

toration may be made up of these somewhat translucent-looking pellets, floating in a small quantity of thin mucus. Some of them are opaque. Often with the naked eye a twisted spiral character can be seen, particularly if the sputum is spread on a glass with a black background. Microscopically, many of these pellets have a spiral structure, which renders them among the most remarkable bodies met with in sputum. It is not a little curious that they should have been practically overlooked until described a few years ago by Curschmann. Under the microscope the spirals are of two forms. In one there is simply a twisted, spirally arranged mucin, in which are entangled cells, derived probably from the smaller bronchi and alveoli, often in all stages of fatty degeneration. The twist may be loose or tight. The second form is much more peculiar. In the centre of a tightly coiled skein of mucin fibrils with a few scattered cells is a filament of extraordinary clearness and translucency, probably composed of transformed mucin. As Curschmann suggests, these spirals are doubtless formed in the finer bronchioles and constitute the product of an acute bronchiolitis. It is difficult to explain their spiral nature. I do not know of any observations upon the course of the currents produced by the ciliated epithelium in the bronchi, but it is quite possible that their action may be rotatory, in which case, particularly when combined with spasm of the bronchial muscles, it is possible to conceive that the mucus formed in the tube might be compelled to assume a spiral form. Within two or three days the sputum changes entirely in character; it becomes muco-purulent and Curschmann's spirals are no longer to be found. They occur in all instances of true bronchial asthma in the early period of the attack. There are, in addition, in many cases, the pointed, octahedral crystals described by Leyden and sometimes called asthma crystals. They are identical with the crystals found in the semen and in the blood in leukæmia. At one time they were supposed, by their irritating character, to induce the paroxysms.

The *course* of the disease is very variable. In severe attacks the paroxysms recur for three or four nights or even more, and in the intervals and during the day there may be wheezing and cough. Early in the disease the patient may be free in the morning, without cough or much distress, and the attacks may appear at first to be of a purely nervous character. In the long-standing cases emphysema almost invariably develops, and while the pure asthmatic fits diminish in frequency the chronic bronchitis and shortness of breath become aggravated.

We have no knowledge of the morbid anatomy of true asthma. Death during the attack is unknown. In long-standing cases the lesions are those of chronic bronchitis and emphysema.

Treatment.—The asthmatic attack usually demands immediate and prompt treatment, and remedies should be administered which experience has shown are capable of relieving the condition of the bronchial mucosa. A few whiffs of chloroform will produce prompt though temporary relaxa-

tion. In a child with very severe attacks, resisting all the usual remedies, the treatment by chloroform gave immediate and finally permanent relief. Perles of nitrite of amyl may be broken on the handkerchief or from two to five drops of the solution may be placed upon cotton-wool and inhaled. Strong stimulants given hot or a dose of spirits of chloroform in hot whisky will sometimes induce relaxation. More permanent relief is given by the hypodermic injection of morphia or of morphia and cocaine combined. In obstinate and repeatedly recurring attacks this has proved a very satisfactory plan. The sedative antispasmodics, such as belladonna, henbane, stramonium, and lobelia, may be given in solution or used in the form of cigarettes. Nearly all the popular remedies either in this form or in pastilles contain some of the plant of the order *solanaceæ*, with nitrate or chlorate of potash. Excellent cigarettes are now manufactured and asthmatics try various sorts, since one form benefits one patient, another form another patient. Nitre paper made with a strong solution of nitrate of potash is very serviceable. Filling a room with the fumes of this paper prior to retiring will sometimes ward off a nocturnal attack. I have known several patients to whom tobacco smoke inhaled was quite as potent as the prepared cigarettes.

The use of compressed air in the pneumatic cabinet is very beneficial; oxygen inhalations may be also tried. In preventing the recurrence of the attacks there is no remedy so useful as iodide of potassium, which sometimes acts like a specific. From ten to twenty grains three times a day is usually sufficient.

Particular attention should be paid to the diet of asthmatic patients. A rule which experience generally compels them to make is to take the heavy meals in the early part of the day and not retire to bed before gastric digestion is completed. As the attacks are often induced by flatulency, the carbohydrates should not be allowed. Coffee is a more suitable drink than tea. In respect to climate it is very difficult to lay down rules for asthmatics. The patients are often much better in the city than in the country. The high and dry altitudes are certainly more beneficial than the sea-shore; but in protracted cases, with emphysema as a secondary complication, the rarefied air of high altitudes is not advantageous. In young persons I have known a residence for six months in Florida or southern California to be followed by prolonged freedom from attacks.

V. FIBRINOUS BRONCHITIS.

An acute or chronic affection, characterized by the formation in certain of the bronchial tubes of fibrinous casts, which are expelled in paroxysms of dyspnoea and cough.

In several diseases fibrinous moulds of the bronchi are formed, as in diphtheria and croup (with extension into the trachea and bronchi), in

pneumonia, and occasionally in phthisis—conditions which, however, have nothing to do with true fibrinous bronchitis. These casts are not to be confounded with the blood-casts which occur occasionally in hæmoptysis.

Etiology.—Nothing is known of its causation. It occurs more frequently in males. It is met with at all periods of life, but is more common between the ages of twenty and forty. It has been known to attack several members of the same family. Cases have been described occurring together as if due to some endemic influence (Pichini). The cases are rare, particularly in hospital practice. The attacks occur most commonly in the spring months. An association with tuberculosis has been frequently noted. Model, in an article from Bäumlér's clinic, states that tuberculosis was present in ten of twenty-one post-mortems. It has been met with also in connection with skin-diseases, such as pemphigus, impetigo, and herpes. The attacks appeared to be related in some cases to the menstrual period. Several instances have been described with heart-disease, but it seems probable that in all these conditions the connection was not causal.

Symptoms.—Acute cases are rare. They may set in with high fevers, rigors, severe paroxysms of cough, and perhaps with hæmoptysis. The clinical picture resembles acute bronchitis, and only the expulsion of the membranous casts gives the characteristic features to the case. It is much more serious than the chronic form and fatal termination is not uncommon. N. S. Davis has reported two fatal cases. In some of the acute cases there has been affection of the tonsils, and it is possible that the disease may have been truly diphtheritic in character and due to extension of the membrane into the trachea and bronchi. The casts in these cases are not only more extensive, but they also do not present the laminated structure characteristic of true plastic bronchitis.

A patient may have a single attack without any recurrence, but in the chronic form the attacks come on at varying intervals and the disease may last for ten or even twenty years. Instances are on record in which the paroxysms have occurred at definite intervals for many months. The attacks may recur weekly or a period of a year or more may intervene. The onset is marked by bronchitic symptoms, not necessarily with fever. The cough becomes distressing and paroxysmal in character; the sputa may be blood-stained and the patient brings up rounded, ball-like masses, which, when disentangled, are found to be moulds of bronchi; the hæmorrhage may be profuse. In one of the two cases which I have seen it invariably accompanied the attack, and the whitish dendritic casts of the tubes were always entangled in the blood and clots. Urgent dyspnoea and cyanosis may be present in severe attacks. The *physical* signs are those of a severe bronchitis. It may occasionally be possible to determine the weakened or suppressed breath sounds in the affected territory and there may be deficient expansion or even retraction of the chest wall in a corresponding area, but this is in reality very difficult, and twice prior to the expulsion of the casts I failed to determine by physical examination the affected region.

As mentioned, the casts are usually rolled up and mixed with mucus or blood. When unravelled in water they present a complete mould of a secondary or tertiary bronchus with its ramifications. The size of the cast may vary with different attacks, but, as has often been noticed, the form and size may be identical at each attack as if precisely the same bronchial area was involved each time. The casts are hollow, laminated, the size of the lumen varying with the number and thickness of the laminae. Sometimes they are almost solid. Transverse sections show a beautiful concentric arrangement. The fibrin appears in places to retain its fibrillary structure; in others, as in diphtheritic membrane, it has undergone the hyaline transformation. Leucocytes are imbedded in the meshes. In the centre, particularly in the smaller casts, it is not uncommon to see alveolar epithelium with numerous carbon particles. Leyden's crystals are sometimes found and occasionally Curschmann's spirals.

The pathology of the disease is obscure. The membrane is identical with that to which the term croupous is applied, and the obscurity relates not so much to the mechanism of the production, which is probably the same as in other mucous surfaces, as to the curious limitation of the affection to certain bronchial territories and the remarkable recurrence at stated or irregular intervals throughout a period of many years.

In the acute cases the *treatment* should be that of ordinary acute bronchitis. We know of nothing which can prevent the recurrence of the attacks in the chronic form. In the uncomplicated cases there is rarely any danger during the paroxysm, even though the symptoms may be most distressing and the dyspnoea and cough very severe. Inhalations of ether, steam, or atomized lime-water aid in the separation of the membranes. Pilocarpine might be useful, as in some instances it increases the bronchial secretion. The employment of emetics may be necessary, and in some cases they are effective in promoting the removal of the casts.

IV. DISEASES OF THE LUNGS.

I. CIRCULATORY DISTURBANCES IN THE LUNGS.

Congestion.—There are two forms of congestion of the lungs—active and passive.

(1) *Active Congestion of the Lungs.*—Much doubt and confusion still exist on this subject. French writers, following Woillez, regard it as an independent primary affection (*maladie de Woillez*), and in their dictionaries and text-books allot much space to it. English and American authors more correctly regard it as a symptomatic affection. Active fluxion to the lungs occurs with increased action of the heart, and when very hot air or irritating substances are inhaled. In diseases which interfere