

up after severe spells of coughing, sputum may be picked out and elastic tissue and bacilli detected.

It is a superfluous refinement to make a diagnosis between capillary bronchitis and catarrhal pneumonia, for the two conditions are part and parcel of the same disease. In simple bronchitis involving the larger tubes urgent dyspnoea and pulmonary distress are rarely present and the râles are coarser and more sibilant. It must not be forgotten that, as in lobar pneumonia, cerebral symptoms may mask the true nature of the disease, and may even lead to the diagnosis of meningitis. I recall more than one instance in which it could not be satisfactorily determined whether the infant had tuberculous meningitis or a cerebral complication of an acute pulmonary affection.

Prognosis.—In children enfeebled by constitutional disease and prolonged fevers broncho-pneumonia is terribly fatal, but in cases coming on in connection with whooping-cough or after measles recovery may take place in the most desperate cases. It is in this disease that the truth of the old maxim is shown—"Never despair of a sick child." The death-rate in children under five has been variously estimated at from thirty to fifty per cent. After diphtheria and measles thin, wiry children seem to stand broncho-pneumonia much better than fat, flabby ones. In adults the aspiration or deglutition pneumonia is a very fatal disease.

Prophylaxis.—Much can be done to reduce the probability of attack after febrile affections. Thus, in the convalescence from measles and whooping-cough, it is very important that the child should not be exposed to cold, particularly at night, when the temperature of the room naturally falls. In a nocturnal visit to the nursery—sometimes, too, I am sorry to say, to a children's hospital—how often one sees children almost naked, having kicked aside the bedclothes and having the night-clothes up about the arms! The use of light flannel "combinations" obviates this nocturnal chill, which is, I am sure, an important factor in the colds and pulmonary affections of young children, both in private houses and in institutions. The catarrhal troubles of the nose and throat should be carefully attended to, and during fevers the mouth should be washed two or three times a day with an antiseptic solution.

Treatment.—The frequency and the seriousness of broncho-pneumonia render it a disease which taxes to the utmost the resources of the practitioner. There is no acute pulmonary affection over which he at times so greatly despairs. On the other hand, there is not one in which he will be more gratified in saving cases which have seemed past all succor. The general arrangements should receive special attention. The room should be kept at an even temperature—about 65° to 68°—and the air should be kept moist with vapor.

At the outset the bowels should be opened by a mild purge, either castor oil or small doses of calomel, one twelfth to one sixth of a grain hourly until a movement is obtained, and care should be taken throughout

the attack to secure a daily movement. The common saline fever mixture of citrate of potash, liquor ammonia acetatis, and aromatic spirits of ammonia may be given every two or three hours. If the disease comes on abruptly with high fever, minim or minim and a half doses of the tincture of aconite may be given with it. The pain, the distressing symptoms, and the incessant cough often demand opium, which must of course be used with care and judgment in the case of young children, but which is certainly not contra-indicated and may be usefully given in the form of Dover's powder. Blisters are now rarely if ever employed, and even the jacket poultice has gone out of fashion. For the latter, however, I confess to a strong prejudice, and when lightly made and frequently changed it undoubtedly gives great relief. Much more commonly we now see, both in private and in hospital practice, the jacket of cotton-batting. Ice-poultices to the chest, I have seen used apparently with great benefit, and they are warmly recommended by many German physicians as well as by Goodhart and others in England. The diet should consist of milk, broths, and egg albumen. Milk often curds and is disagreeable. Egg-white is particularly suitable and very acceptable when given in cold water with a little sugar. It forms, indeed, an excellent medium for the administration of the stimulants. If the pulse shows signs of failing, it is best to begin early with brandy. As in all febrile affections of children, cold water should be constantly at the bedside, and the child should be encouraged to drink freely. With these measures, in many cases the disease progresses to a favorable termination, but too often other and more serious symptoms arise. Cough becomes more distressing, dyspnoea increases, the ominous rattling of the mucus can be heard in the tubes, the child's color is not so good, and there is greater restlessness. Under these circumstances stimulant expectorants—ammonia, squills, and senega—should be given. Together they make a very disagreeable dose for a young child, particularly with the carbonate of ammonia. The aromatic spirits of ammonia is somewhat better. If the carbonate is employed, it must be given in small doses, not more than a grain to an infant of eighteen months. If the child has increasing difficulty in getting up the mucus, an emetic should be given—either the wine of ipecac or, if necessary, tartar emetic. There is no necessity, however, to keep the child constantly nauseated. Enough should be given to cause prompt emesis, and the benefit results in the expulsion of mucus from the larger tubes. In this stage, too, strychnine is undoubtedly helpful in stimulating the depressed respiratory centre. With commencing cyanosis, inhalations of oxygen may be employed, sometimes with great benefit.

With rapid failure of the heart, loud mucous rattles in the throat, and increasing lividity, every measure should be used to arouse the child and excite coughing. Alternate douches of hot and cold water, electricity, which I have seen applied with good results at Wiederhofer's clinic in Vienna, and hypodermic injections of ether may be tried. For the reduc-

tion of temperature, particularly if cerebral symptoms are prominent, there is nothing so satisfactory as the wet pack or the cold bath. In the case of children, when the latter is used it should be graduated, beginning with a temperature which is pleasantly warm and gradually reducing it to 75° or 80°. Even when the temperature is not high, the cerebral symptoms are greatly relieved by the bath or the pack.

V. EMPHYSEMA.

Rupture of superficial vesicles may produce pneumothorax. In the case of deep-seated alveoli the air escapes into the interlobular connective tissue and causes a condition comparable to ordinary subcutaneous emphysema. It is not a very serious condition and rarely produces symptoms. It usually results from violent expiratory efforts, as in whooping-cough. The air-bubbles escape into the interlobular tissue, in which they look like little rows of beads, and when extensive, the lobules are distinctly outlined by them (interstitial emphysema). There may be large bullæ beneath the pleura. A very rare event is the rupture close to the root of the lung and the passage of air along the trachea into the subcutaneous tissues of the neck.

The condition in which the infundibular passages and the alveoli are dilated is called *vesicular emphysema*.

A practical division may be made into compensatory, hypertrophic, and atrophic forms.

I. COMPENSATORY EMPHYSEMA.

Whenever a region of the lung does not expand fully in inspiration, either another portion of the lung must expand or the chest wall sink in order to occupy the space. The former almost invariably occurs. We have already mentioned that in broncho-pneumonia there is a vicarious distention of the air-vesicles in the adjacent healthy lobules, and the same happens in the neighborhood of tuberculous areas and cicatrices. In general pleural adhesions there is often compensatory emphysema, particularly at the anterior margins of the lung. The most advanced example of this form is seen in cirrhosis, when the unaffected lung increases greatly in size, owing to distention of the air-vesicles. A similar though less marked condition is seen in extensive pleurisy with effusion and in pneumothorax.

At first, this distention of the air-vesicles is a simple physiological process and the alveolar walls are stretched but not atrophied. Ultimately, however, in many cases they waste and the contiguous air-cells fuse, producing true emphysema.

II. HYPERTROPHIC EMPHYSEMA.

This form, also known as substantive or idiopathic emphysema, is a well-marked clinical affection, characterized by enlargement of the lungs, due to distention of the air-cells and atrophy of their walls, and clinically by imperfect aëration of the blood and more or less marked dyspnoea.

Etiology.—Emphysema is the result of persistently high intra-alveolar tension acting upon a congenitally weak lung tissue. If the mechanical views which have prevailed so long as to its origin were true, the disease would certainly be much more common; since violent respiratory efforts, believed to be the essential factor, are performed by a majority of the working classes. Strongly in favor of the view that the nutritive change in the air-cells is the primary factor is the markedly hereditary character of the disease and the frequency with which it starts early in life. These are two points upon which scarcely sufficient stress has been laid. To James Jackson, Jr., of Boston, we owe the first observations on the hereditary character of emphysema. Working under Louis's directions, he found that in 18 out of 28 cases one or both parents were affected.

I have been impressed by the frequency of the condition in children, and the number of cases in which on inquiry symptoms pointing to the occurrence of the disease in childhood can be obtained. It may develop, too, in several members of the same family. We are still ignorant as to the nature of this congenital pulmonary weakness. Cohnheim thinks it probably due to a defect in the development of the elastic-tissue fibres, a statement which is borne out by Eppinger's observations.

Heightened pressure within the air-cells may be due to forcible inspiration or expiration. Much discussion has taken place as to the part played by these two acts in the production of the disease. The inspiratory theory was advanced by Laennec and subsequently modified by Gairdner, who held that in the chronic bronchitis areas of collapse were induced, and compensatory distention took place in the adjacent lobules. This unquestionably does occur in the vicarious or compensatory emphysema, but it probably is not a factor of much moment in the form now under consideration. The expiratory theory, which was supported by Mendelsohn and Jenner, accounts for the condition in a much more satisfactory way. In all straining efforts and violent attacks of coughing, the glottis is closed and the chest walls are strongly compressed by muscular efforts, so that the strain is thrown upon those parts of the lung least protected, as the apices and the anterior margins, in which we always find the emphysema most advanced. The sternum and costal cartilages gradually yield to the heightened intrathoracic pressure and are, in advanced cases, pushed forward, giving the characteristic rotundity to the thorax. As mentioned, the cartilages gradually become calcified. One theory of