonary circulation if extensive, dilation of the clavicular or intercostal spaces, and the history and cause of that malady.

In pulmonary abscess the sputa contain shreds of elastic fiber, crystals of hematoidin and chlosterin, blood-pigment masses, and the site of the abscess is denoted by dullness before evacuation, cavernous sounds afterwards. No elastic fibers are found in gangrene, the ferment present causing their solution, but the prostration is extreme. Bronchiectases are usually on one side only; the physical signs of a cavity are present, the history pointing to this rather than to tuberculosis, and the sputa examination confirming the diagnosis.

PROGNOSIS.—The victim of chronic bronchitis rarely recovers unless he removes to a suitable climate in the tropics. The malady may not shorten life, unless emphysema or heart-disease supervenes, or a microbic invasion carries some disease into the lung-structures.

TREATMENT.—As the infection is worse in win-

ter and nearly or wholly disappears in the warm season, whenever it is possible the patient should be sent to live in a land of perpetual summer, where there is the least likelihood of catching cold from changes in the weather. In other cases some protection is secured by hardening the skin, by daily cold baths or salt rubs, wearing woolen clothes exclusively, night and day, summer and winter, outside and inside, head to feet; in fact the "Jaeger system" in its entirety. The avoidance of exposure to cold and wet should be inculcated as a duty. Epidemics of influenza must be escaped from with the utmost speed. The inhalation of irritants must be avoided; crowded halls, smoky saloons, overfilled cars on damp, humid days, being common causes of acute exacerbations. Patients with profuse purulent secretion should be sent to the pine woods, those with scanty tough sputa to the seaside, while anemic cases with serous bronchorrhea should ascend to the mountain resorts. In all cases an equable temperature should be sought. The hot, dry plains of Arizona suit cases with free secretion, while the Florida coast offers a suitable site for dry catarrhs. Among the islands of our Philippine possessions and in Porto Rico ideal locations could be found for all classes of sufferers with chronic pulmonary complaints.

Coexistent disease of the heart, lungs or kidneys, should receive appropriate treatment.

Much may be done by judicious diet and constitutional treatment, especially in diathetic cases. In uricemia the enforcement of the vegetarian regime, with the alimentary canal kept free by saline laxatives, asceptic by zinc and sodium or calcium sulphocarbolate, three decigrams (gr. 5) three to seven times a day, the eliminatives active by colchicine half a milligram (gr. 1-134) two to six times a day, with full exercise, will greatly enhance the effect of direct medication. In scrofula, tuberculosis, cachexias generally, where there is a basal fragility of the cell-walls and consequent disposition to fall into disease easily, with little power to set up healthy repair, the calcium salts are indicated, the sulphocarbolate as an intestinal antiseptic, three decigrams (gr. 5) three to seven times a day; the lactophosphate in similar doses to restrain colliquative discharges; the sulphide, three centigrams (gr. 1-2) every hour or two to check pus-formation; the hypophosphite, a decigram (gr. 1 1-2) every waking hour as a tissue-builder, to be continued for months or years if necessary.

Anemia is best met by iron arsenate, a milligram (gr. 1-67), and iron phosphate a centigram (gr. 1-6), repeated every waking hour.

When the secretions are scanty and dry the

remedies indicated are those that increase and liquefy the sputa, the best being the inhalation of steam, with lobelin or emetin internally, one to five milligrams (gr. 1-67 to 1-12) every waking hour, stopping when the desired effect is manifested or nausea supervenes.

If the secretion is profuse and purulent, calcium sulphide three centigrams (gr. 1-2), strychnine arsenate one milligram (gr. 1-67), and macrotin one centigram (gr. 1-6), should be given together every waking hour till full effect, as indicated by the odor of calcium sulphide on the breath, slight strychnine twitching, or physiologic tonicity of the heart from the macrotin. The latter with the strychnine is intended to tone up the relaxed mucous tissues and thus check the abnormal output of secretion. Possibly hydrastine sulphate one milligram (gr. 1-67), added to each dose, would aid in this respect, but this drug has won repute especially as a tonic of the gastro-intestinal mucosa. In regard to all the remedies suggested the doses given are average and should be increased, diminished or suspended, according to the effects manifested.

If the secretion is serous and profuse, there may be a general broncho-pulmonary mycosis present, or the flow is colliquative, alternating with a similar flow from the skin or the bowels. In the former cases calcium sulphide must be pushed to

full toleration, with europhen or iodoform one to six centigrams (gr. 1-6 to 1), every hour, to destroy the micro-organisms; while sprays of europhen in fluid petrolatum, one part to eight, preceded by complete cleansing of the pulmonary tract by five minutes' inhalation of the fumes of boiling vinegar, should be repeated every two hours. Other antiseptic sprays have not given me as good results, though one of camphor and menthol 1 1-2 grams each (23 grains), thymol 1-2 gram (7 1-2 grains), and fluid petrolatum 30 grams (1 oz.), has often proved a valuable adjuvant. Strychnine to full tolerance, a highly nutritious diet, the air of the room charged with the vapor of the oil of cloves or cinnamon, are also indicated.

When the bronchorrhea is colliquative the fever should be checked by calcium sulphocarbolate three decigrams (gr. 5), every hour or two, with equal doses of calcium lactophosphate which is almost a specific here, and guaiacol externally, five to ten drops diluted with cod-liver oil rubbed into the skin over the lung. The body should be sponged with vinegar. Strychnine is required in full doses, with macrotin six centigrams (gr. 1), every two to four hours. This powerful stimulation of tonicity will generally rouse the failing powers and keep the patient alive a while longer. And in these cases he wants every hour of life he can secure and

is grateful for every day that he is kept alive, though death's pinions hover over him continually.

When the sensation of the bronchial mucosa is lost and the secretions collect, with cyanosis, drowsiness, etc., sanguinarine nitrate is the most effective remedy in doses of one to three milligrams (gr. 1-67 to 1-20), every one to two hours, until the patient is coughing sufficiently to rid his tubes of the redundant secretions. Scillitin, senegin, aristolochin and ammonia act similarly but are less efficient.

If on the contrary the cough is excessive and there is little or no secretion to be expelled, the sedatives are required, codeine half to one centigram (gr. 1-12 to 1-6); zinc cyanide one to three milligrams (gr. 1-67 to 1-20), the best and most manageable of the cyanide remedies; or Dover's powder as modified by me, substituting camphor monobromide for the potassium sulphate and the alkaloids for the opium an ipecac. The inhalation of steam is again a most essential remedy. Murrell advises spraying with wine of ipecac, and I have utilized the suggestion but substituted a watery solution of emetin instead, two decigrams (gr. 3), to thirty grams (1 oz.), of water. The atomization of fluid petrolatum is also very soothing. A full dose of atropine, one-half milligram (gr. 1-134), will often check the irritation, especially if the presence of marked dyspnea indi-

cates the predominance of the spasmodic element. Counter-irritation over the pneumogastric nerve in the neck also often gives great relief.

Of the remedies usually administered for bronchitis very few are given with a definite idea of their true effects. A mixture is made of a number of the so-called expectorants, often antagonistic; these are swallowed at lengthy intervals, until time has cured the patient or established the chronic malady. Ipecacuanha and cocillana relax the congested tissues, lessen hyper-sensitiveness and promote secretion. Squill and senega increase sensitiveness and aggravate the cough, increasing congestion. Tolu, copaiba, myrrh, the balsams and cubeb, check secretion, leaving an acute congestion unrelieved, but are effective in restraining profuse muco-purulent discharge. They have some effect also in clearing away the "dregs" of an attack, when it threatens to become chronic. Sugar, licorice, gums and mucilages, soothe pharyngeal irritation. I have given ammonium many times and have found no place for any of its salts that is not better filled by the agents above mentioned.

In fetid bronchitis the volatile oils are of great value, stimulating the imperiled tissues to throw off the impending death. Oil of turpentine, eucalyptus, cajeput or sandal, should be given in doses of one-half to one gram (seven to fifteen

minims), in capsule every one to three hours. Whether these agents are actually capable of stopping a pulmonary gangrene once begun is perhaps doubtful, but there is no more effective treatment known. Strychnine arsenate should, however, be pushed to full toleration, two milligrams (gr. 1-30) every one to three hours; while the richest diet is to be ordered that the patient can take. Sprays of carbolic acid, 1-2 to 1 per cent in distilled water, should also be used often enough to prevent fetor of the breath.

Pulmonary gymnastics may be of great value. When any micro-organisms are found in the sputa against which we have a known antidotal serum, it should be employed. As the antistreptococcic serum is only available against the streptococcus from which it was derived, and there are many varieties of streptococcus, the most effective method would be to prepare the serum from cocci obtained from each patient's sputa for use in that case alone. Meanwhile calcium sulphide is the best universal germicide for internal use.

The careful regulation of the patient's habits and personal hygiene, the discriminating selection of the remedies appropriate to the conditions present, the scientific rebuilding of the vital forces, will give the best obtainable results.

CHAPTER XXIV.

BRONCHIECTASIS.

Two forms of bronchial dilatation are found, the cylindric and the saccular. The dilated tubes form sacs, with smooth walls, communicating to form compound cavities, of all sizes. The cylindric epithelium lining normal bronchi is replaced by tesselated cells. The subepithelial tissues atrophy. Secretions lying in these cavities decompose causing irritation, inflammation, ulceration and the symptoms consequent.

Etiology.—Whenever a disease exists in the thorax that causes destruction of a part of the lung-tissue or its compression, nature supplies the vacuum by drawing in the intercostal spaces, approximating the ribs, dilating the air-cells in emphysema, or the bronchi into bronchiectases. This process therefore may follow pleurisy with permanent compression of the lung, pneumonia or tuberculosis with destruction of tissue, chronic bronchitis with atrophy, and lobular pneumonia with atelectasis. The weakening of the bronchial walls by disease favors dilation. Straining from whooping-cough is more likely to produce emphysema, though Heubner thinks this affection and measles sometimes cause dilation. Rarely

the malady is congenital, but in such cases the true cause is probably lobular pneumonia. Bronchiectasis is more common in male adults.

SYMPTOMS.—The symptoms depend on the presence of fluid in the sacs. If there is none, the only symptom may be shortness of breath, dependent on the quantity of pulmonary tissue destroyed. More frequently bronchiectasis is simply an incident in the course of the causal malady, whose symptoms are present. If the cavity fills with fluid it is apt to cause irritation and persistent cough until emptied. The sputa are characteristic of cavity-retention, and are separable in layers. Sometimes there is little sensibility and the cough only occurs when the patient lies down or turns to the sound side, when the contents of the cavity begin to flow into the trachea and are coughed up. Cavities may exist on both sides and be thus emptied successively. The sputa may decompose if long retained. The consequent ulceration may then cause hemoptysis. Retained sputa consists of mucus, pus-cells, Charcot-Leyden crystals, fat-crystals in bundles, leptothrix, vibriones and various bacteria. Elastic fibers indicate ulceration and destruction of the pulmonary parenchyma.

The chest-wall is usually retracted. Percussion is flat, dull if the cavity is filled, tympanitic if empty, abnormally clear sometimes from the ac-

companying emphysema and air in the cavity. Auscultation gives a weak vesicular sound, and various moist rales dependent on the fluid present. The majority of pulmonic cavities are, at least in the beginning, bronchiectases.

DIAGNOSIS.—In bronchiectasis there is a history of bronchitis or other causal affection, cough on assuming a certain position, sputa of a cavity, it begins at the base of the lung posteriorly, there are the signs of cavity, running a chronic course,

BRONCHIECTASIS.	TUBERCULAR CAVITY.
History of chronic bronchitis, pleurisy or other malady with diminished thoracic contents.	History of attack, emaciation, sweats, hectic, predisposition, infection,
Cough paroxysmal, sputa of cavity copious,	Cough morning and evening, nummular sputa,
No tubercle bacilli,	Tubercle bacilli.
General health good,	Progressive debility,
Little or no fever,	Fever,
Long course,	Shorter course,
Persistent, quiet, located near base posteriorly.	Progressive; near apex.

with no fever, and no tubercle bacilli. Tubercular cavities have a history of cough, fever, hemoptysis, sweats, rapid loss of flesh and strength, hectic, nummular sputa showing tubercle bacilli, rapid course, signs of a progressive malady, more frequently beginning at the apex.

Empyema with pneumothorax has the history of pleurisy with sudden discharges of much purulent sputa at long intervals. Actinomycosis is diagnosed by the microscope.

PROGNOSIS.—That of the causal malady. The supervention of tuberculosis or of streptococcus-infection is disastrous.

TREATMENT.—The treatment is of the causal infection. The cavity should be kept as clean and as nearly aseptic as possible, by the inhalation of steam, medicated with benzoin, carbolic acid, turpentine, thymol or camphor; and atomizing fluid petrolatum with europhen, 1 to 8, afterwards. Iodoform, terebene or eucalyptol may be given internally with benefit. The cavities have been injected with iodine or silver solution through the chest-wall, and drained by the surgeon, with great advantage.

CHAPTER XXV.

BRONCHIAL STENOSIS.

The bronchi may be narrowed by constriction in the walls, or compression from without. Foreign bodies, polypi, pulmonary growths and exudates, aneurisms, cysts, tumors, enlarged glands, abscesses and pleural effusions are among the causes. The pressure induces dyspnea in proportion to the importance of the bronchus compressed. The dyspnea is persistent and progressive until the cause is relieved. A similar condition obtains to that seen in croup, the air in the obstructed region being rarefied, and the affected part retracted on inspiration. Other symptoms depend on the causal disease. Edema and hyperemia of the obstructed lung follow as in croup. The respiratory movement and tactile fremitus are lessened, percussion clear, vesicular sound diminished, serous rales supervene with the œdema. The diagnosis is made from the limitation of the physical signs, the history of the antecedent affection, and the absence of tracheal or laryngeal symptoms. The prognosis is generally bad. The treatment is that of the cause. It is obvious that bolder surgery will be the rule than in the past history of such maladies.

CHAPTER XXVI.

PULMONARY CONGESTION.

Passive congestion occurs mechanically as a result of mitral or aortic disease, obstructing the outflow of blood from the pulmonary capillaries. Compensatory hypertrophy of the right ventricle sustains the aortic circulation but increases the pulmonary congestion. Some cerebral maladies give rise to this condition, which may also be caused by the pressure of tumors upon the pulmonary veins.

The blood-vessels of the lungs are distended, the lungs swollen and engorged, the connective tissue hyperplastic in old cases, the air-cells compressed and oxygenation correspondingly diminished. The process begins at the base of the lungs.

Dyspnea is pretty constant, a sense of stuffiness, with a disposition to take long breaths occasionally. This is worse after meals, as the bulk of the blood is then increased. Bronchial catarrh develops, but without this the engorgement causes constant irritative cough with serous or bloody sputa. The lips are stained as if the patient had been eating mulberries. Shortness of breath increases with exertion.

The diagnosis is unmistakable when cough,

dyspnea and hemoptysis with deficient oxygenation coincide with valvular heart-disease.

The term hypostatic congestion is used to designate a condition, most common in typhoid states, when the lower portions of the lungs become water-soaked or dropsical. The general vitality is low, the vesicular tension so reduced that the blood-serum oozes through the vessel-walls and collects in the most dependent parts. When the position is changed the serum slowly shifts, collecting in what has become the lowest part. The air-cells and parenchyma become alike overflowed with serum. This is sometimes seen in aged and very feeble people, especially when in the last stages of exhausting disease.

The symptoms may be unnoticeable—unusual weakness, somnolence, pulse weak, respiration a little hurried, the mouth open and accessory respiratory apparatus brought in use, and deepening cyanosis. Examination shows the lungs dull in the dependent parts, serous rales, loud or fine, bronchial breathing, increased fremitus, the signs shifting when the patient's position has been altered for a few hours.

In both forms of passive congestion the prognosis is that of the primary affection.

TREATMENT.—In mechanical congestion the treatment is that of the causal malady—and in fine this means the reduction of the heart's work

to the lowest possible limit by the imperative restriction of fluids, so as to reduce the bulk of the blood. Richardson sought to relieve the dyspnea and aërate the blood by the use of hydrogen dioxide internally, but this could be better done by disengaging in the air of the patient's room an extra quantity of oxygen.

Those liable to hypostatic congestion should be changed about every few hours, the heart and arterial tone sustained by strychnine in full doses, with berberine, a centigram (gr. 1-6) every two to four hours to increase capillary tonicity. Apocynin in the same dose aids in carrying off the surplus water. Feed richly, keep the blood circulating by massage, with stimulating liniments. Be wary about allowing the patient to lie half-asleep for long periods. Sanguinarine in small and repeated doses, one to three milligrams (gr. 1-67 to 1-20) every two to four hours, stimulates the vitality of the pulmonary tissues and is consequently of special value in this condition.

CHAPTER XXVII.

CHRONIC PNEUMONIA.

Cirrhosis or fibrosis of the lung occurs in two forms, local and diffuse. It is unilateral. The history is that of cirrhosis elsewhere—there is hyperplasia of the connective tissue, which later contracts, both processes being at the expense of the air-cells and glandular elements, whose space is seized first and which are choked out by the contraction. The affected part of the lung is converted into a fibrous, scar-like mass, occupying less space than when healthy. The vacated space may be filled up by retraction of the intercostal and clavicular spaces, emphysema, bronchiectases, and the heart may even be drawn over towards the affected region. Adhesions of various degrees may form. Tuberculosis may supervene.

The affection is secondary to various inflammations, tubercle, syphilis, hydatids, etc. The diffuse form follows acute pneumonia with missed crisis, influenzal pneumonia, pleurisy, atelectasis and especially broncho-pneumonia.

The process begins in the submucous layers and extends into the parenchyma. It may arise primarily or from the inhalation of irritants.

The symptoms are cough, expectoration, early

dyspnea, worse on ascending heights, oppression, pain if the pleura are involved. There is no fever. Other symptoms are due to the accompanying conditions.

The chest-wall is shrunken or swollen with emphysema; the side may be distorted to bring the ribs closer, the spine curving, the heart displaced. The fremitus is increased, percussion dull, breathing bronchial, with signs of bronchiectasis if present. Rales depend on the presence of fluid.

The malady is slowly progressive. Acute pneumonia may occur.

There is no known curative treatment. The efforts of the physician should be directed to securing the patient's comfort, treating complications and prolonging life.

Thiosinamin is said to possess the power of destroying scars, and even of causing the absorption of urethral strictures. It may check pulmonary fibrosis. The dose is half a gram (gr. 7 1-2) in fifteen per cent alcoholic solution, injected into the gluteal tissues. The severe pain is alleviated by drawing the solution into the syringe and then a few drops of four per cent cocaine solution, which is thus first injected. Singularly, the anesthetic action of the cocaine is manifested immediately. The dose should not be repeated more than once a week. Europhen

with fluid petrolatum, one part to eight, should be sprayed into the lungs daily, as this agent also seems to have local absorptive powers that may be of value here.

CHAPTER XXVIII.

ATELECTASIS.

The term atelectasis denotes a permanent collapse of the air-cells forming a lobule. The affected lobule is solid, airless, dark, the bronchi occluded by exudate, but inflatable by the blow-pipe. The capillaries are distended.

Etiology.—This occurs in new-born infants from imperfect distention of the lungs. In older children it is caused by stoppage of the bronchial lumen by exudates, the air being absorbed or expired. Compression of the lung causes it, even that of flatulence. It also results from some cerebral diseases, pneumogastric paresis, and paralysis of the chest-walls. Distortions of the thoracic cage may be attended by atelectasis.

The symptoms occur during the primary affection, which is most frequently broncho-pneumonia. Respiration is rapid and shallow, with dyspnea in older children, lividity and cold skin and extremities in new-born babes. The pulse is feeble and rapid, the cry weak, and carbonic acid poisoning ensues, insidiously in the case of infants.

If extensive, over the posterior lower lobes, this part of the thorax retracts during inspira-

tion; the percussion note is dull, unless masked by emphysema; with vesicular murmur, weak bronchial breathing, subcrepitant rales.

The diagnosis from lobar pneumonia is made by the location of the dullness, in the posterior part of both lungs, disseminated through all parts but most marked between the scapulæ and in the lower lobes; by the dyspnea and cyanosis, and the absence of the signs of true pneumonia.

If the process is extensive it is apt to be permanent, the function of the affected tissue being lost. In infants it is a dangerous affection. With whooping-cough, broncho-pneumonia or pleurisy, it is often fatal. Emphysema simply masks the malady and adds to the injury.

The treatment is that of the causative malady. Inflating the lung forcibly should be practiced to prevent or relieve the collapse; the position should be changed regularly. Infants must be made to cry vigorously. An effective measure is placing the child in a warm bath and squirting cold water forcibly against the chest. Sanguinarine is useful as a stimulant to the cough; the dose being 0.0005 (gr. 1-134) every half-hour to a child two years old.

CHAPTER XXIX.

EMPHYSEMA.

Interlobular emphysema is due to rupture of the air-cells, the air escaping into the connective tissue. It may be due to wounds, violent coughing or sneezing and other strains. The most common locality is the clavicular region, which may puff up with escaped air. This may penetrate the pleura, or the subdermal tissue over the entire body.

Vesicular emphysema is a simple dilation of the air-cells without rupture. It is termed compensatory when it aids in filling up the vacuum caused by loss of part of the thoracic contents. It is only compensatory as to volume, not as to function, as the enlarged cell aërates but little more blood than the small, and not nearly as much as the group of cells normally occupying the same space.

Hypertrophic emphysema is due to permanent dilatation of the air-cells, by overstretching. The lungs do not collapse when the pleura is opened. Presumably there is in these cases a congenital deficiency of the elastic tissue.

The thorax becomes barrel-like, the lung-tissue anemic, pitting on pressure. The cells are nota-

bly large, of various sizes, pleura pale, showing patches devoid of pigment (Virchow's albinism). The septa are thinned and broken, the cells coalescing, the elastic fibers broken or atrophied, the capillaries disappear, the epithelium becomes fatty. The muscular fibers may become hypertrophied. The larger blood-vessels are enlarged. Bronchial catarrh usually coexists, with cirrhosis and bronchiectasis. The diaphragm is depressed, the heart lowered, its cavities dilated or hypertrophied, the pulmonary arteries enlarged and atheromatous. Other viscera show the effects of prolonged venous engorgement.

ETIOLOGY.—Emphysema in the upper lobes develops in whooping-cough, bronchitis, etc., from the violent strain of coughing while the glottis is closed. Asthma, playing wind-instruments, blacksmithing, and other occupations involving similar pulmonary strain, cause emphysema. The loss of elasticity and atrophy of the tissues in old age give rise to a harmless emphysema, and if contracted in childhood it reappears in old age.

SYMPTOMS.—Emphysema being not so much a distinct disease as a process entering into the clinical history of various maladies, its symptoms are those of the latter. It slowly develops from occupations, but occurs suddenly as an accident from unusual strains. It causes dyspnea, dry cough, perhaps cyanosis, the breathing-power

lessens on exertion or after full meals, becoming worse as the malady increases. Expiration is laborious and prolonged. In advanced cases the cyanosis becomes extreme. Expectoration depends on the coexistence of catarrh, which is a frequent concomitant, acute attacks developing a cyanosis not usual to bronchitis alone. There is no fever, the pulse is normal or weak, the temperature subnormal. The patient becomes thin, weak, stooping, cachectic. The right ventricle hypertrophies to force the blood through the fewer capillaries.

Besides the barrel chest, the winged scapulæ are characteristic, and a belt of dilated venules may be seen around the lower border of the ribs and cartilages. Hyper-resonance is present, the vesicular sound is weak, expiration prolonged, and the cardiac dullness is obscured by overlapping lung. The unaffected parts give a harsh vesicular murmur. Bronchitic rales are usually present, with those due to any other complication. Dry crumpling sounds may be heard, or Laennec's rale, resembling the subcrepitant.

The diagnosis is made from the history, occupation, dyspnea, cyanosis, barrel chest and other signs. Pneumothorax develops suddenly, unilaterally, with violent dyspnea, clear tympanic note, amphoric breathing, soon followed by the splashing of liquid.

Acute emphysema is curable, the chronic form permanent and usually progressive, though the symptoms may be checked or show improvement under treatment. Patients are carried off by intercurrent disease, dropsy, hemoptysis, or sudden dilation and failure of the right ventricle.

TREATMENT.—Remove the cause. Treat the bronchitis. Potassium iodide has long been recognized as exerting a remarkably beneficial influence over emphysema. The dose is one gram (gr. xv), thrice daily. The causal occupation or habits must be given up. Cough must be held in check, colds prevented, asthma relieved, the bowels kept soluble, flatulence guarded against, and the nutrition sedulously maintained. The heart must receive careful attention. Sudden and urgent dyspnea may require venesection. Mechanical compression of the chest, by hand or apparatus, has proved of service. Inhaling compressed air and exhaling into a partial vacuum is a promising method. When cyanosis becomes distressing, arrangements should be made for oxygen inhalation of the patient's convenience. Patients with emphysema are thought to do well in Minnesota, even in winter.

CHAPTER XXX.

PNEUMONOKONIOSIS.

Men who work in coal-mines inhale the carbon as dust; it is deposited in the lungs faster than the mucous cells can dispose of it, penetrates the perivascular lymph-spaces, is enveloped in the leucocytes, and conveyed to the lymph-nodules, interlobar spaces and lymphatic glands. Catarrh with emphysema may occur. More often interstitial inflammation is set up, resulting in fibrosis. Some of the indurated areas may soften, and then ulcerate if air is admitted. This ends in tuberculosis. All city-dwellers have some degree of this anthracosis, but not to an injurious extent.

Chalicosis, stone-cutter's consumption, occasions a similar affection. Tool-grinders suffer still more acutely. Siderosis applies to the malady as exhibited by dyers. Grain-shovelers, cigar-makers, cotton-spinners, millers, and all workers in dust-laden atmospheres suffer similar maladies, the symptoms varying with the nature of the dust inhaled. Polishers in watch-case factories, inhaling rouge, seem also specially liable to epilepsy.

The symptoms are those of bronchitis of varying grades, generally chronic. Emphysema fol-

lows. The sputa contain the dust, muco-pus, and in due time the tubercle bacillus. The microscopic examination and the history suffice for the diagnosis. The prognosis depends on the stage the malady has reached and the ability of the sufferer to secure healthier occupation.

TREATMENT.—One of the finest object-lessons is secured by covering the nose and mouth with a respirator of wet flannel, and breathing through it the air of the workshop. In a short time the respirator is so clogged that it must be renewed, or washed out and replaced. Its use prevents the malady. Nowadays many shops are properly ventilated and free from this evil. In others the owners advise the use of respirators, but find it difficult to induce work-people to use them. When the disease has begun the patient must leave the dusty shop for a fresh-air occupation. The treatment is that of bronchitis, etc.

CHAPTER XXXI.

PULMONARY CANCER.

All forms of cancer occur in the lungs, usually secondarily to its development elsewhere, the infection (?) being carried by the blood or lymph-vessels, or by extension directly. The causes are those of cancer in general.

The symptoms are pain, especially when the pleura is involved, inflammation excited by the growth, dyspnea and cyanosis. If the growth compresses the heart or great vessels the circulation is disturbed; pressure on the œsophagus causes dysphagia, on the recurrent laryngeal nerve hoarseness or aphonia, on the trachea dyspnea, etc. The sputa contain blood, and may resemble currant-jelly, or be grass-green or putrid. The tumor causes dullness and loss of the vesicular murmur; the thorax may be pressed out or perforated, the superficial veins engorged, and œdema appears in the obstructed area. The cervical or axillary glands may be involved.

The diagnosis is made from the existence of cancer elsewhere, and the evidence of a thoracic tumor, steadily increasing, causing irritation and pressure-symptoms, by the cancerous sputa, the lymphatic glands being involved. The prognosis

is bad. The treatment simply means relief of pain—morphine and chloroform *ad lib.*

What has been said of carcinoma applies as well to sarcoma, save that the course is usually more rapid. Among cobalt-miners there has been found a form of pneumonokoniosis attended in some cases with the development of slowly growing lympho-sarcomas, with secondary growths in the lymphatic glands, liver, spleen and pleura.

CHAPTER XXXII.

PULMONARY HYDATIDS.

Primary pulmonary hydatids are exceedingly rare, secondary ones very rare. The symptoms are those of the original development, usually in the liver, with pain, cough, dyspnea, sometimes bloody sputa, and the physical evidences of the developing tumor. The characteristic hooklets may be expectorated. The cysts may discharge through the bronchi or the serous sacs, or externally, causing inflammation in their path. It is a dangerous affection.

The treatment is surgical.

CHAPTER XXXIII.

CHRONIC PLEURISY.

Chronic serous pleurisy may follow the acute form or develop insidiously. There may be scarcely any symptoms except dyspnea on exertion, perhaps a sense of fullness in the chest, an occasional long-drawn inspiration. The pulse may be faster and slight evening fever be present, with some fall in the patient's strength and in his weight. The malady may develop into empyema, especially in children. The affection runs on for months or years, and may end in tuberculosis.

Chronic dry pleurisy may also follow the acute or chronic serous form. The fluid is absorbed rapidly at first, more slowly as it thickens, the pleura come together and adhere, forming a fibrous capsule compressing the lung.

Some cases are dry from the start, and may present no symptoms of effusion. The pleura adhere, the respiratory motion is restricted, the sounds are weak, the other lung is hypertrophied, the heart displaced, spine curved, thorax distorted. Sometimes vasomotor equilibrium is disturbed, flushing or sweating unilaterally, or dilatation of the pupil, occurring.

The treatment looks to removal of effusions if present and improvement of nutrition. Carefully regulated diet, gymnastics, the pulmonary and hygienic regime in general, and climatotherapy, are the leading indications. The tonics, digestives, reconstructives and absorbents, are required when indicated. Cases vary too much for a fixed line of treatment. The persistent action

PLEURAL EFFUSION.	HYDROTHORAX.
History of pleurisy.	General dropsy.
Unilateral.	Bilateral.
Effusion following change of posture only at first, being soon encysted by adhesion of pleura.	Fluid follows change of posture throughout. No inflammatory adhesion.
Fever.	No fever.
Heart displaced.	Heart in normal position, but muffled by pericardial effusion.

of arsenic, mercury and iron iodides, in moderate doses continued for many months, gradually brings about absorption of the effusion. Iron iodide one centigram (gr. 1-6), with a milligram (gr. 1-67) each of the others, may be given three to seven times daily; the bowels and kidneys being kept in activity to stimulate the removal of the loosened debris.

CHAPTER XXXIV.

HYDORTHORAX.

Hydrothorax signifies the presence of serum in the pleura, usually in both, and occurring in general dropsy, especially in hydremia. It also occurs in chronic diarrhea, dysentery, leukemia, pernicious anemia, cancer, malaria, syphilis, scurvy and compression of the thoracic duct.

The symptoms are dyspnea, cyanosis, cough, weak heart, general debility, with dullness on percussion, the fluid shifting with change of posture.

The treatment is that of the causal malady. Tapping is done as in serous pleurisy.

CHAPTER XXXV.

CHRONIC PHTHISIS.

The causes are those of the acute form. The infection is less virulent, or the body forces more powerful, and the malady drags along for years.

PATHOLOGY.—The upper lobe is usually first affected near the apex, the lower lobe next, then the upper lobe of the other lung. The left side is primarily affected somewhat more frequently than the right.

The primary lesion is tuberculous infiltration, beginning in the air-cells or bronchioles, which are soon obstructed by debris, caseation follows, then softening, liquefaction forming cavities, increasing by ulceration, or calcification may ensue, or fibrosis. Extinct tubercle may be surrounded by zones of compensatory emphysema, or of cirrhotic tissue.

Tubercular nodules in the bronchial mucosa may break down and the resulting ulcers become infected by pyogenic bacteria and spread. The same process occurs in the cavities formed by softening, when open to the air. In slowly progressive cases, or when tubercular infection follows thoracic disease causing loss of lung-substance, bronchiectasis may occur, and the cavi-

ties may increase by ulceration, their walls breaking down under the influence of septic matter collecting in them. Gradually enlarging the cavities communicate, the septa breaking down, sometimes forming large compound cavities, in which large masses of sputa collect and decompose. The effect of such matter coming in contact with the healthy lung and bronchial tissues adds much to the distress and increases the area of the disease.

The walls of freshly formed cavities are soft and necrotic, those of older cavities are lined with a pyogenic membrane, later becoming exfoliative. Bronchiectases may present smooth walls. Large cavities may be traversed by fibrous cords formed of obliterated arteries. Arteries still previous are studded with aneurismal dilatations, often the source of hemorrhages. The most common seat of cavities is the upper lobe. Small cavities may become obliterated by the contraction of the fibrous capsules. In this capsule tubercle bacilli may penetrate, and their destructive work enlarge the cavity, or fibrosis may extend into the surrounding zone of lung-tissue, thickening the protective wall at the expense of the pulmonary parenchyma. It is to this process that the dullness on percussion is mainly due, not to tubercle, which only occasions dullness when in large nodules. Hence, dullness in chronic phthi-

sis is usually a good prognostic. Disseminated miliary tubercles do not cause dullness, and their effects are more rapidly fatal than those of isolated nodules, even if large. The miliary tubercle, with its zone of fibrosis or caseation and compensating emphysema, when multiplied countlessly, disables a large proportion of the pulmonary tissue. The process is similar, occurring in many small spots instead of one large one. Miliary tubercles are usually deposited also in the pleura, bronchial glands, larynx, and other organs.

SYMPTOMS.—The affection comes on gradually from a condition of debility, in convalescence or exhaustion. There is evident a decline in strength, loss of weight, anorexia, inability to digest foods previously agreeable, with slight hacking cough of which the patient may not be conscious. Some fever becomes apparent towards evening perhaps, with bright eyes, flushed cheeks and unusual brilliance in conversation. When at last the patient consults the physician, self-prescribed treatment proving futile, there may be found a very fine rales, heard at the end of forced inspiration, over a limited area of one lung, in the clavicular spaces in front, or more frequently in the space uncovered by the angle of the scapula when the shoulders are drawn forward. Only a slight local catarrh; but a localized catarrh in the upper lobe of one lung is ominous! There is

value in the popular saying that a cough is dangerous inversely to its strength.

In other cases the attack opens with pleurisy, marked indigestion, peritonitis or laryngitis. More acute cases begin like pneumonia, with regular periodic chills, or with bronchial hemorrhage.

Of course the malady is so varied that an analysis of the symptoms will give a better idea of it than an attempt at detailed description.

Pain may be due to pleurisy, straining of the diaphragm by severe coughing, aching preceding hemorrhage; or pleurodynia accompanying phthisis but not due to intercostal tuberculosis. Aching between the scapulas is of diagnostic value.

The cough is at first slight, later varies with the course of the disease, irritative especially if the larynx is affected or when decomposed secretions flow into healthy bronchi. Cough on rising, and later on lying down, is characteristic. Coming at meals it may cause vomiting.

There is little or no sputa at first, then it becomes gray and sticky, afterwards is yellow or green, as pus forms, bloody when ulceration is active. The continuance of gray sputa when a bronchitic discharge would have become yellow is significant. The sputa from cavities has been described. The sputa mainly consists of mucus from the bronchi, and contains tubercle bacilli and

other micro-organisms, pus, blood, elastic fibers when lung-tissue is breaking down, fat, food-particles and substances inhaled.

To examine for tubercle bacilli select a grayish bit, spread evenly over a cover-glass previously sterilized by holding in the flame of a spirit-lamp; dry over the lamp, and fix by passing through the flame, stain with carbol fuchsin, decolorize with nitric acid, wash and stain with methylene blue. Viewed with a 1-12 oil immersion lens and Abbe condenser the tubercle bacilli appear as red rods in a blue field. Many and repeated examinations are necessary before one can say there are no tubercle bacilli in the sputa, for failure to find them on one slide does not prove there are none in the whole quantity. In collecting sputa for examination let the patient eject that collected in the throat and save what he brings up "from the bottom of the lungs," after full deep coughing.

To find elastic fibers, the sputa should be boiled in a solution of caustic soda, one part to thirty-two of water, and allowed to settle in a conical beaker-glass. The lowest drop can be taken up by a pipette and placed on the slide. Fibers from the air-cells are interlaced, those from blood-vessels or bronchi are long and parallel. Some are branching. They are relics of broken-down lung-tissue; the cause of the destruction is gathered from the symptoms.

I have already discussed the relations of bronchial hemorrhages, which may indicate the presence of tuberculosis or may be the cause of it by preparing a suitable soil through the influence of the decomposed blood on the pulmonary tissues. Profuse hemorrhage occurring late in the course of phthisis or when ulceration is progressing rapidly, indicates erosion of an artery. Smaller hemorrhages are not uncommon and are usually beneficial, the patient feeling relieved, the fever and cough subsiding. Blood-spitting, small quantities of blood in streaks, is very common and does not necessarily indicate tuberculosis. Pneumonic or stained sputa occur from capillary oozing. Change of residence to the sea-shore, or to an elevation 5000 feet or more above the previous habitation, is apt to be followed by a hemorrhage. The phthisical patient is liable to engorgement of the lungs and consequent hemorrhages, from emotion, over-eating or drinking, exposure to cold, and from unknown conditions. A sense of vascular fullness, thoracic stuffiness, with pain most frequently referred to the second right intercostal space near the sternum and irritative cough, often precede the hemorrhage for one or several days.

Dyspnea is conspicuously slight, considering the degree to which the respiratory tissues are inhibited or destroyed. Respiration is accelerated, however, and in proportion to the fever and the

tissue-destruction. Unusual exertion quickly demonstrates the absence of a pulmonary reserve.

Inspection shows the thorax flat above, intercostal spaces wide, clavicular spaces sunken, lower part of sternum depressed, scapulas wing-like, the angle of Louis prominent. The "paralytic" thorax may precede or follow the development of phthisis. Emaciation is usual, the skin soft, elastic, greasy, sometimes emitting a catarrhal odor. Expansion is defective over the diseased area, best ascertained by palpation. Tactile fremitus is increased early. Forced expansion is less than two and one-half inches, unless the patient has trained for this test.

Dullness on percussion is evident in the clavicular spaces, when the lung below is consolidated. This is mainly due to fibrosis. In one case of acute miliary tuberculosis no dullness could be demonstrated; in fact, Prof. Scott, an accomplished diagnostician, doubted the diagnosis. The patient died within ten days of his seizure and every part of the lung was densely stuffed with tubercles. Dullness in other parts of the lung alone may indicate large tubercular nodules or circumscribed pleuritic exudations.

The first note of danger may be a fine crepitation heard at the apex, or under the posterior angle of the scapula, confined to a limited area, heard at the end of a forced inspiration. Pro-

longed expiration is an early sign, and inspiration broken into "steps." Sharpened vesicular breathing is followed by broncho-vesicular and this by bronchial. During the progress of the malady every form of rale known may be heard, crepitant, subcrepitant, mucous, submucous, sibilant, sonorous, rhonchus, œgophony, pectoriloquy, etc., as well as every form of pleuritic sound.

Cavities cause marked retraction and loss of motion, increased tactile fremitus if empty, less sound-conduction if full, dullness on percussion if full of secretion, tympany if large and full of air. The note is louder and higher pitched if the mouth is wide open (Wintrich's sign). The tympanitic note may change in pitch with change of posture (Gerhardt's change of sound). The "cracked-pot" sound may be heard over large cavities with thin walls.

Auscultation over small, lax-walled cavities shows cavernous, low-pitched breathing; over large tense-walled ones there is amphoric, high-pitched respiration. Moist rales depend on the contents, and are developed or altered by coughing. Large cavities with smooth walls give "metallic tinkling." Pectoriliquy and amphoric whispers are heard over the largest cavities.

Fever is present from the first and its height indicates fairly the activity and extent of the disease process. Chronic forms with slight or no

tubercular infection show fever towards night and a normal temperature in the morning. Very high fever with hectic and night-sweats, or chills, indicates streptococcus invasion. Cessation of fever indicates quiescence of the malady, and if continuous, a cure. Sometimes chills occur so regularly as to induce the diagnosis of (quotidian) ague. Night-sweats follow fever of 104 or more, and are especially marked during destructive or septic stages. Wasting is also to be credited to the fever, being rapid in acute forms and becoming extreme in subacute. During apyretic intervals the patient may fatten considerably. Anemia comes from the fever and the impairment of nutrition. The blood may be normal or deficient in hemoglobin. Leucocytosis occurs only in septic, suppurative states. Debility is progressive.

Among concomitant phenomena may be mentioned tricuspid valvular disease, thrush, gastritis, early hyperacidity, later subacidity. Hectic sweats may alternate with bronchorrhea or colliquative diarrhea. Intestinal tuberculosis may result from swallowing sputa. The appetite is feeble, capricious, the digestive power small. Anal fistula is not common. Albuminuria is common, and nephritis may eventuate, amyloid or desquamative. Pyelitis or cystitis may occur from secondary tubercular infections. The face is pale, cyanotic sometimes in the later stages, the skin

dry and harsh with chloasma on the chest, or pityriasis versicolor, the hair extraordinarily luxuriant, the nails soft or brittle, the finger-ends clubbed.

The patient is singularly buoyant. The fever stimulates his mental faculties to unhealthy brilliancy. To the last he has a conviction that his malady is not "true consumption," and that he is going to recover.

DIAGNOSIS.—The aspect of the patient, his family history, occupation, habitation, the physical signs of localized pulmonary disease in one apex, slight cough, fever, wasting, hectic, hemoptysis, brilliancy in evenings and night-sweats are all ominous; but in these modern days the diagnosis is made solely by the microscope. The X-ray is of value only in advanced stages. The rise of temperature following the hypodermic injection of tuberculin is highly significant.

PYOPNEUMOTHORAX.	LARGE PULMONARY CAVITY.
History of pleurisy, interspaces motionless and bulging,	Immobile, flat chest, spaces depressed,
Apex beat displaced,	Apex beat normal,
Vocal fremitus less. Percussion note full and deep.	More fremitus.
Outline of dullness follows change of posture.	Tympanic or cracked pot.
Vesicular sounds and vocal resonances absent,	Wintrich's change of sound.
Amphoric sound if air passes opening,	Vesicular sounds and vocal resonance present.
Coin sound and succession splash.	Bronchial sound, increased,
	Crackling, gurgling, cavernous or amphoric sounds, pectoriloquy,
	No bell-tympany or splash.

PROGNOSIS.—Bad indications are the acuteness of the attack, rapidity of its progress, deficient resisting power of the patient, high and persistent fever, hectic, night-sweats, the presence of many tubercle bacilli and streptococci in the sputa, softening and cavity formation, complications, inability to take and utilize needed food, disposition to substitute alcohol for food, age below or at puberty, bad hygienic environment and poverty.

Death may occur from intercurrent disease, nephritis with hydremia, endocarditis, hemorrhage, angina pectoris, but usually is due to exhaustion. The course is most varied; one of my patients died in four days, while many survive for many years. Anders gives the average as three years.

LIABILITY.—The liability to tuberculosis is universal.

I have known the strongest men, living the healthy life of farmers, without an instance of the disease in their ancestry as known for several generations, to become tuberculous within a year from the day they married consumptive wives. Nevertheless the predisposition to the disease varies, and some are more liable to contract it than others. This is not always a question of strength, as the strongest of men may succumb to the attack of the bacillus when weaker men escape. When a student in Cleveland, one of my

classmates, Lee Heavner of West Virginia, a great powerful man, of faultless habits, without preliminary ailment, was seized with tubercular phthisis and succumbed within the year. None of his classmates, exposed to the same influences, occupying the same room, were affected. His family was well known to be consumptive. In this case the evidence seemed to be conclusive that there was a hereditary predisposition and not an infection through residence in an infected house, for the man was not living at home when the disease attacked him.

In many other cases the alleged inheritance is really a contagion, the patient being attacked while occupying the house, room, or bed, in which a tuberculous person is or has been. Flick has accumulated much evidence showing that tuberculosis haunts certain houses, attacking successive families dwelling therein. If, as is claimed, a consumptive emits billions of tubercle bacilli each twenty-four hours, it is easy to see how a house becomes affected. The most remarkable cases of galloping consumption I have ever known were in four men who occupied a very small bedroom. One became tuberculous and spit all over the floor, walls and bed. Two of the others were attacked, and died, one in six weeks, the other in four days. The lungs were crowded with tubercles to an incredible extent.

The liability to tuberculosis is greater in the children of consumptives, in scrofulous children, in those who are liable to epistaxis during childhood, in those who are debilitated through disease and faulty hygienic environment, the rickety, cyanotic, etc. The liability is also increased by the occurrence of typhoid fever, measles, whooping-cough, and any form of pneumonia.

Contagion is favored by crowding together numerous persons, in badly ventilated places such as asylums, jails, factories, and sweat-shops, especially when poor feeding and depressing influences are at work. The milk and flesh of tuberculous cattle carry bacilli, and domestic animals are frequently to be blamed with the infection of their owners.

In the great majority of cases the attack may be credited to the inhalation of the bacilli given off with the sputa of consumptives. Less frequently the other excreta are the source of infection. While the bacilli live for an unknown period outside the body, the influences fatal to them probably balance their reproduction, since the proportion of the human race that becomes tuberculous does not perceptibly increase. It is therefore evident that if care were taken to destroy all the excreta of all tuberculous patients an end would be put to the affection in time.

TREATMENT.—Consumptives should use a por-

table cuspidor, of which there are several available forms in the market. The sputa should be burnt; chemical disinfectants are less certain. The feces and urine should be passed into a vessel containing freshly made whitewash, and allowed to stand an hour before emptying. When the patient vacates his apartments, by death or otherwise, the disinfection should be as thorough as possible, the most satisfactory method being to burn the house down. For this reason it is advisable that such cases live in inexpensive houses, of wood or of corrugated iron, with the simplest of furniture.

No person should occupy the same bed as the consumptive, and the children of such patients should be taken to another residence if possible. They should be systematically hardened, by cold baths, salt rubbing, and open-air life, carefully regulated exercise, scientific feeding and, in a word, all the resources of modern hygiene. Children predisposed to consumption are apt to be very "nice" about their eating. They should be taught systematically to discourage the eccentricities of taste, and to eat everything. Too often these peculiarities are encouraged by the mother, under the idea that they are evidences of some sort of superiority on the part of the child. The stomach is a creature of habit and may be trained to do its duty as readily as the child itself. Especially should they be taught to eat fats, which

such children rarely do. At first the fat will cause indigestion, but by a few weeks' persistence this will be overcome and the fat will be relished. Similar persistence will subdue the dislike for nearly if not all foods at first not relished, and the net result will be a stomach that will digest anything its owner thinks best to put into it; a very desirable state of affairs. I have tried this method on myself and on my children, and speak from personal experience when I say that it can easily be done, and that the results are very satisfactory.

There are three respects in which the choice of a climate influences the patient, whether he is already a consumptive or simply predisposed to that disease. First: All persons gain blood in an elevated locality, the blood becoming richer in red cells and in hemoglobin in high altitudes. I noticed with interest the brick-red complexions of all the inhabitants, especially the children, at Silver Plume, Colorado, over 9,000 feet above the sea-level.

Secondly: All persons enjoy better health and resist the attacks of disease better as they spend more time in the open air. Those who are predisposed to tuberculosis and those who still feel capable of making a fight for their lives should arrange their affairs so as to keep in the open air as much as possible. There are advantages even in

the noble profession of the tramp, even in that of the book-agent. That climate is best for each patient in which he or she can spend the most time in the open air. This embraces the consideration of heat and cold, moisture and dryness, sunshine and shade, etc. An equable climate, without sudden changes or extreme heat or cold, with a maximum of sunny days, with a dry atmosphere and a free circulation of air, is usually preferred. A thickly wooded country would be objectionable because there would be little circulation and much dampness. Taken altogether, the western slopes of the Rocky Mountains offer the most generally suitable locations, the patient following them south into Mexico as the fall approaches, and north into Idaho as the summer advances.

Third: Individual preferences and peculiarities must be consulted. Broadly speaking, mankind is divided into two classes, the mountaineers and seamen. Some improve the moment they reach the mountains and languish at the seashore, while others, perhaps in the same family, find the seaside suits them and do badly in the elevated regions. Along the Atlantic coast there are many persons formerly consumptive who have found health there and have wisely made it their permanent home. Others are to be found in the Adirondacks, in Minnesota, Colorado, Southern California, Arizona, Texas, the Gulf Coast, Florida, the

West Indies, Old Mexico, and every other locality that has as yet been exploited as a "cure" for consumption. And in every one of these places are the graves of unnumbered dead, who have been allured by the glowing reports of the first enthusiasts who, finding health there, jumped at the hasty conclusion that their experience would be that of all who followed them. Beyond the principles laid down above, there is absolutely no benefit to be obtained from any climate, and the selection must be made on personal grounds entirely. It has not as yet been shown that any climate is specifically curative, or that any atmosphere has in it any element fatal to the tubercle bacillus, or is deficient in any element necessary to its vitality.

The only rule deducible from our experience is that no person should be sent to any place that has acquired a reputation for the cure of consumption. The reasons are, the pollution of the air by the bacteria from the crowds of consumptives, the lack of proper accommodations from the same cause, and the depressing influence of seeing around one these fellow-sufferers, all animated by the hope of a cure, and most of them evidently deceiving themselves. For the marvelous hopefulness of the consumptive does not take in his consumptive neighbor; and when one sees the others equally hopeful and yet failing every day,

the pessimistic thought is apt to intrude, that he also has been deceiving himself, and pessimism is a fatal symptom in a consumptive.

When the location has been selected, the patient must find some suitable occupation; and this is a matter of much importance. He ought to have a productive one, as he should be encouraged to look upon himself as a normal, self-supporting member of the community, not as an invalid. Indeed, it is hard to say how far this principle can be carried with advantage, as even advanced cases have responded favorably to it. By rule, the patient should keep quiet and in bed while the temperature is up, and do his exercising in the morning, when the fever is down. Fatigue is also to be avoided, as the tubercle bacilli more readily overcome the resistance of the body when it is exhausted by any cause. Fatigue is therefore apt to be followed by a development of the malady. The minute care that follows the patient about, checks him whenever he has had exercise enough, throws a shawl over him when heated or as the air grows cooler, keeps him in bed during the febrile period, and thus prevents taking cold, becoming fatigued and other possible causes of backsets, has its place especially with advanced cases, and that numerous class that has no sense of its own to exercise. Nevertheless, in this class we can but rarely look for a cure. In

the majority the result of our efforts is simply that prolongation of life and alleviation of its miseries that seem so much to the doctor and so little to the patient.

Though this method of management is theoretically correct, so strong is the influence of suggestion that some will improve by disregarding every precaution and deliberately forgetting that they are invalids. They go out every day, rain or shine, fever or no fever, persist in wandering over the mountains, eat all sorts of food with an out-door appetite, and by the force of will, of rousing the vital powers, and the influence of hope, they actually recover, the wounded lung cicatrizes, and they live out their allotted time. These are the exceptional cases. For one that is thus cured, twenty are killed by the same means. If the patient be of the timorous class that dreads death and wants to cling to every day that he may be kept alive, it is best to adopt the painstaking plan; and this is the only one for the advanced cases, for the weakly and indolent, and for those who are not likely to follow up the active plan with energy and intelligence. But for those brave souls that will only give up when life is extinct, who will die fighting if die they must, and will take any chance, small though it may be, rather than sit still and wait for death, the active plan is preferable.

The diet of the consumptive should be rich in nitrogenous articles, care being taken that they are completely digested. There is a certain antagonism between uricemia and consumption, and the meats that produce uric acid protect against the graver affection. Milk is most useful if from cows certainly not themselves infected. Eggs, fish, oysters, rare meats, with acid-pepsin to aid digestion, are of special value. But these are not to be used to the exclusion of other food. The most infinite variety of foods gives better results than any limited diet.

The question of alcohol has been fought over for many years, but the view now held is that this agent does not in any manner aid the patient, while it favors the occurrence of fibrosis and the destruction of the pulmonary cells. Its interference with nutrition is beyond question, while it destroys the appetite, the patient tending to gradually substitute alcoholic beverages for food. I never use alcohol in the treatment of consumptives and rarely in any other affections.

The use of nuclein in tuberculosis is based on the following consideration: Leucocytosis, the multiplication of the white blood cells beyond the normal number, takes place in almost every disease of bacterial origin, with the exception of tuberculosis. All these other microbic affections are self-limiting, again excepting tuberculosis. Is

there any connection between these two facts? Metschnikoff, in his celebrated observations on the phagocytic action of the white cells, concluded that these bodies played the part of an armed force, ready to combat any intruding micro-organism. Buchner followed with the observation that the blood-serum exclusive of the cellular elements could destroy disease germs. Finally Vaughan announced that by the administration of nucleinic acid the number and activity of the leucocytes could be increased.

While the evidence is strong in favor of nuclein when given by the mouth, it seems wiser, in administering an agent whose action is so nearly if not altogether a vital one, to take no chances on its being destroyed by the gastric juice, but to give it by the more direct or hypodermic method.

It is uncertain how much nuclein can be given with advantage, but I have administered it in doses of ten to fifteen minims once a day. My results are encouraging and the reports from my correspondents enthusiastic, but as yet the method has not been tried and judged with the thoroughness that is required by modern medical science. All I can say at present is that I recommend its use in all cases of tuberculosis.

This, with reconstructive tonics, preferably the arsenates of iron, quinine and strychnine, is the

only direct treatment I have to recommend. The various forms of tuberculin have all failed to establish their efficacy, and have less in their favor theoretically than nuclein. The reports from Trudeau indicate that no more is to be said on behalf of the various serums tested at his sanatorium. Many capable workers are running out the possibilities in these lines, and it may be that they will ultimately hit upon something of more practical utility; but at present this is still "in the air."

The endeavor to destroy the bacilli in the body by chemical germicides has resolved itself into the use of creosote and its derivatives, especially guaiacol. Out of many cases treated with these agents a few have been cured. These have been individuals who exhibited a remarkable tolerance of the drug, and very large doses were given for long periods, until the patient was saturated with it. One woman thus treated smelt like a ham and her skin was the color of drief beef. Few stomachs can bear these large doses of creosote and guaiacol, but oleo-creosote, the carbonates of creosote and guaiacol and other derivatives have proved more agreeable. Whether they are as effective also, I am not quite sure; but I have obtained excellent results from them in some cases, pushing the doses up to the limit of toleration; for if benefit is to be expected from a germi-

cide it should be given to bring the body under its influence as quickly as possible, to attain such a degree of saturation as will render it impossible for the bacillus to live in it.

The most potent agents I have yet found are the sulphocarbolates. The discovery of their usefulness was accidental. I had reason to fear that by swallowing sputa a patient would infect his intestinal canal, and to prevent this I gave him zinc sulphocarbolate, which I had long used as an intestinal antiseptic. With the disappearance of odor from the stools the fever dropped, the appetite and digestion improved, and the general improvement followed that is seen in other cases of febrile disease when intestinal antisepsis has been produced. For three years this patient has taken the sulphocarbolate of lime, forty grains a day, and in that time she has never missed a meal or had an indigestion. The calcium salt was chosen because the fragility of her tissues demanded lime, and it agreed with her stomach. I have since made the sulphocarbolates a standard prescription in all cases of consumption, and have been abundantly satisfied with the results.

Iodoform is a remedy that has been recommended by many clinicians, on different grounds. J. Solis-Cohen praises its general utility, affirming that he had obtained more benfit from it than from any other single remedy. It is, in part at

least, eliminated by the lungs, favorably affecting the cough, stimulating the absorbents, and possibly acting in some degree as an obstacle to the multiplication or to the activity of the bacilli. There is an unusual tolerance of this agent in consumption, and I have given from five to twelve grains daily for months without the production of iodism.

Many observers have noted the virtues of strychnine as a general tonic, improving the appetite and digestion, checking the fever and the night-sweats, as well as the tendency to colliquative discharges by the skin or the bowels, etc. I have found it decidedly advantageous to give strychnine arsenate gr. 1-30, three to seven times daily.

Fever is not so much due to the direct efforts of the bacilli as to the absorption of septic products. It is necessary therefore to keep the purulent matter cleared away as thoroughly as possible. The pulmonary tract may be cleared out by inhaling the fumes of boiling vinegar for five minutes or more every night just before retiring. This removes the collected secretions, and the patient has relief from the cough for some hours, perhaps until the next morning. Advantage may be taken of this to try to reach the affected tissues with local remedies applied by the atomizer. I usually employ an oil atomizer charged with a mixture of europhen in fluid petrolatum, one part

to eight, and spray with this for five minutes. Some few patients find great relief from inhaling the fumes of burning sulphur, and this should be of great value as a germicide, but most persons are unable to bear even a slight inhalation of this irritant gas.

The foregoing treatment, aimed at its cause, generally reduces the fever to a safe point; so that direct treatment of this symptom is not often required. In case an antipyretic is needed, however, from five to ten drops of guaiacol may be rubbed into the skin, in the clavicular region. This produces so decided a fall of temperature that some caution should be exercised in its application. Or, five grains each of guaiacol and piperazin may be given in capsule every four hours. The reduction of the temperature in this manner is more decided and lasts longer than when Niemeyer's pill, quinine alone or any of the synthetic antipyretics of ihe anilin series are given

The cough may be treated on general principles, giving codeine, the cyanide of zinc, cannabis, or steam inhalations to soothe irritation; emetin or lobelin to stimulate secretion; sanguinarine to arouse sensibility and cause retained secretions to be ejected; atropine or aspidospermine to allay dyspnea; strychnine and cubebin to restrain excessive secretion, etc. The uses and causes of a cough should not be forgotten in treating it.

Indigestion, diarrhea, etc., cease to be prominent symptoms of consumption when the general treatment advised is employed, and hence I have nothing to add on this score.

And with all this done, what is the net result? What hopes can we hold out to our patient? Will he in spite of it all simply delay his steps awhile, and then rejoin that innumerable caravan that is steadily marching along the road to the consumptive's grave?

We are entirely too gloomy in our prognoses of consumptives. Whittaker says that it is shown by the records of many thousands of autopsies that two-thirds of the human race suffer at some period of their lives with tuberculosis, and that one-half of these examinations show that the disease has been cured. This gives a general mortality of fifty per cent. Admitting the correctness of the gentleman's figures, it is difficult to get away from his conclusions.

I can now look back over a period of thirty years spent in the study and practice of medicine. I have attended many a consumptive to the grave. But throughout my professional life I have seen cures; at first not admitted, as the conviction was so strong that the disease was incurable, that the diagnosis was denied if the patient recovered. This, of course, effectually "jugulated" all the chances of establishing a successful method of

treatment. But since the discovery of the bacillus, easily determined by the use of reagents and the microscope, we can proceed on the basis of certainty as to diagnosis, and maintain our claims of success. And this enables us to assert that our earliest claims were well founded, and that consumption has indeed been cured many times when the doctor allowed himself to be "bluffed" out of the results of his labors.

It is also evident from this retrospect that there has been a progressive improvement in the results, as the methods and the skill of the doctor improved with experience. Cures have been more frequent, and the average life of those who were not cured has been longer. And since everyone must expect to die sometime, the importance of this latter statement is greater than at first sight seems obvious. Let it be understood that in each case the prime object is not so much to kill a swarm of invading micro-organisms, or to restore a diseased organ to an impossible condition of perfection, a return to the *statu quo ante bellum,* as it is to best utilize and promote the patient's remainder of vitality, to extend his life and capacity to work and enjoy to their utmost possibility. If this be fully comprehended by the doctor and his patient, the problem assumes a somewhat different aspect. Many a valuable life has been wasted in the vain attempt to win an utterly

impossible "cure," when under proper management the patient might have lived to the full limit of his expectancy.

How to live the best and longest with tuberculosis is often our study. In this is involved the proper care and treatment of all classes of cases, from those that can be entirely and permanently cured to those who go down rapidly to the grave.

From the treatment outlined in this paper the writer has had better success than from any method previously employed. The improvement in some cases is almost past belief. In some, the bacilli in the sputa grow scarcer at each successive examination and finally disappear; the symptoms showing a corresponding course. In others the bacilli decrease until very few remain, but these few persist obstinately. No case in three years submitted to this method has failed to improve very much. Cases of mixed infection have received in addition such treatment as was indicated, Marmorek's serum for streptococci, calcium sulphide for staphylococci and other infectious micro-organisms, etc. The value of the latter agent in tubercular infection is a question in which I am deeply interested, but which I am not yet ready to discuss.

CHAPTER XXXVI.

CAMP AND SANATORIUM TREATMENT OF CHRONIC PULMONARY MALADIES.

It has been shown conclusively that exposure to sunlight is destructive to the tubercle bacilli, while it increases the vital resistance of the patient. Denison says that when cattle are confined to stables they become tuberculous, but when taken from their stalls and sent out to graze on the open prairie they gradually recover, so that tuberculosis becomes extinct on the ranges.

Local tuberculosis of the skin has been treated by exposure to the actinic rays with some success. The effect has been attributed to the germicidal action of the chemical rays, just beyond the violet, to the increased supply of blood thus attracted to the skin, and to the effect of the light upon the blood. In the laboratories light must be excluded or the cultures are lost. It is obvious, therefore, that the climate best suited for consumptives is that where they can enjoy the most sunshine.

Kime very rationally contends that to secure the benefits of sunlight the patient's body should be exposed to it, and not merely his clothes. He

has demonstrated that when concentrated the actinic rays pass entirely through the human body, with sufficient intensity to reproduce a picture on a photographic dry plate. The skin offered most resistance, the muscles less and the bones the least. By using blue light a large percentage of the actinic force is utilized, with little of the heat, which is strongest in the red rays. Kime is in doubt as to whether the rays kill the tubercle bacillus directly or simply by stimulating phagocytosis; but in skin tuberculosis he is positive as to the curative action, the malignant ulcer being converted into a simple one. In one of his cases three treatments of ten minutes each, with a blue lens near the cautery point, effected a cure in three weeks.

Abrams reported cures of tuberculous lymphatic glands by this agent. Whether the method will prove as successful in the treatment of pulmonary tuberculosis remains to be seen; though the early reports are encouraging. The question is most important, as, if the advantages of climato-therapy can be thus secured at any place, its benefits may be extended to the enormous majority who cannot leave their homes.

The value of a residence in elevated regions lies partly in breathing the rarefied air. This stimulates the respiratory apparatus and develops it, so that mountaineers are noted for the

fine development of their chests. This is imitated in the pneumatic cabinet, which the patient enters and the air is rarefied by an exhaust pump. This is said to be a very effective remedy for pulmonary hemorrhages, but at the best it is but a paltry substitute for the mountaineer's life, with its sunlight, pure, cool air, exercise in climbing, with the consequent appetite and digestion. An hour or two spent in the cabinet is of benefit, but living on the mountains for 24 hours of each day is that much better.

The cabinet permits the use of medicated inhalations but these are managed easily without it. In the cases where I have employed the fumes of burning sulphur I have been surprised at the ease with which patients withstood them. Personally the smallest trace of the fumes in the air will set up the most violent coughing, which will last long after leaving the room; but tuberculous patients will breathe with comfort, and absolutely with liking, air thick with the gas. The inhalations generally give marked relief, and the symptoms are ameliorated, sometimes for weeks or months afterwards.

The great value of Finsen's light-cure lies in the patient's being treated at his home, where he is under the doctor's watchful care. In the vast majority of cases this is the first essential. Few men or women know how to live hygienically.

Still fewer do it, even when healthy. In chronic disease of the lungs the regulation of the life is everything. Fatigue seems always to be followed by a renewal of the malady, as if the little enemies were ever ready to seize a favorable opportunity to renew their attacks. A lazy indoor life saps the vitality also; so that to steer between the two difficulties, securing the maximum benefit of out-door exercise and avoiding fatigue, requires a nicety of judgment rarely seen outside of the medical profession and not too often within its ranks.

Then again, few consumptives know how to vary their clothing with the changing weather, how to get the greatest benefit from their food without overtaxing the digestive organs, how to train the stomach properly; in a word how to give their personal habits that minute and intelligent care they demand, and yet not become hypochondriacs or valetudinarians. Is it not all summed up by saying that the consumptive must have a doctor to do the thinking for him, in so far as his malady is concerned?

I have said that the best climate is that which affords the largest proportion of sunshine. Add to this the benefit of mountain air, and we will find what we seek in the elevated regions of the Rocky Mountains, along their entire extent. In summer the patient can go north, and ascend

higher to secure coolness; in winter he must go south, or descend to the foot-hills. In Northern New Mexico, at Aztec, on Las Animas river, some consumptives have regained health. This table-land is about 6000 feet above the sea; it is cooled in summer by the breezes from snow-clad mountains, and protected by them from excessive wind. The winters are mild, with but little frost, so that with the aid of an oil-stove patients can live in tents the whole year. The soil is sandy, drainage good, water alkaline. Fruits of all kinds flourish on the soil watered by irrigation (by private ditches, not by corporations). The air is dry, the sandy plains extracting the moisture. No great rush has yet occurred to this region, so that it is as yet unpolluted.

Arizona is well-suited for winter residence, but too hot for summer. Along the mountains thence down into old Mexico can be found many ideal localities, for those able to care for themselves and secure their own food. Those able to hunt can find game in abundance, but outside the States they need not expect hotels or American food. For those who can endure and enjoy the life of the hunter and prospector, health is to be found in these regions.

For the delicate, women and advanced cases, it is wiser to go where the comforts of civilized life can be procured. Florida, our new island

possessions in the West Indies, Cuba and the Lesser Antilles, offer many eligible locations. where the patient may enjoy life, obtain its luxuries, accomplish a cure when still possible, and prolong life and its enjoyment to the greatest extent when a cure cannot be secured. In other words, a residence here is pleasant, and offers the best chances for a cure to those not calculated for the rough life of a hunter.

I know of no work so well suited as a guide-book than the one written by my old friend W. F. Hutchinson, under the title of "Under the Southern Cross." Dr. Hutchinson for many years spent the winters in the West Indies, Central or South America, and gave in this book exactly the information one wants—where, when and how to go, hotels, prices, pleasures, dangers, how to dress, etc. The book was published, I believe, by Appletons.

Porto Rico has not yet been exploited, but deserves especial attention. Its hills should prove especially suitable for the winter homes of invalids, when the government is settled and roads built. Probably many openings for the profitable employment of convalescents with some capital will be found there.

Robert Louis Stevenson sought health in the islands of the South Pacific, and found there a grave. Nevertheless, he undoubtedly lived longer

and more comfortably than if he had remained in the North. The climate of the Philippines is hot and damp, and under such influences the disease progresses rapidly, the bacteria multiplying fast. But there are many islands where eternal spring reigns, and if one can bear the isolation the conditions are most favorable to a cure. But—one young man I sent there returned; and when I asked him if he knew he came back to die, he said, "Yes, but I would rather die in God's country than live there."

Some persons care more for life than for human society, but this matter should be considered carefully before advising. If the patient, forewarned, chooses life, let him be sent to seek out a suitable place, and when there adopt the native costume of a bracelet or two, and let the sun exert its full power. To some of us who have had fifty years of not overly pleasant experience with humanity, a Crusoe-like life on an ocean inland, with a shipload of books and other necessaries, would not seem so undesirable.

In prescribing a camp life several important objections are advanced by Von Ruck, such as the difficulty of obtaining a constant supply of fresh meats, milk, cream, butter and other stores, and preserving them, keeping the camp in a sanitary state; taking colds; care for acute attacks; shifting location with the season; to which may

be added the questions of accessibility, aid in case of need, and the intrusion of hostile or curious visitors. In truth, camp life suits but a limited class. Even so, the time required for a cure is long, by no means limited to a few months; and when one has been cured, there will be found an increased liability to relapse, when the whilom patient returns to the germ-laden air of civilization. He has lost his immunization by breathing pure air.

Brooks enumerates the following essentials for sanatoria designed for consumptives:

1. There should be a good southern exposure.

2. The soil should be well drained and preferably of gravel. It is, of course, essential that the foundations should be dry.

3. There must be free access of sunlight.

4. The "camp" for the "Liege und Dauerluftkur" should be situated in the open, but protected from the north and east winds. Glass covers to the verandas are not necessary.

5. There should be facilities for walking, preferably through woods, and if possible up a slight incline from the sanatorium, so that the homeward journey may be downhill. There should be facilities for resting at easy distances.

6. The diet should be most carefully regulated. Feeding should be slightly in excess, but

the food should be well selected, nutritious, temptingly served and, of course, properly cooked.

7. There should be large, airy, individual sleeping apartments, affording free admission of sunlight.

8. Every patient must be provided with an individual spitting-cup, and forbidden upon pain of immediate dismissal to spit anywhere else.

9. There should be withal scrupulous cleanliness, adequate service and regular disinfection. The furniture should be somewhat severe. Carpets, brooms and hangings have no place in a well organized sanatorium. Cloths, dampened with antiseptics, should be substituted for dusting.

10. There should be a routine of occupation, together with simple diversions, to prevent introspection.

Much, very much, could be said in favor of the sanatorium for consumptives. The constant supervision, the watchfulness over the development of the malady and prompt application of suitable remedies, all by one skilled in the management of these cases by daily association with the patients, all this is of incalculable value.

All that can be urged against the sanatorium may be embraced under the single head of mismanagement. If the destruction of sputa, the daily fumigation of the living rooms, and the

other measures to prevent the infection of the premises and reinfection of patients, are not carried out perfectly, the sanatorium is about the most dangerous place a consumptive could find. A patient once informed me that every morning the servants in a popular "sanatorium" could be seen mopping up the sputa from the halls, corridors and public rooms!

But with proper management such an institution offers the very best chances for the cure of the consumptive, and I believe the per cent of cures there largely exceeds that obtained by the camp method. Under the use of the treatment herein advised the bacilli in the sputa become fewer until they disappear, the symptoms and general condition of the patient showing corresponding improvement. Keep him in the sanatorium until this has been accomplished, and he has been taught thoroughly the lesson of how to care for himself; then send him to the camp.

What after all do we mean when we speak of a cure for consumption? The bacilli may disappear, the cavity scar and contract, the disease become obsolete. But the bacillus always lurks for an opportunity to reinfect his victim; the predisposition that originally determined the attack remains; the congenital vulnerability of the tissues has not changed. Hence the patient who has been cured of phthisis still remains more

liable to a fresh attack than the person who has never suffered from the malady; more, even yet, when he sojourns in a bacteria-free atmosphere he loses the degree of immunity he has enjoyed while constantly exposed to the action of the bacilli, and when he returns to the inhalation of air thickly inhabited by them, they find his leucocytes unprepared to resist their onslaught. Hence the cured consumptive, who wants first of all to continue living, should find an open-air life that he is content to adopt for the remainder of his days, and henceforth eschew the "busy haunts of men." There must be no hankering for the flesh-pots of civilization; he must be a solitary wanderer on the face of the earth the rest of his days.

CHAPTER XXXVII.

MANAGEMENT OF THE PREDISPOSED

One of the most serious problems before the physician is the care of persons not yet consumptive but predisposed to become so. These are the weakly children born of consumptives; of parents weakly, drunkards, greatly differing in age; in families where the new baby comes regularly every year or less. The children are frail, teething late and badly, walking late, the sclerotics blue, the skin thin and transparent, the veins showing through, under-sized, precocious in studies and too weakly to take part in the rougher games of their companions, subject to catarrhs, epistaxis and gastro-intestinal attacks. The skin sometimes has a soft, greasy feel, and emits a catarrhal odor. The eyelids may be eczematous. The chest is flat, the lung-power below the average.

Some of these children suddenly shoot up to unusual height, but this only emphasizes the defective chest-capacity. They are usually very nice about eating, liking few things, avoiding fat and coarse vegetables. Some, however, are gross, the face pimply, the neck seamed with the scars of glandular suppuration, the habits glutonous,

with indigestion, biliousness, and uricemia habitually.

Very rarely the florid type develops, with a complexion whose rich olive and high color has a brilliancy that is wonderful. These people generally get the reputation of using cosmetics, or "eating arsenic," to explain the unnatural beauty of the skin. One remarkable case of this variety died of Pott's disease; two others are married, mothers, and seem to have safely passed the dangerous period. All were girls. I have never seen or heard of a male case of this description.

I have always looked upon the essential point of this predisposition to phthisis as being a deficiency of lime, the element to which the cells of the body owe their strength. If the lime is deficient the cells are fragile, they break down easily, the skin breaks on slight irritation or exposure to cold or wet; the bones ossify slowly, the teeth are slow in erupting and decay soon.

It has been noted that consumptives rarely have good teeth. I have also noted that never once in over 30 years' practice have I seen a case of cervical adenitis in a person with sound teeth; so that I have learned to look on the decaying teeth as an open door of which tubercle bacilli often avail themselves. The tonsils form another

open door; and in their crypts may be found the original site of many a tubercular invasion.

The deficiency of lime is not due to its scarcity in the food or drink, for this element is often in excess in hard waters, and is present in every ordinary meal in sufficient proportion for the bodily needs. The difficulty is in its assimilation. This may be partly remedied by giving an excess of lime with the food, or by giving this element in the most manageable form. Experience has shown that while a large proportion of fat, lime, iron, etc., passes through the alimentary canal and is ejected in the feces, the larger the quantity swallowed, the more will be absorbed. If, for instance, one grain of iron be given daily, but one-tenth of a grain may be absorbed, but if ten grains be given one-tenth of this, or one grain, will be taken up.

So with lime. Give a superabundance of it, preferably as lactophosphate, the form experience has shown to be most easily dissolved in the body-fluids. Let the child be taught to suck soft bones of young animals, and chew off as much of them as possible. Powdered bone would doubtless also be useful if it could be procured at a reasonable price. Marrow on toast or in soup is usually relished by any one. More lime will be absorbed if given in numerous small doses than in a few large ones. A granule of calcium lactophosphate,

0.01 (gr. 1-6) every half-hour, does more good than 0.3 (gr. v) thrice daily.

I have many times noted the good effect on such delicate infants of daily inunctions with oil. It seems reasonable that a thin animal oil will be more readily taken up by the skin and utilized than a thick or vegetable grease; so that cod-liver oil, lard oil or goose-grease is usually recommended. They may be rendered inodorous by adding a little eucalyptol or any volatile oil. The inunctions should be kept up throughout the winters and as long as the child appears to require them. For older patients a woolen undershirt may be saturated with the oil and covered with oiled silk to protect the outer clothes.

Even more important is the regime by which the child is strengthened, its power of assimilating the food-elements increased, and the tissues rendered more resistant to morbific influences. The diet should be carefully regulated to the needs, and the child taught to eat all varieties of wholesome food. Dislikes are soon overcome by having the child eat *one very small morsel* of any food it dislikes, or that it does not digest readily, at every meal. Especially should it be thus trained to eat fats of every description. A well-trained stomach is the most secure form of life-insurance.

Hot salt baths keep the skin in good order,

and bring the blood to the surface for aeration. These may be gradually replaced by dry rubbings, with towels dipped into brine and dried, and in midsummer the cold bath may be begun. This should be looked upon as strictly a therapeutic measure, not a means of purification. The ideal cold bath is a quick plunge, shower or douche, of momentary duration, a quick in-and-out-again, followed by brisk rubbing or slapping to bring about strong reaction. If commenced in midsummer the baths may safely be continued the year around.

The effect is to increase oxygenation, stimulate a more active circulation, put the skin in a healthy condition, and by accustoming it to cold render the patient less susceptible to catching cold. The sense of strength and well-being following the cold plunge stimulates the child to greater physical activity, and arouses the desire for free out-door sport. Moreover, the moral effect is by no means unimportant. No child at first can look on the prospect of a cold plunge without shrinking; and the necessary nerving one's self up to do a disagreeable thing because it is a right thing to do, is a lesson that cannot be learned too early in life.

The love of out-door sports and occupations should be sedulously cultivated, and yet over-exertion as sedulously avoided.

It does seem as if a most useful innovation in our school system would be the making of domestic and personal hygiene a leading study, with practical demonstrations, and such exercises as would compel the pupil to really comprehend its meaning, instead of a perfunctory topic slurred over once a week, hastily, that the pupil may get back to the "classic" topics; the real value of which in the adult life is incomparably smaller. I would have every pupil compelled to measure the air-space of every living room in his home, and calculate its capacity for those dwelling therein, with the average consumption of oxygen by firelight and respiration; the ventilation; test the drinking water; examine the dust microscopically and bacteriologically; examine the food chemically and microscopically—in a word I would make him comprehend hygiene, even if he never learned to expand the binomial or even to enumerate the Kings of England.

Gymnastic training is of value, to expand the chest and develop the body symmetrically; but here also good sense must rule. Compare on the one hand the consumptive pugilist Needham, the only man who ever won a decision in the ring against Tom Sayers, and the fact that so many trained athletes die consumptives. Needham, by carefully developing his powers to their utmost healthy limit, accomplished his object. Many

athletes, by attempting to develop themselves beyond their natural powers fall victims to the bacillus, to which the exhaustion of over-training offers a most excellent opportunity.

The selection of an occupation should be made with the advice of the physician. I am too well aware of the execration that one would incur, by advising any one to increase the number of book-agents or peripatetic dealers in anything, but really the life is nearly an ideal one for our ci-devant predisposed-to-consumption, who yet is not prepared to take to the hunter's or prospector's life. In the millennium the noble profession of the tramp may become respectable; or perhaps a really useful form of tramping may be devised, as of a youth I once knew who regained health as a peripatetic varnisher. There are many such things that would make a workman welcome at the farmhouse.

Space forbids a detailed description of the useful gymnastic methods, but a few words must be said of respiratory exercises. Indian club swinging develops the chest-muscles admirably, and has the great advantage that the patient can have the clubs ready for a five-minute swinging at any hour, and many times a day. Always stop short of fatigue, and use the clubs for short periods and but few times a day at first, gradually increasing

the length and frequency of the exercises as the muscles develop.

Let the child be taught to breathe through the nose alone, to hold the head well up, and to slowly inhale until the lungs are fully distended, five or six times in succession, after every club-swinging. Carrying something balanced on the head is an excellent means of cultivating an erect carriage, and if the weight be gradually increased the spinal supports are thereby strengthened.

Athletic contests, foot-ball, wrestling, boxing, etc., are usually to be avoided, though tennis, golf, hand-ball and base-ball are useful. The rule is that the youth must avoid all exercises that strain his muscles, or try them to the limit of their capacity. All his work must be easily within this limit, and neither his own ambition nor the taunts or persuasions of his comrades must be allowed to provoke him to the full display of his strength. The best way to insure this is to teach the boy to look on exercise and sport as means for attaining health rather than as exhibitions of prowess.

For these subjects a residence in the mountains is always advisable. The chest develops best by breathing the thin air of elevated regions. The blood is better oxygenated there, so that the brick-red complexion of dwellers over 8000 feet above sea-level excites the wonder and admiration of lowlanders; and the pure air offers few chances

for infection. But woe to the mountain-bred youth who leaves his hill-tops to reside in the crowded city. He is doomed to the consumptive's grave. The mountaineer's pining for his native hills of which the poet has so often sung is strictly physical in its basis, and easily comprehended by the pathologist.

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Haught

Diseases of the Respiratory Organs