hibition bread is included, as it is particularly apt to disagree. Articles of diet that are fried, pastry, cakes, and sirup, etc., are highly objectionable. Meats should be broiled or roasted. Boiled meats and soups are improper. There should be as little fluid drunk at meals as possible, but a little black coffee may be allowed at breakfast.

DISEASES OF THE LARYNX—ACUTE CATARRH OF THE LARYNX—LARYNGITIS.

Definition.—By *acute catarrh of the larynx* is intended an inflammation involving the mucous membrane—a catarrhal inflammation. There is also a chronic form of the disease—chronic inflammation.

Causes.—The mucous membrane of the larynx is in a position to be quickly and easily affected by external agents of a gaseous or aëriform kind—such as ammoniacal gas, chlorine, tobacco-fumes, etc. Very fine solid particles may be carried in the air in sufficient quantity to excite an irritation of the laryngeal mucous membrane. But the organ is more frequently affected by the condition of the atmosphere itself. The long-continued inspiration of air contaminated by respiration is very apt indeed to cause congestion of the mucous membrane, especially when to this is added the sudden contact of cold air. Too prolonged exertion of the voice may also excite a catarrhal inflammation, especially when the exertion is made in the open air. "Taking cold" is a fruitful cause of laryngitis. There may be an extension of trouble from the pharynx and from the face (erysipelas). Influenza may extend to the mucous membrane of the larynx. Inflammation of the larynx is not an infrequent complication in the course of the infectious diseases. Climate has an unquestionable influence; humid, cold, and variable climates increase the disposition to affections of the larynx, while warm and equable climates lessen the tendency to these diseases. Affections of the larynx occur at all ages, and both sexes are equally liable in proportion to their exposure to the causes.

Pathological Anatomy.—In the mildest cases there is a transient hyperæmia of the mucous membrane—in certain situations—over the arytenoid cartilages, the ventricular bands, the posterior ends of the vocal cords, and the space between the arytenoid cartilages. In more severe cases there is a good deal of swelling as well as injection of the ventricular bands, the epiglottis, the ary-epiglottidean folds, and the inter-arytenoid space, etc. The color in severe cases, instead of being reddish, is a dark, reddish-brown.

Symptoms.—In the mildest cases there is no constitutional disturbance. The local symptoms consist in heat, rawness, and tickling, referred to the larynx and pharynx. When the thyroid cartilages are pressed, unusual soreness, irritation, and severe pain are experienced. There are also present dryness, and a feeling of a foreign body sticking in the throat. Swallowing causes pain by the upward movement of the larynx, and by the pressure of the bolus on the larynx as it descends to the stomach. In the more severe cases the onset of the disease is announced by some chilliness and general *malaise*, followed by moderate fever, anorexia, etc., for several days. Cough occurs at once, and it is noisy, harsh, hoarse, or toneless; or, in children especially, has a ringing, sonorous, so-called "croupy" character. The cough is dry, and produces a sensation in the larynx as of scratching over a raw surface; but in a short time secretion is poured out, and then the cough has a loose character. At first some frothy mucus is expectorated; it may be streaked with blood occasionally, but in the rare hæmorrhagic form pure blood may be expectorated. The sputa soon assume the appearance of muco-pus, the pus elements predominating; and it contains also cast-off ciliated epithelium, young cells, etc. At first the voice is thick, and becomes hoarse on talking; but as the case progresses the hoarseness deepens, and at length there is aphonia. Dyspnœa rarely occurs to adults in simple mucous laryngitis, but in children spasm of the glottis may come on, when there is extreme dyspnœa in brief paroxysms. But, as this disorder will be discussed in a separate section, its consideration as a symptom of laryngitis is postponed. A sense of oppression and need of air is caused if there be much swelling of the vocal cords or ventricular bands in the case of adults—a condition of things not apt to occur unless there be some effusion into the sub-mucous connective tissue. Besides hoarseness, which may end in aphonia, there may be various alterations in the tone of the voice, high pitch or low pitch, and its timbre may be subjected to corresponding variations. The peculiarities of voice are due to swelling of the mucous membrane, variations in tension of the vocal cords, and the condition of the muscles moving the arytenoid cartilages. The tone of voice is hoarse and rough from swelling of the cords, discordant from the difference in the rate of vibrations of the two cords, high-pitched if the tension in the cords is great, low-pitched if the tension is low; or there is a double tone, now high, now low, if the cords vibrate with opposite tension. On laryngoscopic examination the state of the mucous membrane, of the vocal cords, ventricular bands, etc., can be made out, and the changes described verified.

Course, Duration, and Termination.—Acute laryngitis passes through its course in a week, if mild; but the more severe cases may occupy three weeks to a month. Mild as well as severe cases may continue indefinitely by repeated relapses, and at last assume the chronic form. Under some circumstances a simple laryngitis may assume formidable proportions by the extension to the sub-mucous connective tissue.

Treatment.—Confinement to bed for the more severe cases, and to a uniformly but not too highly warmed apartment for the milder cases,

is essential. The air of the apartment should be kept moist by the vapor of water disengaged in it. For the relief of the inflamed mucous membrane, tincture of aconite-root—one drop for a child and two drops for an adult every two hours—is highly efficient. If there be much cough, and especially if the cough have the "croupy" character, two to five drops of the deodorized tincture of opium and one or two drops of fluid extract of ipecac may be given together. Application by spray douche of a solution of morphia to the throat is an excellent means of relieving cough, but is not so generally available as the internal administration. A very minute quantity of tartar emetic, with paregoric and sirup of lactucarium, is also an efficient combination. A hot or cold pack should be wrapped about the throat after a brief application of mustard; and, if the case is just beginning, the feet should be placed in a mustard foot-bath. If there be a tendency to spasm of the glottis, bromides should be used. Bromide of potassium may be given with any of the combinations above mentioned.

Prophylaxis is very important in the case of those who have frequent attacks, especially if a phthisical tendency exists. They should wear flannels and protect the feet against dampness, while at the same time they should avoid warm wrappings, especially furs about the throat. The tendency to take cold may be obviated by a daily morning cold sponge-bath, and by keeping up the general health. During a variable season, taking cold may be prevented by the daily morning administration of five to ten grains of quinine, and the access of an impending attack may be prevented by a full dose of quinine and morphine (15 grs.—gr. $\frac{1}{4}$–$\frac{1}{2}$).

CHRONIC LARYNGITIS—CHRONIC CATARRH OF THE LARYNX.

Definition.—*Chronic laryngitis* is an inflammation of the mucous membrane, less active in type than, but the same in mode as, the acute inflammation.

Causes.—The chronic form of catarrhal inflammation of the larynx arises under the same conditions as the acute form, or it succeeds to an acute, or is a result of repeated acute inflammation. Tobacco-smoking, spirit-drinking, and careless use of the vocal organs in speaking, reading aloud, or singing, are all influential causes, the most important, in fact, in our day. The middle period of life and the male sex are predisposing causes.

Pathological Anatomy.—The changes described as occurring in the acute form are the initial lesions in the chronic, except that in the latter the color is deeper red or brownish, the mucosa is more swollen, and the submucosa as well as the mucosa is thickened and indurated. Swelling of the inter-arytenoid fold of mucous membrane and of the ventricular bands (false vocal cords) occurs to the degree that the movements of the arytenoid cartilages are interfered with, and consequently of the vocal cords also. The epiglottis is likewise swollen and thickened, and marked by enlarged and varicose veins. The vocal cords themselves are injected, and their margins roughened. The follicles of the mucous membrane are enlarged by accumulation of their contents in part, but much more by hyperplasia of the surrounding connective tissue. The enlarged follicles or glands, more or less thickly distributed over the surface, give to the mucous membrane a granular appearance. Very rarely hyperplasia of the connective tissue underlying the vocal cords takes place; the new tissue contracts, and deformity, with stenosis, is the ultimate result.

Symptoms.—Various uneasy sensations are felt in the larynx—a sense of heat, and an irritation compounded of itching and scratching of a tender surface; this leads to hawking and clearing the throat as if some obstruction were present. Exposure to cold air increases these sensations, but still more irritating is prolonged talking, especially in the open air, leading to frequent swallowing of saliva. The voice is husky, and becomes so much so by talking that frequent efforts to clear the throat are necessary. The voice becomes hoarse, rasping, and deep, or it is high-pitched, and unexpectedly drops into falsetto. As much effort is necessary to get out the sounds, these patients acquire a straining tone and manner, and now and then, amid husky and hoarse, almost toneless sounds, they utter a more distinct and intelligible sound, giving an eccentric and variegated expression to the conversation. The effort required makes talking very fatiguing. In the morning the most severe paroxysms of coughing and straining are experienced; the secretion accumulates during the night, and it is detached with difficulty, so that much coughing, hawking, and straining are necessary. The secretion is in the aggregate not considerable, and consists of a tenacious mucus, with some pus-corpuscles.

Course, Duration, and Termination.—It is a very chronic malady and is subject to exacerbations and remissions. Care in the management of the organ, and of the general health, rest, and appropriate treatment, bring relief, but abuse of the organ, irregularities of life, and the absence of all treatment, will restore the diseased state to full activity. Years may be passed in this way, the general health meanwhile not suffering from the laryngeal disease. Cures may be effected in favorable cases, if proper treatment is carried out faithfully for a sufficient period of time, but the difficulties in the treatment, the self-denial to be practiced, and the duration of the case, should not be concealed from the patient.

Treatment.—Any effective treatment must include local applications, directed by the laryngeal mirror and by spray. As there is a large extent of surface involved, and as the increased blood-supply is the leading pathological factor, the application of medicated spray may be sufficient of itself. A great number of medical agents are so employed—a solution of tannin (gr. v—ʒ j), of sulphate or acetate of

zinc (gr. j—℥ j), of chlorate of potassium (gr. v—℥ j), of bromide of potassium (gr. x—℥ j), of nitrate of silver, with care (gr. j—℥ j), and of morphine sulphate if there is much irritability. Solution of nitrate of silver is applied by the brush directly to the interior of the larynx. Ziemssen recommends in inveterate cases the solid nitrate, which is applied by the caustic-holder directly. Such external applications as the tincture of iodine, the ointment of the red iodide of mercury, etc., are serviceable as counter-irritants. The larynx must be kept at rest as long as practicable. Taking cold, sudden changes of temperature, exposure to draughts, must be avoided. The general health must be maintained by a suitable mode of life. Change from a variable to a more equable, and from a humid and cold to a warm and dry climate, will often have a most favorable effect on the case.

ŒDEMA OF THE GLOTTIS—INFILTRATION OF THE LARYNX.

Definition.—*Œdema of the glottis* means a serous effusion into the sub-mucous connective tissue. The disease or condition intended by this term is an obstruction to breathing produced by an infiltration of the larynx by any kind of fluid.

Causes.—An inflammation of the mucosa may extend to the sub-mucosa, and cause œdema. A deep-seated phlegmon of the neck, or of the tonsil and the base of the tongue, may involve the larynx by the diffusion of the pus under the mucous membrane. An inflammation of the cartilages or of the perichondrium may result in a similar purulent infiltration. Erysipelas of the face, typhoid fever, or scarlatina, may be unexpectedly terminated by a sudden effusion into the sub-mucous connective tissue. During the course of Bright's disease, œdema of the glottis may occur, or this may be the first symptom of the malady to attract attention.

Pathological Anatomy.—The œdema exists in those parts containing the most abundant and loose connective tissue—in the ary-epiglottic folds, the glosso-epiglottic ligament, at the base of the epiglottis, and in the inter-arytenoid space. When the inferior or true vocal cords are inflamed (one or both), the cord changes its color, and instead of appearing white, glistening, and brilliant, is dull, grayish-red, or violet-red, in patches, the vessels enlarged and varicose. When œdema exists without inflammatory changes, the sub-mucous connective tissue of the ventricular bands especially, and of the folds mentioned above, is distended with a serous fluid, and has the translucent appearance of a fish's swimming-bladder. The ventricular bands project forward, almost meeting in the median line, and shutting from view above the vocal cords. The epiglottis sub-mucous tissue may also be distended in the same manner, giving to that organ the same pellucid and semi-transparent appearance. If the swelling be due to purulent infiltration, the epiglottis, the aryteno-epiglottidean folds, and the ventricular

bands, will be swollen, and present a deeply congested, reddish-brown or violet tint, with here and there spots of a yellowish hue. A very considerable collection of pus may form when the base of the tongue, or the loose connective tissue beneath the tonsils, and the tissues of the larynx are simultaneously involved. A serous infiltration sufficient to cause fatal œdema has disappeared in the death-agony, or immediately after, leaving but small traces of the mischief to account for the formidable symptoms.

Symptoms.—Infiltration of the larynx, succeeding either to some inflammatory process in the neighborhood or of the larynx itself, or coming on in the course of some constitutional malady, adds its special features to the symptoms of the preëxisting disease. These are a sensation of distress or actual pain in the pharynx and larynx; painful dysphagia; dyspnœa; or paroxysms of a suffocative character. The sensations referable to the larynx consist of constant oppression as if a foreign body were wedged in the organ, and more or less severe soreness and pain shooting through the whole area occupied by the purulent infiltration, if that be the cause of the symptoms. There may be in attempts to swallow only a sense of soreness or of obstruction, but in the case of inflammation and swelling there will be acute pain. The feeling of the presence of a foreign body and the accumulation of saliva incite the act of swallowing, which is the more painful the more frequently it is repeated. When there is extensive infiltration, swallowing may become impossible, and then the saliva is permitted to dribble from the mouth. At first the cough is dry, rather harsh, and somewhat resonant, but as the swelling proceeds it becomes stridulous and suppressed. The peculiar difficulty in inspiration is the most characteristic symptom. At first a slight sense of stuffing of the larynx and huskiness of the voice are experienced, but the sensation of stuffing grows tighter, and the inspiration becomes prolonged and with a very obvious effort. A hissing, stridulous, somewhat snoring noise accompanies the inspiration, but expiration is easy and noiseless. As the inspiration increases in difficulty, all of the muscles needed to expand the chest, and the accessory muscles of inspiration also, are brought into play. The inspiration is difficult, because, in drawing in the air, the swollen mucous folds are brought together in the center, and the more strongly the effort is made the more tightly the folds are approximated—for, the cartilages of the larynx keeping the lower cavity open, where a partial vacuum is created by the expansion of the chest, the incoming air pushes the mobile folds of swollen mucous membrane before it, and hence, the more powerful the attempts at inspiration, the more tightly the folds are wedged into the narrow space. Expiration also becomes difficult when the swollen folds become immovably distended, and fixed in more or less close apposition. When this occurs, expiration becomes stridulous, whistling, crowing, and difficult, but not usually in the same degree as inspiration.

In the more formidable cases, the obstacles to the entrance of air may become extreme in a short time, the patient dying asphyxiated. In many other cases the group of symptoms just mentioned are varied by attacks of suffocative breathing produced by spasm of the muscles of the larynx. Excited by cough, by attempts at swallowing, or the accumulation of secretion, etc., on a sudden the breathing is arrested, the face gets blue, the eyes start from the head, there are wild gasping, a terrified expression, and death seems imminent. Death may occur in such an attack. Consciousness may be lost, and then the breathing may be resumed ; again, in other cases—but usually the paroxysms do not proceed so far as unconsciousness—air enters the lungs, and the ordinary difficulty of breathing goes on as before. The existence of the obstruction can usually be made out by carefully passing the index-finger over the base of the tongue, when the swollen epiglottis and aryteno-epiglottidean folds may be felt. It is generally impracticable to use the laryngeal mirror when the case is well advanced, but, earlier, valuable information may be gained by its use.

Course, Duration, and Termination.—The most acute cases are those occurring during the course of some infectious malady, as typhoid. The effusion takes place in a few hours, and the patient expires in a short time, asphyxiated. Such may be the course in cases of scarlatina also. In the more chronic kinds of laryngeal disease, if œdema occur, the progress of obstruction is slower ; there may be days passed between the first attack of spasmodic dyspnœa and the fatal result from the asphyxia of œdema. The duration of infiltration of the larynx varies from a few hours to several days.

Diagnosis.—From the difficult breathing produced by capillary bronchitis, emphysema, and asthma, that of infiltration of the larynx is distinguished by the important characteristic of *difficulty in inspiration*, whereas in the former the *difficulty is in expiration*. The aid afforded by digital exploration and by the mirror, when practicable, will enable a diagnosis to be made at once. Passing the index-finger carefully over the base of the tongue, the swollen glosso-epiglottic folds, etc., can be felt. Croup, or laryngismus stridulus, foreign bodies, polypi of the larynx, and aneurisms of the aorta involving the recurrent laryngeal nerve, may produce symptoms similar to œdema. The attacks of pseudo-croup come on suddenly, occur at night, are quickly relieved, and between the paroxysms there is no trouble of any kind. The presence of foreign bodies and polypi is determined by the use of the laryngeal mirror, and by the difference in the rational symptoms. The history of the case, the sudden occurrence of suffocative attacks after the accidental inhalation of some foreign body, and the coming on or cessation of difficult breathing according to the position of the object, are characteristics differing from those due to œdema. The symptoms produced by laryngeal polypus are of slow development, but the mirror enables a view to be had of the growth,

revealing a condition of the larynx very different from that of œdema.

Treatment.—To open the trachea is necessary if suffocation is imminent, but, before resorting to such a severe measure, scarification of the swollen membrane should be practiced, according to the method of Dr. Gurdon Buck, of New York. A scalpel wrapped, but leaving the point free, is passed over the tongue, guided by the finger, and when the swollen parts are reached the cutting edge is turned against them, and free scarifications are practiced. If pus is reached, a free incision is necessary to evacuate it. In the case of purulent infiltration the act of vomiting may, happily, effect a rupture of the depot. Vomiting, for this purpose, is best induced by the hypodermatic injection of apomorphine, since swallowing becomes so difficult in these cases. When the infiltration is serous, absorption may be effected by the free salivary and cutaneous discharge induced by pilocarpine. From $\frac{1}{12}$ grain to $\frac{1}{8}$ grain should be given subcutaneously, usually twice or three times in twenty-four hours. Inhalation of ethyl iodide should be frequently practiced, and the air of the apartment should be kept moist by the vapor of hot water. If attacks of laryngeal spasm threaten asphyxia, ethyl bromide can be cautiously inhaled with advantage. The free exhibition of iodide of potassium—ten grains every two hours—is much to be commended in cases of inflammatory character. If uræmic in origin, besides the pilocarpus, digitalis infusion should be given to stimulate the renal functions, and compound jalap powder to cause free intestinal discharges. As the effusion is forming, full doses of quinine should be given before the pilocarpus, and subsequently to support the vital powers reduced by the loss of fluid. Quinine, in full doses, is more distinctly serviceable when the infiltrating material is pus. If the onset of the disease is inflammatory, and the effusion into the submucosa is the result, tincture of aconite-root should be freely administered, and quinine should also be given to prevent migration of the white corpuscles. As this disease very rapidly depresses the vital powers, it is important to supply the system with nutritious aliment from the beginning. The careful administration of stimulants is also necessary. If swallowing becomes very difficult and but little aliment enters the stomach, the amount taken should be supplemented by "rectal alimentation." Defibrinated blood should be injected into the rectum, and nutrient enemata should also be employed.

TUBERCULAR ULCERATION OF THE LARYNX—LARYNGEAL PHTHISIS.

Definition.—Ulceration of the laryngeal mucous membrane is a frequent complication of phthisis, and sometimes, indeed, precedes the pulmonary lesions. Although a symptom in consumption, its independent importance seems to require more elaborate treatment.

Causes.—Virchow* suggests laryngeal tuberculosis as the best manifestation for the study of true tubercle. Miliary tubercles deposited superficially readily induce ulceration, but follicular deposits and infiltration of the basement membrane cause more extensive and destructive changes. Hence to primary and secondary tubercular deposits are due the ulcerations of the larynx.

Pathological Anatomy.—Those parts of the larynx affected by tubercular ulcerations are most exposed to injury by the performance of their proper functions in phonation and deglutition. These parts are the mucous membrane of the vocal processes, the vocal cords, inter-arytenoid region, the aryteno-epiglottidean ligaments, and the cartilages of Santorini. The most superficial ulcers are flat, with a grayish base, and often very extensive from a coalescence of smaller ones. These are probably ulcers by corrosion, the ichorous matters from the lung-cavities setting up an infection in a part—the seat of a catarrhal process. Another form consists in tubercular deposition in the follicles, disintegration and loss of substance, the resulting ulcer having the characteristic "grape-shape" (Rindfleisch). As the follicles lie in the sub-mucous connective tissue, it is readily seen how deep must be the ulcers thus produced. Extensive excavations result from the spread of the destruction laterally and the union of several ulcers. These ulcers, forming on the laryngeal cartilages, soon extend to and ultimately involve this structure. Still another variety of ulcer is derived from the disintegration of tubercle granulations deposited in the sub-epithelial layer of the mucous membrane. The extent of injury to the larynx varies greatly. The mucous membrane of the vocal processes, of the posterior wall of the larynx at the base of the arytenoid cartilages, of the vocal cords, and elsewhere, is destroyed. The vocal cord may not only be deeply ulcerated but even loosened from its process (Von Ziemssen). The ulcers penetrating to the cartilages set up perichondritis, necrosis, and disease of the crico-arytenoid articulation. Thus the mucous membrane of the larynx in its entirety may be the seat of ulcerations, the sub-mucous tissue becoming œdematous and the muscles relaxed and fatty.

Symptoms.—The earliest implication of the larynx in disease is announced by changes in the voice, by hoarseness on making any considerable and prolonged effort, or on taking a slight cold. The changes seen on laryngoscopic examination at this stage are either pallor, anæmia, and paresis of the muscles, or hyperæmia, and some swelling of the mucous membrane of the inter-arytenoid region, etc. Catarrh of the mucous membrane soon comes on, and is followed by superficial erosions and flat ulcers in the region first attacked, these solutions of continuity being surrounded by a zone of more or less intense hyperæmia. In the further progress of the cases, deep and extensive ulcera-

* "Die krankhaften Geschwülste," Bd. ii, p. 645.

tions occur, the vocal cords becoming ragged, and the edges of the ulcers forming irregular excrescences which may and have been mistaken for polypi. The ulcerations extend over the epiglottis and the arytenoids, and extensive losses of substance occur in advanced cases in the former organ. The weakness and ready failure of the voice and the easy occurrence of hoarseness, noted at first, increase in every way as the ulcerations extend; hoarseness presently becomes habitual and constant, and finally the voice loses its tone, the patient speaking with difficulty in a husky whisper. Paresis of the laryngeal muscles and œdema of the sub-mucous tissue are in part responsible for the failure of phonation. The pain at first is trifling, a mere sense of heat, but, as the cases progress, much soreness and burning are referred to the larynx, and are increased by the attempts at swallowing. Frequent efforts to clear the larynx of the muco-pus and detritus are made, with the effect to increase the soreness and burning pain. The glottis becoming damaged and the aryteno-epiglottidean folds swelling with œdema, as well as damaged by ulceration, the larynx is imperfectly closed in the act of swallowing, and hence, particles of food and drink entering it, paroxysms of violent coughing and suffocative attacks are provoked.

Course, Duration, and Termination.—The progress of these cases is greatly affected, as might be expected, by the extent of the laryngeal disease and of the pulmonary lesions. In some cases of laryngeal phthisis, so called, the progress of the disease is due chiefly to the extent of the mischief in this organ; in other cases the pulmonary disease is relatively more active. The duration of the laryngeal malady is therefore a question of the condition of the lungs. When, by reason of the changes in the larynx, swallowing becomes difficult, the nutrition suffers because of the failure to obtain sufficient aliment. No exact limits can be set as to the duration of the case. In some cases the progress of the pulmonary and of the laryngeal lesions is equally rapid; in other cases the lung-disease is slow, and the laryngeal ulcerations are limited to a few points; in still others the ulcers of the larynx cicatrize, and an apparent arrest of phthisis occurs, to be followed, after some years, by a renewed activity in the morbid process.

Diagnosis.—We have in the laryngoscope an accurate means of determining the extent of the ulcerations, and from them to judge of the condition of the cartilages and articulations. Varicose prolongations of the margins of ulcers may be mistaken for polypi, an example of which error fell under the author's notice, as made by a celebrated specialist. Careful inspection, the head well extended to bring the excavations into view, will enable the observer to get a correct notion of the local condition. More frequently the error made by specialists consists in the failure to properly appreciate the condition of the lungs, and to ascribe the symptoms solely to the laryngeal lesions. As it is