their early use as would warrant a recommendation, and when an arterial sedative is indicated in the robust, full-blooded, healthy individual, I much prefer the lancet.

Expectorants are rarely of any value in pneumonia. If any one wishes to be convinced of the futility of such remedies, let him study their action on a series of cases of sthenic pneumonia, in which it would be a real gain to loosen the cough and give to the sputa a certain degree of fluidity. Nor in the stage of resolution can they be said to be of any special service. In cases of tardy resolution I have not hesitated to use pilocarpine, as suggested by Riess.

For the distressing cough and the pain in the side, opium in some form may be given, either the hypodermic of morphia or, for the cough alone, Dover's powder. There has been a feeling in the profession that opium was counter-indicated in pneumonia, but I fully agree with Loomis that it may be given with safety and with the greatest comfort to the patient. With marked cerebral symptoms an ice-cap may be used. If there is delirium, the patient should be carefully watched. For these symptoms the cold bath is by far the most efficient remedy, and it or the cold pack should be resorted to without hesitation. For the complications, in the more serious ones, such as meningitis and endocarditis, but little can be done. Pleurisy with large effusion may require aspiration. If there is doubt as to the existence of fluid the exploratory needle should be used. It may be necessary, in pericarditis with extensive effusion, to aspirate the sac.

Careful feeding forms an essential part of the treatment. The diet should be light and made up of articles which, while nourishing, are not heavy and not apt to induce flatulency. Milk or milk-whey, broths, beef-juice, and eggs constitute the main articles of food. The starchy articles, as a rule, should be excluded, because they tend to induce flatulency. If the milk also has this effect, it is better to use the whey and egg-white or beef-juices. Before leaving the question of diet it may be mentioned that the use of cold drinks, such as soda or Apollinaris water, not only gives relief to the distressing thirst, but also helps to reduce the fever, and may diminish slightly the viscidity of the expectoration.

III. CHRONIC INTERSTITIAL PNEUMONIA

(*Cirrhosis of Lung*).

This consists in the gradual substitution to a greater or less extent of connective tissue for the normal lung. It is a fibroid change which may have its starting point in the tissue about the bronchi and blood-vessels, the interlobular septa, the alveolar walls, or in the pleura. So diverse are the different forms and so varied the conditions under which this change occurs that a proper classification is extremely difficult. We may recognize, however, two chief forms—the *local*, which involves only a limited

area of the lung substance, and the *diffuse*, invading either both lungs or an entire organ.

Etiology.—*Local* fibroid change in the lungs is common. It is a constant accompaniment of tubercle and in every case of phthisis the chronic interstitial changes play a very important *rôle*. In tumors, abscess, gummata, hydatids, and emphysema it also occurs. Fibroid processes are frequently met with at the apices of the lung and may be due either to a limited healed tuberculosis, to fibroid induration in consequence of pigment, or, in a few instances, may result from thickening of the pleura.

Diffuse Interstitial Pneumonia is met with under the following circumstances: 1. As a sequence of acute fibrinous pneumonia. Although extremely rare, this is recognized as a possible termination. From unknown causes resolution fails to take place. A gradual process of organization goes on in the fibrinous plugs within the air-cells and the alveolar walls become greatly thickened by a new growth, first of nuclear and subsequently fibrillated connective tissue. Macroscopically there is produced a smooth, grayish, homogeneous tissue which has the peculiar translucency of all new-formed connective tissue. This has been called gray induration. The subsequent history of this form needs more careful study. A majority of the cases terminate within a few months, and instances which have been followed from the outset are very rare.

In one of Charcot's cases, quoted by Bastian, death occurred about three months and a half after the onset of the acute disease and the lung was two thirds the normal size, grayish in color, and hard as cartilage. In the only case of the kind which has come under my observation, the patient died about a month from the onset of the chill. The lung was uniformly solid and grayish in color. In certain regions the fibrinous moulds in the air-cells were fatty, while in others there were areas of a grayish translucent aspect, firm, smooth, not at all granular, and resembling recent connective tissue. Microscopically, these areas showed advanced fibroid change and great thickening of the alveolar walls, while the fibrin plugs of the air-cells were undergoing fibroid transformation.

2. *Chronic Broncho-Pneumonia.*—The relation of broncho-pneumonia to cirrhosis of the lung has been specially studied by Charcot, who states that it may follow the acute or subacute form of this disease. The fibrosis extends from the bronchi, which are usually found dilated. The alveolar walls are thickened and the lobules converted into firm grayish masses, in which there is no trace of normal lung tissue. This process may go on and involve an entire lobe or even the whole lung. Many of these cases are tuberculous from the outset.

3. *Pleurogenous Interstitial Pneumonia.*—Charcot applies this term to that form of cirrhosis of the lung which follows invasion from the pleura. Doubt has been expressed by some writers whether this really occurs. While Wilson Fox is probably correct in questioning whether an

entire lung can become cirrhosed by the gradual invasion from the pleura, I think there can be no doubt that there are instances of primitive dry pleurisy, which, as Sir Andrew Clark has pointed out, gradually compresses the lung and at the same time leads to interstitial cirrhosis. This may be due in part to the fibroid change which follows prolonged compression. In some cases there seems to be a distinct connection between the greatly thickened pleura and the dense strands of fibrous tissue passing from it into the lung substance. Instances occur in which one lobe or the greater part of it presents, on section, a mottled appearance, owing to the increased thickness of the interlobular septa—a condition which may exist without a trace of involvment of the pleura. In many other cases, however, the extension seems to be so definitely associated with pleurisy that there is no doubt as to the causal connection between the two processes. In these instances the lung is removed with great difficulty, owing to the thickness and close adhesion of the pleura to the chest wall.

4. *Chronic Interstitial Pneumonia*, due to inhalation of dust. Zenker has proposed the term *pneumonokoniosis* for the group of diseases due to the irritating effects of dust in certain occupations, such as coal-mining, stone-cutting, axe-grinding, and working in iron dust. It is essentially a chronic broncho-pneumonia leading to fibroid induration, at first nodular and peribronchial, and finally involving large areas of the lung tissue, which are converted into dense grayish-brown or black masses. The subject will receive separate consideration.

The term cirrhosis should be limited strictly to those cases in which a lung is involved in the fibroid process, whether originating in the parenchyma or in the pleura. It should not be applied to fibroid phthisis of tuberculous origin.

Morbid Anatomy.—The disease is unilateral; the chest of the affected side is sunken, deformed, and the shoulder much depressed. On opening the thorax the heart is seen drawn far over to the affected side. The unaffected lung is emphysematous and covers the greater portion of the mediastinum. It is scarcely credible in how small a space, close to the spine, the cirrhosed lung may lie. Indeed, it may be overlooked, as happened in the case of a physician of my acquaintance, who left instructions that his lung should be sent to Palmer Howard, of Montreal. It was reported, however, that at the autopsy no lung could be found! The adhesions between the pleural membranes may be extremely dense and thick, particularly in the pleurogenous cases; but when the disease has originated in the lung there may be little thickening of the pleura. The organ is airless, firm, and hard. It strongly resists cutting, and on section shows a grayish fibroid tissue of variable amount, through which pass the blood-vessels and bronchi. The latter may be either slightly or enormously dilated. There are instances in which the entire lung is converted into a series of bronchiectatic cavities and the cirrhosis is apparent only in certain areas or at the root. The tuberculous cases can usually be

differentiated by the presence of an apical cavity, not bronchiectatic, and often large; and the other lung almost invariably shows tuberculous lesions. There are cases in which it is difficult to determine satisfactorily the true nature. A question of some interest in connection with chronic interstitial pneumonia is, Do softening and cavity formation ever occur apart from caseation and tuberculosis? That is to say, are there cavities in a cirrhotic lung which may be due to a simple necrosis? Undoubtedly, though they are rare; I have seen them in at least two instances of anthracosis, and Charcot* refers to them as "*ulcères du poumon*," to distinguish them from the abscess cavity of acute pneumonia or a tuberculous cavity. The other lung is always greatly enlarged and emphysematous. The heart is hypertrophied, particularly the right ventricle, and there may be marked atheromatous changes in the pulmonary artery. An amyloid condition of the viscera is found in some cases.

Symptoms and Course.—It is essentially a chronic disease, extending over a period of many years, and when once the condition is established the health may be fairly good. In a well-marked case the patient complains only of his chronic cough, perhaps of slight shortness of breath. In other respects he is quite well, and is usually able to do light work. The cases are commonly regarded as phthisical, though there may be scarcely a symptom of that affection except the cough. There are instances, however, of fibroid phthisis which cannot be distinguished from cirrhosis of the lung except by the presence of tubercle bacilli in the expectoration. As the bronchi are usually dilated, the symptoms and physical signs may be those of bronchiectasis. The cough is paroxysmal and the expectoration is generally copious and of muco-purulent or sero-purulent nature. It is sometimes fetid. Hæmorrhage is by no means infrequent, and occurred in more than one half of the cases analyzed by Bastian. Walking on the level and in the ordinary affairs of life the patient may show no shortness of breath, but in the ascent of stairs and on exertion there may be dyspnœa.

Physical Signs.—*Inspection.*—The affected side is immobile, retracted, and shrunken, and contrasts in a striking way with the voluminous sound side. The intercostal spaces are obliterated and the ribs may even overlap. The shoulder is drawn down and from behind it is seen that the spine is bowed. The heart is greatly displaced, being drawn over by the shrinkage of the lung to the affected side. When the left lung is affected there may be a large area of visible impulse in the second, third, and fourth interspaces. Mensuration shows a great diminution in the affected side, and with the saddle-tape the expansion may be seen to be negative. The *percussion* note varies with the condition of the bronchi. It may be absolutely dull, particularly at the base or at the apex. In the axilla there may be a flat tympany or even an amphoric note over a large

* Œuvres complètes de J. M. Charcot, tome v, p. 189.

sacculated bronchus. On the opposite side the percussion note is usually hyperresonant. On *auscultation* the breath-sounds have either a cavernous or amphoric quality at the apex, and at the base are feeble, with mucous, bubbling râles. The voice-sounds are usually exaggerated. Cardiac murmurs are not uncommon, particularly late in the disease, when the right heart fails. These are, of course, the physical signs of the disease when it is well established. They naturally vary considerably, according to the stage of the process. The disease is essentially chronic, and may persist for fifteen or twenty years. Death occurs sometimes from hæmorrhage, more commonly from gradual failure of the right heart with dropsy, and occasionally from amyloid degeneration of the organs.

The *diagnosis* is never difficult. It may be impossible to say, without a clear history, whether the origin is pleuritic or pneumonic. Between cases of this kind and fibroid phthisis it is not always easy to discriminate, as the conditions may be almost identical. When tuberculosis is present, however, even in long-standing cases, bacilli are usually present in the sputa, and there may be signs of disease in the other lung.

Treatment.—It is only for an intercurrent affection or for an aggravation of the cough that the patient seeks relief. Nothing can be done for the condition itself. When possible the patient should live in a mild climate, and should avoid exposure to cold and damp. A distressing feature in some cases is the putrefaction of the contents of the dilated tubes, for which the same measures may be used as in fetid bronchitis.

IV. BRONCHO-PNEUMONIA (*Capillary Bronchitis*).

This is essentially an inflammation of the terminal bronchus and the air-vesicles which make up a pulmonary lobule, whence the term broncho-pneumonia. It is also known as lobular, in contradistinction to lobar pneumonia. The term catarrhal is less applicable. The process begins in all cases with an inflammation of the capillary bronchi, which is a condition rarely if ever found without involvement of the lobular structures, so that it is now customary to consider the affections together.

Etiology.—Broncho-pneumonia is as a rule a secondary affection met with under the following circumstances:

1. As a sequence of the infectious fevers—measles, diphtheria, whooping-cough, scarlet fever, and, less frequently, small-pox, erysipelas, and typhoid fever. In children it forms the most serious complication of these diseases, and in reality causes more deaths than are due directly to the fevers.* In large cities it ranks next in fatality to infantile diarrhœa. Following, as it does, the contagious diseases which principally affect children, we find that a large majority of cases occur during early life.

* Cyclopædia of the Diseases of Children, vol. ii.

According to Morrill's Boston statistics, it is most fatal during the first two years of life. The number of cases in a community increases or decreases with the prevalence of measles, scarlet fever, and diphtheria. It is most prevalent in the winter and spring months. In the febrile affections of adults broncho-pneumonia is not very common. Thus in typhoid fever it is not so frequent as lobar pneumonia, though isolated areas of consolidation at the bases are by no means rare in protracted cases of this disease. In old people it is an extremely common affection, following debilitating causes of any sort, and supervening in the course of chronic Bright's disease and various acute and chronic maladies.

2. In the second division of this affection are embraced the cases of so-called aspiration or deglutition pneumonia. Whenever the sensitiveness of the larynx is benumbed, as in the coma of apoplexy or uræmia, minute particles of food or drink are allowed to pass the *rima*, and, reaching finally the smaller tubes, excite an intense inflammation similar to the vagus pneumonia which follows the section of the pneumogastrics in the dog. Cases are very common after operations about the mouth and nose, after tracheotomy, and in cancer of the larynx and œsophagus. The aspirated particles in some instances induce such an intense broncho-pneumonia that suppuration or even gangrene supervenes.

3. The most common and fatal form of broncho-pneumonia is that excited by the tubercle bacillus, which has already been considered.

Among general predisposing causes may be mentioned age. As just noted, it is prone to attack infants, and a majority of cases of pneumonia in children under five years of age are of this form. At the opposite extreme of life it is also common, particularly in association with various debilitating circumstances and chronic diseases incident to the old. In children rickets and diarrhœa are marked predisposing causes, and broncho-pneumonia is one of the most frequent post-mortem-room lesions in infants' homes and foundling asylums. The disease prevails more extensively among the poorer classes, because their children are of necessity more exposed and cannot have the needful care and nursing, particularly after eruptive fevers.

Morbid Anatomy.—In the lungs of a child dead of broncho-pneumonia, after measles or diphtheria, the appearances are very characteristic. On the pleural surfaces, particularly toward the base, are seen depressed bluish or blue-brown areas of collapse, between which the lung tissue is of a lighter color. Here and there are projecting portions over which the pleura may be slightly turbid or granular. The lung is fuller and firmer than normal, and, though in great part crepitant, there can be felt in places throughout the substance solid, nodular bodies. The dark depressed areas may be isolated or a large section of one lobe may be in the condition of collapse or atelectasis. Gradual inflation by a blow-pipe inserted in the bronchus will distend a great majority of these collapsed areas. On section, the general surface has a dark reddish color and usu-