Treatment.—There is no remedy that has a marked direct influence upon the course of bronchitis. All the methods of treatment hitherto recommended are frequently found to fail. There are principally two symptoms, for the subjugation of which every effort should be made, namely, the dyspnœa, and the immoderate secretion. The first originates through the accumulation of the bronchial mucus, with the removal of which it also disappears, and the best means for effecting this is the act of vomiting. It is not necessary to give strong emetics, for, by these, vomiting is produced too rapidly, and the retchings, which in reality are the most important results, by no means stand in direct relation to the size of the dose. A very good means of inducing protracted retching and vomiting consists in the administration of a strong infusion of ipecacuanha (ʒ j to water ℥ j), of which even one teaspoonful has the strongest effect without implicating the alimentary canal. If, during and after vomiting, no large quantities of mucus are expelled, and if the breathing does not thereby become easier, any further emesis will prove useless, and will only give rise to a chronic gastric catarrh, by which the child is very much reduced. As to the class of expectorants, the vegetable ones only are recommendable, and even these should only be used in cases where no disturbance of the digestion exists. When the latter supervenes, the harm caused by the expectorants is more apparent than their very problematical usefulness, and this remark is especially applicable to the antimonials, *tartar emetic*, *sulphuret of antimony*, *kermes-mineral*, and *white oxide of antimony*. Muriate of ammonia, so much in vogue in bronchitis of the adult, usually is not administrable to children in any form. In acute catarrh of the bronchi of infants, a mild infusion of ipecacuanha (gr. j to water ℥ j), with a little *oxymel simplex*, or a very dilute solution of *kali carb.* (gr. ij—℥ j) are the most appropriate remedies. *Little* very highly recommends frictions of the chest with turpentine every two or three hours, and covering of the chest with flannel. When the paroxysms become spastic, antispasmodics and narcotics are indicated, which not only exercise a favorable abortive effect upon the severity of the cough, but also upon the course of the disease generally. Chief among these is *aq. amygdal. amar.*, given in two or three times as many drops pro dosi as the child numbers years of age, three or four such doses daily; next laudanum, in doses already mentioned, several times; ext. belladonna, gr. $\frac{1}{20}$ to $\frac{1}{10}$, several times daily, etc.

When tuberculosis is at the bottom of the catarrh, this treatment of symptoms, as a rule, proves entirely fruitless. In these cases *ol. jecor. iron* and *quinine* must be tried. Pulv. cinchona, given in quantities such as can be taken up on the point of a knife, can be

administered to almost all children, and I have frequently seen very suspicious bronchitis, accompanied by febrile exacerbations and emaciation, disappear under a continuous employment of this remedy for from four to eight weeks. The temperature of the room in which the little patient is confined should be uniformly warm, the garments warmer than those worn in health; the drinks should be plentiful, so that a beneficial perspiration may be established. If the cause of the catarrh still continues, its removal, of course, must be attended to; it should be particularly insisted upon not to allow the children to remain in dusty manufacturing cities, as is so often the case with the laboring classes.

In order to guard against further bronchial catarrhs, and to counteract the disposition to that disease, a systematic inuring is to be urgently recommended. As regards the clothing, no definite directions can be given; at any rate the garments should not be so warm as to make the children feel uncomfortable, and cause them to perspire profusely on taking a little exercise. More catarrhs are undoubtedly produced by these warm dressings than prevented. The best and most rational means of inuring is to sponge the whole body with cold water before the child retires for the night; this may be commenced with immediately after the eruption of the canine teeth.

(2.) Lobular and Lobar Inflammation of the Lungs (*Pneumonia Lobularis et Lobaris*).—Pneumonia occurs extremely frequently in children, generally, however, in a form which anatomo-pathologically presents a different picture from that which we are in the habit of finding in the autopsies of adults. Namely, the lungs do not become extensively inflamed, throughout one or more lobes, but only in some places scarcely of the size of peas, between which normal pulmonary tissue is found in tolerable quantities, a process that has been correctly described as lobular pneumonia. Lobar pneumonia, it is true, also occurs, but comparatively much less frequently; it may come on idiopathically, or be produced by a blow, as in the adult; usually, however, it is like pleuritis of the new-born child, of a pyæmic nature. In the latter case it always terminates fatally; the prognosis, on the whole, even in lobar pneumonia, not of a pyæmic character, is also extremely unfavorable. In the nursling, lobular pneumonia is an extremely frequent affection, and carries off many children, especially during the period of dentition. In foundling-hospitals many children die from it, and the horizontal posture in which these children are kept both night and day has been considered the chief cause. What tends to confirm this view is the circumstance that, in most of the autopsies, the posterior and lowest portions of the lungs, and consequently the most depending parts,

have been found oftenest affected. Moreover, it has been statistically demonstrated that many more children suffer from it in winter than in summer, and that a part of the lung is never found with lobular inflammation to which the bronchi leading to it do not also exhibit a considerable degree of catarrh. The relation of lobular pneumonia to bronchial catarrh is probably of such a character that the gravitating secretion acts as an irritant, and perhaps mechanically upon the region in which the affected bronchi terminate, and that at the irritated places small pneumoniæ develop themselves secondarily. We have here, therefore, the relation of cause to effect. This condition also arises in most cases of croup, and lobar pneumonia is about as frequent here as lobular pneumonia, and the extension of the false membranes—whether they are thick or thin, confined to small or large surfaces, or extend far down into the bronchial tube on all sides—has no particular influence upon the origin of pneumonia. It is also found in almost all the cadavers of children who have succumbed to sclerema, and often it supervenes as the closing scene in tuberculous lungs.

Pathological Anatomy.—The anatomo-pathological processes are, as the names already designate, of two kinds, and lobular pneumonia is distinguished from lobar, not only as regards the extent but also as regards the quality of the exudation.

Lobar pneumonia, with the exception of the metastato-pyæmic form, occurring in lying-in and foundling-hospitals, is remarkably rare in the nursling, but wherever it does occur it displays the same morbid alterations as in the adult. Here also we have a *red* and *gray* hepatization, according to the time of the occurrence of death. The exudation is not poured out between the pulmonary alveoli nor into their walls, but into the cavities themselves, filling them up completely, and having the properties of purely croupous exudation. The red hepatized lung does not collapse on opening the thorax, it is totally emptied of air, the cut surfaces are dry and brownish red, mostly uniformly granular, and such portions of the lungs are as friable as the parenchyma of the liver. The granular quality of the section is produced by the elastic fibres lying between the alveoli, which are swollen by the deposit of firm exudation. The red color of the exudation is due to the interspersion of blood-corpuscles.

The exudation, which, with the exception of the blood-corpuscles, primarily was amorphous, becomes quickly transformed into albuminous and muculent masses; cells soon begin to form, which are produced alike from the alveolar walls and from the exudation. The blood-corpuscles meanwhile are undergoing dissolution, their coloring matter disappears, the entire mass changes its color, grows pale—gray hepatization—and the exudation constantly grows more like pus, on account

of which the French physicians have also called it *infiltration purulente*. Finally, the contents of the alveoli dissolve to a milk-like consistency, and are immediately absorbed, and then the rather rare process of a complete *restitutio in integrum* occurs. Occasionally large abscesses form, and still more rarely complete obsolescence, hardening, and induration, of the pulmonary tissue take place. In children lobar pneumonia never degenerates into tuberculous, as sometimes occurs in the adult, for tuberculous children generally succumb in the first few days after having acquired the croupous pneumonia.

Lobular pneumonia is not a croupous, but a catarrhal inflammation. Here small spots in the healthy pulmonary parenchyma become diseased, which, although they sometimes aggregate, nevertheless do not present the morbid appearance of the croupous lobar pneumonia. Generally, the disease involves both lungs, the right more than the left, and the posterior parts of the lower lobes are oftenest affected. Such lungs do not collapse completely, and this is not due so much to the lobular pneumonia as to the bronchial catarrh that constantly accompanies it, and when they are felt in different directions a few hard nodules will be found near their surface or deeply within them. If these nodules are now divided, bluish-red, denser spots, without sharp circumscriptions, will be seen in the transverse section. The walls of the pulmonary air-cells are intensely swollen, and, when they are scraped with the scalpel, a reddish, muculent, but sparsely-frothy secretion is obtained. The lobules affected with pneumonia seem to be somewhat beneath the level of the surface, on account of the pulmonary tissue surrounding them being mostly emphysematous, and their darker color makes them easily recognizable. If such places are carefully cut out, so that no normal pulmonary substance remains attached to them, they will sink completely in water, and do not present the least trace of crepitation. But, by inflating the whole lung, they again become filled with air to a certain extent, in contradistinction to the croupous pneumonia, in which inflation has no effect whatever; still these inflated lobules always retain a darker-red color, and a perceptible hardness. The microscopical examination shows that the pulmonary vesicles are filled with large quantities of newly-formed epithelium-cells and fluid exudation. We have here, therefore, no red and no gray, in fact, no *hepatization* whatever, for which a firm, solid exudation is always necessary, and hence also no different stages. Even when lobular pneumoniæ become confluent, the lobules are nevertheless distinguishable from croupous lobar pneumonia, by the absence of friability, by the possibility of forcing air into them by inflation, by the greater moistness, and by the remaining free parts which at all times are interspersed between those affected. The process always

remains catarrhal, never becomes of a croupous nature. When pneumonia is superficially located, we find in addition exudations upon the pleura, and invariably bronchitis in the bronchi leading to the inflamed places. The secretion in the arachnoid sac of the medulla spinalis is said to be augmented. The most common complications are thrush, enteritis folliculosa, and sclerema.

Symptoms.—The symptoms of lobular and lobar pneumonia may be very properly described together, since all the signs, with the exception of one, furnished by percussion, differ but little from each other. In the following description, children under two years are referred to: children who have passed the first dentition seldom suffer from lobular pneumonia. They usually have lobar pneumonia, which differs in no respect from that of the adult. The physical diagnosis of infantile pneumonia is attended by great difficulties, and requires much patience and time. The children are invariably opposed to the examination, and set up such a cry as to render all investigation impossible. Added to that, the sputa are also entirely absent, and by their very absence demonstrate their importance in the confirmation of the diagnosis. For this deficiency, however, we are indemnified by the characteristic appearance of the child, and a very peculiar kind of respiration, whose presence is so characteristic that with a little practice it is possible to diagnosticate such an infantile pneumonia even before the child is undressed.

It is seldom possible to accurately establish the commencement of a lobular pneumonia, for a bronchial catarrh always precedes it for some time, and its transition into pneumonia does not take place at once. It is generally ushered in by a cough, without fever, which grows worse and worse; sooner or later fever supervenes, the temperature of the skin constantly rising higher, and in a few days the whole train of symptoms of pneumonia is fully developed.

The most striking symptom is great acceleration of the breathing, which may rise to sixty and eighty per minute, and have an inverse rhythm. While in health the accent lies upon the inspiration—if the respiratory sounds be at all audible—in pneumonia, the accent falls upon the expiration, which is accompanied by a louder noise than the inspiration. The most energetic contractions of the diaphragm are now seen. At every respiratory act the intercostal spaces sink, producing a momentary depression beneath the nipples, extending toward the sternum. In a higher grade of pneumonia, the facial muscles also participate, the alæ nasi rise—a phenomenon upon which too much attention cannot be bestowed—the mouth is opened, the angles of the mouth are drawn downward and outward, indicative of suffering, and the eyes glassy, staring, or anxiously rolling about.

These symptoms of the respiratory modus, and the facial muscles, are not more pregnant with information than are the results derived from the physical examination fruitless.

Percussion gives a purely negative result in lobular pneumonia; in the lobar form, marked dulness is found over the inflamed places—a dulness which, in contradistinction to the physiological dulness during abdominal pressure, may be demonstrable without percussion, both during the inspiration and the expiration. That this physiological dulness posteriorly on the right is very frequently confounded with the pneumonic dulness is but too evident, from the fact that it is expressly stated in all the text-books that croupous pneumonia establishes itself by preference in the right lower lobes.

Also the rapid and generally favorable course that is ascribed to and claimed for pneumonia in the yearly reports of children's hospitals and nurseries, shows tolerably plainly that the error is of frequent occurrence.

The rest of the precautions that are to be observed in percussion have already been stated in the general part, page 20.

By *auscultation*, fine crepitating râles may be detected in lobular pneumonia; but by this we do not intend to say that no pneumonia exists wherever these are absent, for the dense places which give rise to them do not always lie near the periphery. Added to that, bronchial catarrh is always present, the sonorous râles of which often mask the much less audible crepitations, and the latter are also inaudible when the affected places are very much scattered between large portions of healthy parenchyma. As they are usually perceived within a small circumference only, a very close examination of the entire dorsal surface is, therefore, necessary for this purpose, which, in restless children, or in those that have once been disquieted, is impossible, even with the utmost patience and perseverance. Sibilant râles are invariably heard over both lungs. Crepitating râles is a valuable sign in confirming the diagnosis; their absence, however, does not exclude pneumonia.

In lobar pneumonia, fine crepitation, as in the adult, is heard at first; then, for several days, distinct bronchial breathing, strong consonance of the cough, of the voice and rhonchi, and, thereupon, crepitation again; till finally, at the end of eight or nine days, in case of recovery, normal vesicular respiration returns, if the still-existing bronchial catarrh does not produce for some time diffused sonorous râles.

By *palpation* nothing but sonorous râles are felt in lobular pneumonia; the vibrations of the thorax, caused by coughing and crying, are alike on both sides. In lobar pneumonia, stronger vibrations of the cough, of the rhonchi, and of the voice, are felt over the parts cor-

responding to the dulness, or they are not to be felt at all if the bronchi leading to the solidified lung are momentarily occluded by mucus. Palpation of the thorax cannot be too zealously practised, for in the crying child it is the only means which can be employed with benefit.

The cry of children suffering from pneumonia is characteristic: it is never very loud, and still less continuous; it should rather be called abruptly-interrupted moans and groans. The cough is frequent and persistent in all cases; when it becomes violent and paroxysmal, little white foam appears between the lips, even in the youngest children; generally, however, no expectoration whatever is to be seen. The cough is distinguished from that in bronchial catarrh by being apparently productive of pain, the children groaning pitifully after each paroxysm, and, at the same time, distorting the countenance in evidence of suffering.

The general symptoms vary according to the extent of the disease and its complications. The fever of lobular pneumonia usually begins after protracted feverless vespertine bronchial catarrh, disappears in a few hours, only to return with greater frequency and violence, till finally it becomes continuous. The skin is felt to be hot and dry, but the feet are cold and difficult to be warmed. The pulse becomes uncommonly rapid, and may rise to two hundred beats per minute. That is the utmost limit which, by any practice, it is possible to count.

In most cases of lobar pneumonia, the fever begins suddenly, even before the symptoms of disturbed respiration become apparent, and is as severe as in the eruption of an acute exanthema. On the following day the pneumonia comes on, and assumes its cyclical course. The consecutive cerebral symptoms do not depend upon the extent of the pulmonary affection, but upon the individual irritability. There are children who, in the most violent lobar pneumoniæ, retain a free sensorium, and others, again, who in the slightest ailment are attacked by all sorts of convulsions and nervous phenomena.

There is complete loss of appetite, the thirst is great, and the secretion of urine corresponds to the amount of liquids drank. The stool is frequently diarrhœal, because the majority of those affected with pneumonia suffer from the effects of dentition, and these, as a rule, are attended by loose stools. As this is often a result of the treatment, the impropriety of such treatment will be discussed more in detail in the future.

The *course* is extremely rapid in lobar pneumonia, for death or improvement ensues in from six to eight days. In young children the

fatal termination is more frequent than recovery. Children over two years of age bear lobar pneumonia as well as adults. It is difficult to determine the commencement of a lobular pneumonia, on account of its gradual development from a simple bronchitis, which must have preceded for at least four or five days, but may have existed for weeks and even months. Its course is by no means cyclical, sometimes rapid, and attended by such pronounced symptoms, that every lay person is able to recognize an alteration in the lungs, sometimes so gradual and insidious that it escapes the most experienced diagnostician. Such children seldom recover completely in less than two or three weeks, but, when it tends to a fatal termination, all the symptoms become aggravated, the dyspnœa and the frequency of the pulse increase, the extremities become cool, the nails cyanotic, the facial muscles distorted more and more, and now the expirations are not particularly accentuated. Finally, the respirations grow more infrequent, become gurgling or gasping, and death takes place by convulsions. In lobular pneumonia, which seldom occurs before the second or third week, *Bouchut* lost thirty-three out of fifty-five patients, ranging from a few days to two years of age. According to *Valleix*, all the new-born children in the Parisian foundling-hospital attacked by this disease die (out of one hundred and twenty-eight children one hundred and twenty-seven died). *Trousseau* has described, as a most unfavorable prognostic sign, the swelling of the veins of the back of the hand. This sign is significant, in view of the fact that the cutaneous veins can only be seen in emaciated children, and that these children rarely recover from pneumonia. In robust children who perished by this disease, I never observed any swelling of the veins of the hands during its entire course.

Treatment.—Since every pneumonia is preceded by a bronchial catarrh, it is evident that in young children it ought never, under any circumstances, to be slighted. Those measures recommended in the previous section are immediately to be resorted to. The patients should be kept in a uniform temperature; should not, even in summer, unless the air is perfectly still, be carried out of the room; and should be kept warm and dry, especially about the chest. Internally, small doses of opium, belladonna, or *aq. laurocerasi*, are very appropriately given. This treatment, with strict surveillance, must be continued until the last traces of cough have disappeared. Whoever has treated many children with lobular pneumonia, and has seen the much-praised remedies disappoint expectations, will not regard this minute and careful prophylactic treatment of a simple bronchial catarrh as pedantic and over-anxious. It is necessary to become habituated to regard the bronchial catarrh of every teething child as the possible beginning

of a pneumonia. Too often, unhappily, experience will prove that this view is a perfectly justifiable one.

Abstraction of blood is still pretty generally recommended in both lobar and lobular pneumonia, when already fully developed, and leeches are resorted to for that purpose with especial preference, for cupping is too painful, and, on the small surfaces of the thorax, their application is rendered difficult. Phlebotomy is usually impracticable, on account of the smallness of the cutaneous veins and the density of the subcutaneous fascia. Two or three leeches are therefore applied around the nipple, upon the sternum, or, according to *Bouchut*, on the inner surface of the thigh; the subsequent hæmorrhage to be encouraged for an hour. For the last five years I have not employed them at all, and must confess that, since then, I am more satisfied with the results of my treatment. I have frequently had opportunities, in consultation, of observing children in whom leeches had been employed by physicians differing from my views in regard to the abstraction of blood, and can report nothing favorable whatever of the course of pneumonia treated in that manner. Most of the children were prostrated and anæmic, the lips were blanched and eyelids pale, and, although temporary mitigation of their dyspnœa was said to have resulted, no such improvement was to be seen on the second day after. This treatment can be regarded as abortive in no other sense than that these children die sooner than those treated on the expectant principle. When this treatment is followed by recovery, convalescence lasts very decidedly longer, they retain their pale color and anæmic appearance for a long time, and their development is much retarded. Therefore, since I have never yet seen any marked benefit, but, on the contrary, very lamentable effects, produced by leeches, it would be totally inexcusable on my part not openly and directly to protest against the practice of abstracting blood.

And I may say the same of the much-lauded tartar emetic, which men, in other respects of sound judgment (*Valleix*, for instance), extol. Intestinal catarrh, according to the most extensive experience and observation, is the most frequent complication of pneumonia, and all those remedies are therefore to be avoided which are liable to produce it. The chief of these is *tartar. stibiat.*, which, particularly in small doses, insufficient to induce vomiting, almost invariably produces a diarrhœa that is difficult to arrest. The injurious effect of this agent upon the intestinal canal is earlier and more surely manifest than its favorable antiphlogistic and expectant action. In this respect, even ipecacuanha, although much less frequently, may do harm, yet the diarrhœas following it are of much shorter duration, less pernicious, and easily controlled by small doses of opium. In dyspnœa and suffocative attacks, a few teaspoonfuls of a strong infusion of ipecacuanha (℥ j to water ℥ j) act decidedly favorably, but even this should not be given more than once in twenty-four hours, at the utmost. Diarrhœa must be arrested immediately by small doses of laudanum, one drop *pro dosis*, for example. A weak infus. ipecac. (gr. j—ij to water ℥ j) causes neither vomiting nor diarrhœa, and therefore, in this respect, is harmless; but whether the expectoration of the catarrhal secretion is thereby materially facilitated is another question. It may be safely stated that the changes in the kind and severity of the cough following its administration are not very striking.

When the skin is burning hot, and no diarrhœa is present, I give one-eighth of a grain of calomel, four or five times daily, until green, semi-fluid stools ensue; after that a simple mucilage of gum-arabic, with a little syrup simpl. and tr. opii gtt. j—ij, until constipation is produced. The infus. ipecac. is avoided as long as possible, but may be prepared and preserved in a cool place till required. In cases where the dyspnœa increases rapidly, a large quantity of bronchial mucus is often suddenly expelled by an energetic act of vomiting, and in this manner very apparent palliation is frequently obtained. In all cases, the local treatment consists in the application of a moist girdle, in the following manner: A diaper, or a large white pocket-handkerchief, is folded up like a cravat; the bandage thus obtained should be three or four fingers wide, and the whole length of the handkerchief. This is now dipped in tepid water, and wrung out so that the cloth does not drip, and then applied, like a girdle, around the chest of the child. A second cloth, double the size of the first, is folded up in the same manner like it, but which must be six to eight fingers broad, and then applied, dry and warm, over the first. It is very advisable to interpose a piece of gutta percha between the dry and the wet girdle, by which, on the one hand, the moistness of the first cloth is preserved longer, while, on the other, the second does not become wet. If the water with which the fomentations are made is not too cold, the child will tolerate them very well, and, in a short time, a slight retardation in frequency and improvement of the respiration are indicated by less motion of the al ænasi. These tepid compresses should be continued for from four to six days, and it is not at all necessary, during the entire time, to remove the bandage; the gutta percha is raised up a little, and a few teaspoonfuls of water are poured upon the girdle, or it is moistened with a sponge. The principal thing is not to allow a cooling of the skin by evaporation to take place. To secure this object, the dry cloth should properly overlap the moist one on all sides, and, as it is impossible to prevent the upper cloth from becoming wet, it should be changed several times during the day. I certainly

have applied this girdle many hundreds of times, and have very often seen rapid improvement ensue; nevertheless, it cannot be denied that the half of these children perish notwithstanding. If *cold* compresses are applied to the children, as recommended by some authors, a cry of fright is the consequence; the child is seized with a feeling of dread, the breathing is palpably accelerated, and does not subside until the cold water has become warm through the temperature of the skin. Hence it seems more rational to make the compresses warm at once, by using warm water, in order to avoid the temporary restlessness and discomfort to the child.

(3.) Acquired Atelectasis of the Lungs.—Congenital atelectasis has already been treated of (on page 54) in connection with the diseases which are regarded as the immediate effects of the delivery; it therefore only remains for us to speak of the acquired atelectasis. This affection has the most intimate connection with rachitis of the thorax, and therefore mostly occurs in children between the ages of six months and three years. In many cases the augmentation in the density of the pulmonary tissue and the final atelectasis are due to a marked curvature of the spine, to a distended pericardium, hypertrophied heart, to aneurisms or neoplasms. It is found most exquisitely marked in pleuritic exudations, where the lung is compressed to the thickness of a finger and correspondingly condensed.

Pathological Anatomy.—The degrees of atelectasis vary exceedingly. A mere increase in the density may occur, which is recognized by the augmented consistency, but the compression may also attain to such a high degree as to cause a total obliteration of the alveoli, and the disappearance of the capillary vessels. At first these compressed and atelectic places contain blood and have a great similarity to muscle, on account of which this condition has been called carnification; but, when it has existed for some time, they become bluish brown or gray, shrink up into a leathery rind, the pulmonary tissue cannot be recognized, and is converted into a fibro-cellular mass, which is gradually displaced by the slightly emphysematous surrounding parts, and ultimately disappears altogether. Such solitary atelectic places are very rarely found, at least, in older children and adults. Sometimes it is still possible to inflate such atelectic places, if they are of but recent formation; generally, however, this experiment proves fruitless, for the alveoli have actually disappeared, and been replaced by a fibro-cellular mass.

When the lesion is extensive, it will have a similar effect upon the circulation as pulmonary emphysema. The capillary circulation becomes so impeded here, that a stasis takes place in the trunk of the pulmonary artery, producing dilatation of the right side of the heart, and finally venous stagnation and cyanosis.

The cause of acquired atelectasis is therefore chiefly to be sought in the rachitic thorax; the latter, however, originates in the following manner: The inspiration is brought about by the contraction of the inspiratory muscles, and a dilatation of the pulmonary vesicles is thereby produced. A momentary rarefaction of the air within them results, which helps to overcome the atmospheric pressure which is becoming stronger and stronger upon the thorax, aided by the elastic pulmonary tissue, which drags inwardly at every inspiration. The combined effects of these forces is an inward curving of the intercostal spaces, and, in lean persons, of the clavicular region also. I was once able to see this condition most strikingly displayed in a child in whom a rib was broken in two places by the shaft of a wagon running against it. The fragment of the rib, one and a half inches in length, was kept in place by mere skin, and flapped in and out with every inspiration and expiration, like the valve of a bellows. If the bony ribs have lost their firmness by being deprived of some of the calcareous salts, they will also participate in the inward movement, which otherwise is only seen in the intercostal muscles, and thereby lose their external convex shape. Moreover, they also yield to the diaphragm, which, by the pressure of the abdominal viscera, drags upon them so as to retard their longitudinal growth (producing rachitic shortening of the bones). By these various forces is finally produced a distorted, contracted, and misshapen thorax, the contents of which necessarily must suffer, more especially as, in consequence of the curving and retarded growth of the spinal column, it is also lessened in perpendicular dimension.

Symptoms.—In consequence of the diminished number of pulmonary cells containing air, an acceleration of the respiration necessarily must result, if an interchange of gases corresponding to the bodily weight is to take place. The respirations, in fact, are quickened and executed with considerable exertion, the alæ nasi thereby participating. The application of the stethoscope to the rachitic thorax is attended by many difficulties, for the button-like sternal ends of the ribs, and the concavities in the region of the nipples, render a perfect adaptation of the instrument impossible. We almost always have to confine ourselves to an immediate auscultation of the back, and generally hear sonorous râles in all parts, because the bronchi leading to the atelectic portions are affected with catarrhal inflammation. Over the diseased places proper crepitating râles and bronchial breathing are heard, provided the sonorous râles do not drown all other sounds. But on the infantile thorax, and especially the rachitic, the vesicular, puerile breathing is so sharp, and the expiration so loud, that the distinction between puerile and bronchial breathing consists