of bronchiectasy. The secretion may be very liquid and watery—*bronchorrhœa serosa*. More commonly, it is purulent though thin, and with greenish or yellow-green masses. It may be thick and uniform. This profuse bronchial secretion is usually a manifestation of chronic bronchitis and may lead to dilatation of the tubes and ultimately to fetid bronchitis. In the young the condition may persist for years without impairment of health and without apparently damaging the lungs.

(*c*) *Putrid Bronchitis.*—Fetid expectoration is met with in connection with bronchiectasis, gangrene, abscess, or with decomposition of secretions within phthisical cavities and in an empyema which has perforated the lung. There are instances in which, apart from any of these states, the expectoration has a fetid character. The sputa are abundant, usually thin, grayish white in color, and they separate into an upper fluid layer capped with frothy mucus and a thick sediment in which may sometimes be found dirty yellow masses the size of peas or beans—the so-called Dittrich's plugs. The affection is very rare apart from the above-mentioned conditions. In severe cases it leads to changes in the bronchial walls, pneumonia, and often to abscess or gangrene. Metastatic brain abscess has followed putrid bronchitis in a certain number of cases.

(*d*) *Dry Catarrh.—Catarrhe sec* of Laennec is a not uncommon form, characterized by paroxysms of coughing of great intensity, with little or no expectoration. It is usually met with in elderly persons with emphysema, and is one of the most chronic and obstinate of all varieties of bronchitis.

Treatment.—By far the most satisfactory method of treating the recurring winter bronchitis is change of climate. Removal to a southern latitude may prevent the onset. Southern France, southern California, and Florida furnish winter climates in which the subjects of chronic bronchitis live with the greatest comfort. All cases of prolonged bronchial irritation are benefited by change of air.

The first endeavor in treating a case of chronic bronchitis is to ascertain if possible whether there are constitutional or local affections with which it is associated. In many instances the urine is found to be highly acid, perhaps slightly albuminous, and the arteries are stiff. In the form associated with this condition, sometimes called gouty bronchitis, the attacks seem related to the defective renal elimination, and to this condition the treatment should be first directed. In other instances there are heart-disease and emphysema. In the form occurring in old men much may be done in the way of prophylaxis. Septuagenarians should read Oliver Wendell Holmes's* "De Senectute" with reference to the care of the health and the avoidance of catching cold. He lays stress upon the importance of the daily study of the thermometer and barometer. There is no doubt that with prudence even in our changeable winter weather much may be done to prevent the onset of chronic bronchitis. Woolen undergarments should be used and especial care should be taken in the spring months not to change them for lighter ones before the warm weather is established.

* Over the Tea-cups, Boston, 1890.

Cure is seldom effected by medicinal remedies. There are instances in which iodide of potassium acts with remarkable benefit, and it should always be given a trial in cases of paroxysmal bronchitis of obscure origin. When the secretion is excessive the muriate of ammonia is perhaps the most useful. Stimulating expectorants are contra-indicated. When the heart is feeble, the combination of digitalis and strychnia is very beneficial. Turpentine, the old-fashioned remedy so warmly recommended by the Dublin physicians, has in many quarters fallen undeservedly into disuse. Terebene in capsules is a useful substitute because it is more easily taken. Of other balsamic remedies, sandalwood, the compound tincture of benzoin, copaiba, balsam of Peru or tolu may be used. Inhalations are often very useful. If fetor be present, carbolic acid in the form of spray (twenty to thirty per cent solution) will lessen the odor, or thymol (1 to 1,000). In full-blooded men, when venous engorgement exists and shortness of breath, the abstraction of twenty to thirty ounces of blood will afford prompt relief.

III. BRONCHIECTASIS.

Etiology.—Dilatation of the bronchi occurs under the following conditions: (1) As a congenital defect or anomaly. Such cases are extremely rare, commonly unilateral. Grawitz has described the condition as *bronchiectasis universalis*. Welch has met an instance in a young girl. (2) In connection with inflammation of the bronchi, particularly when this leads to weakness of the walls with the accumulation of secretion. Under this category come the dilatation met with in chronic bronchitis and emphysema, the dilated bronchi in chronic phthisis, in the catarrhal pneumonias of children, and particularly the dilitation which results from the presence of foreign bodies in the air-tubes or from pressure, as of an aneurism on one bronchus. (3) In extreme contraction of the lung tissue, whether due to interstitial pneumonia or to compression by pleural adhesions, bronchial dilatation is a common though not a constant accompaniment.

Unquestionably the weakening of the bronchial wall is the most important, probably the essential, factor in inducing bronchiectasy, since the wall is then not able to resist the pressure of air in severe spells of coughing and in straining. In some instances the mere weight of the accumulated secretion may be sufficient to distend the terminal tubules, as is seen in compression of a bronchus by aneurism.

Morbid Anatomy.—Two chief forms are recognized—the *cylindrical* and the *saccular*—which may exist together in the same lung. The

condition may be general or partial. Universal bronchiectasis is always unilateral. It occurs in rare congenital cases and is occasionally seen as a sequence of interstitial pneumonia. The entire bronchial tree is represented by a series of sacculi opening one into the other. The walls are smooth and possibly without ulceration or erosion except in the dependent parts. The lining membrane of the sacculi is usually smooth and glistening. The dilatations may form large cysts immediately beneath the pleura. Intervening between the sacculi is a dense cirrhotic lung tissue. The partial dilatations—the saccular and cylindrical—are common in chronic phthisis, particularly at the apex, in chronic pleurisy at the base, and in emphysema. Here the dilatation is more commonly cylindrical, sometimes fusiform. The bronchial mucous membrane is much involved and sometimes there is a narrowing of the lumen. Occasionally one meets with a single saccular bronchiectasy in connection with chronic bronchitis or emphysema. Some of these look like simple cysts, with smooth walls, without fluid contents.

Histologically the bronchi which are the seat of dilatation show important changes. In the large, smooth dilatations the cylindrical is replaced by a pavement epithelium. The muscular layer is stretched, atrophied, and the fibres separated; the elastic tissue is also much stretched and separated. In the large saccular bronchiectasies and in some of the cylindrical forms, due to retained secretions, the lining membrane is ulcerated. The contents of some of the larger bronchiectatic cavities are horribly fetid.

Symptoms.—In the limited dilatations of phthisis, emphysema, and chronic bronchitis, the symptoms are in great part those of the original disease, and the condition often is not suspected during life.

In extensive saccular bronchiectasy the characters of the cough and expectoration are distinctive. The patient will pass the greater part of the day without any cough and then in a severe paroxysm will bring up a large quantity of sputum. Sometimes change of the position will bring on a violent attack, probably due to the fact that some of the secretion flows from the dilatation to a normal tube. The daily spell of coughing is usually in the morning. The expectoration is in many instances very characteristic. It is grayish or grayish brown in color, fluid, purulent, with a peculiar acid, sometimes fetid, odor. Placed in a conical glass, it separates into a thick granular layer below and a thin mucoid intervening layer above, which is capped by a brownish froth. Microscopically it consists of pus-corpuscles, often large crystals of fatty acids, which are sometimes in enormous numbers over the field and arranged in bunches. Hæmatoidin crystals are sometimes present. Elastic fibres are seldom found except when there is ulceration of the bronchial walls. Tubercle bacilli are not present. In some cases the expectoration is very fetid and has all the characters of those described under fetid bronchitis. Nummular expectoration, such as comes from phthisical cavities, is not

common. Hæmorrhage may occur, but in my experience it has been rare. Abscess of the brain has in a few instances followed the bronchiectasis. Rheumatoid affections may develop (Gerhardt).

The *diagnosis* is not possible in a large number of the cases. In the extensive sacculated forms, unilateral and associated with interstitial pneumonia or chronic pleurisy, the diagnosis is easy. There is contraction of the side, which in some instances is not at all extreme. The cavernous signs may be chiefly at the base and may vary according to the condition of the cavity, whether full or empty. There may be the most exquisite amphoric phenomena and loud resonant râles. The condition persists for years and is not inconsistent with tolerably active life. The patients frequently show signs of marked embarrassment of the pulmonary circulation. There is cyanosis on exertion, the finger-tips are clubbed, and the nails incurved. A condition very difficult to distinguish from bronchiectasy is a limited pleural cavity communicating with a bronchus.

Treatment.—Medical treatment is not satisfactory, since it is impossible to heal the cavity. I have practised the injection of antiseptic fluids in some instances with benefit. In suitable cases drainage of the cavities may be attempted, particularly if the patient is in fairly good condition. For the fetid secretion turpentine may be given or terebene, and inhalations used of carbolic acid or thymol. In extreme cases it is very difficult to get rid of the offensive odor.

IV. BRONCHIAL ASTHMA.

Asthma is a term which has been applied to various conditions associated with dyspnœa—hence the names cardiac and renal asthma—but its use should be limited to the affection known as bronchial or spasmodic asthma.

Etiology.—All writers agree that there is in a majority of cases of bronchial asthma a strong neurotic element. Many regard it as a neurosis in which, according to one view, spasm of the bronchial muscles, according to the other, turgescence of the mucosa, results from disturbed innervation, pneumogastric or vaso-motor. Of the numerous theories the following are the most important:

(1) That it is due to spasm of the bronchial muscles, a theory which has perhaps the largest number of adherents. The original experiments of C. J. B. Williams, upon which it is largely based, have not, however, been confirmed of late years.

(2) That the attack is due to swelling of the bronchial mucous membrane—fluctionary hyperæmia (Traube), vaso-motor turgescence (Weber), diffuse hyperæmic swelling (Clark).

(3) That in many cases it is a special form of inflammation of the smaller bronchioles—*bronchiolitis exudativa* (Curschmann). Other theo-