

one lobe, or an entire lung, or the tissues, having become totally liquefied, have a gangrenous odor, and are infiltrated with a flocculent, frothy, gangrenous-odored ichor. This kind of mortification is nowhere strongly defined, but gradually merges into healthy structures, larger or smaller streaks of cedematous tissue being interposed between the gangrenous and sound portions of the lung. It is very rarely observed alone, but generally associated with circumscribed gangrene.

Circumscribed gangrene is oftener met with than the preceding. In this process, a small portion of the tissues at one place becomes transformed into a greenish-black, moist, not easily-lacerable crust or slough, which is sharply defined. In the infant, the size of this slough rarely reaches that of a walnut. After a while this gangrenous plug becomes detached from its normal surroundings, and lies in an excavation of gangrenous pulmonary parenchyma, and bathed by a gangrenous ichor; or it soon dissolves into a sanious, ichorous fluid, and is surrounded by a sloughing excavation, with irregular, shaggy walls. Its site is oftener on the periphery, and in the lower lobes, than in the centre of the lung, and, after it becomes detached, it will drop into the pleural sac, if the pleura is not implicated and firmly united with the costal pleura. This accident results in an ichorous pleuritis, and pneumothorax becomes developed.

The pulmonary tissue surrounding the gangrenous plug is either only cedematous or pneumonic to variable extents; in both instances there is a disposition to assume a diffused mortification, and thus, if the children have lived long enough with this dreadful disease, an entire lobe may be found transformed into a pultaceous, sanious mass. If the arteries coursing through the affected places do not become completely occluded by thrombi, serious hæmorrhage may ensue, the blood escaping by the bronchi, while that which accumulates in the gangrenous cavities tends to increase the gangrenous material. No recovery from traumatic gangrene of the lung has been ever observed.

Symptoms.—The symptoms vary according to the cause of the gangrene. In typhus fever, in noma, and malignant measles, the general disease is so severe, and the susceptibility to the pain, at the same time, so diminished, that no subjective symptoms whatever, and only a few objective symptoms, become noticeable, while traumatic gangrene begins with the symptoms of pneumonia. I once met with such a case, in which a boy, fourteen years of age, had a grain of corn in his mouth, and, from some cause or another, suddenly commenced to laugh, during which the grain slipped into his larynx. For several days thereafter he was still tolerably well, and it was supposed that he was mistaken, and that he had swallowed the corn. But all the

symptoms of pneumonia at length suddenly came on, but did not run the regular course. The sputa became gangrenous, and, through violent paroxysms of coughing, the patient expectorated portions of the grain of corn, and large quantities of sloughing shreds, whose odor contaminated the atmosphere of the room to an unbearable degree. This expectoration continued for several weeks, and did not stop completely until after many months. The boy was reduced to a mere skeleton, and a cavity in the lungs remained, which gradually has diminished in size, and now, after six years, is barely traceable. Many years elapsed before he regained his former health and appearance. This case of gangræna pulmonum is the only one that I have seen terminate favorably.

In the other, non-traumatic, cases of gangrene of the lungs, the disease makes its appearance by a sudden aggravation of the general condition, in which the face, in particular, quickly becomes changed, assumes a leaden hue, and a distorted Hippocratic *facies*, and the pulse becomes extremely small and rapid. The temperature of the skin is not increased; the putrid odor from the mouth is always the most pathognomonic sign, which cannot be attributed to any morbid alteration in the mouth. The physical investigation may prove barren of results, if the process is central, or there be feebly circumscribed dulness, crepitating râles, bronchial breathing, and sibilant râles, or when perforation of the lungs occurs, and signs of pneumothorax appear. Generally, the sputa are bloody, the cough is intense and spasmodic. Colliquative sweats, hectic fever, and delirium, soon become superadded, after which death almost invariably closes the scene.

Treatment.—Where death appears to be inevitable, any rational treatment must be doubtful. The recoveries observed hitherto have been achieved by a treatment with quinine, mineral acids, acetate of lead, chlorine and its preparations, and, finally, with creosote.

(9.) **TUBERCULOSIS OF THE LUNGS AND BRONCHIAL GLANDS.**—Since we intend to subject the dyscrasæ, as collective diseases, to a detailed discussion in a special section, it will be sufficient, for the sake of completeness, to speak here of the pathological anatomy and symptomatology of pulmonary tuberculosis, while the etiology and consideration of the general disease will be treated of along with the dyscrasæ.

Pathological Anatomy.—All kinds of tuberculosis occur in the infantile lung. Thus there is (1), the discrete or miliary tubercle; (2), the aggregated; and (3), the large cheesy tubercular infarction. All the three varieties are often met with in one lung.

Miliary tubercle originates in the pouring out of a rich fibrous

exudation into the pulmonary alveoli. Usually, not many alveoli near to each other are thus involved, and still less frequently is an entire lobule. The process is mostly confined to solitary pulmonary vesicles only, and thus the name of discrete tubercle has been very appropriately selected. It occurs as a small nodule, barely as large as a pin's head, is of a grayish color, microscopically of a perfectly amorphous nature, for, with the exception of a few epithelium-cells and elastic fibres from the adjacent interstices, nothing but detritus is found. Acetic acid slowly dissolves it.

The *aggregated* tubercle consists of the same amorphous detritus as the miliary, is situated in clusters or nests, and may be found dispersed throughout several lobules and has a deeper yellowish tint. The pulmonary tissue lying between the single tubercles of such a nest is always devoid of air, solidified, and filled with exudation.

The *tuberculous infiltration* extends over large portions of the lungs, half of, or even over an entire lobe; in children, unlike adults, it occurs oftener in the lower lobes than at the apices of the lungs; has an undefined, unlimited form, and a yellow cheesy consistence. On these large tubercular infiltrations, the process of softening and degeneration can be studied to the best advantage. The tubercular mass, which has finally attained to a semifluid consistence, is evacuated by a bronchus, and a partly filled or a completely empty cavity remains, in the walls of which new tubercles may be deposited, and then, by the softening of these, the cavity is still more enlarged. Thus irregular, excavated cavities, provided with various prolongations, finally result, and are filled up with a dirty crumbling, yellow, or gray pus. Sometimes several small ones, then again a single one, so large as to occupy the whole lobe, may occur. In this connection it may be well to remark that a cavity seldom encroaches upon the adjacent lobes, but always leaves the demarkations naturally existing between them uninjured. Large caverns always communicate with some bronchus, whose open mouth is seen sharply cut off and adherent to the walls of the cavity. Occasionally obliterated vessels, or remnants of parenchymatous tissue, run like strings or bridges across the cavity. These vessels, however, invariably seem to be obliterated, for hæmoptysis is so extremely rare in children as nowhere to be mentioned as ever having been observed. So, too, the rupture of a cavern into the pleural sac, with pneumo-thorax resulting therefrom, so far as I am aware, never occurs in tuberculous children. That the pulmonary parenchyma surrounding a cavity is never perfectly normal, but always solidified like cicatricial structures, or in a state of gray or

red hepatization, containing more or less tubercles, is well known. Œdema is also frequently met with, especially in the lower lobes, while a vicarious emphysema usually involves the upper lobes. The bronchi which communicate with the cavities contain a yellow, crumbling pus like that found in the caverns, while the rest exhibit a swollen and injected mucous membrane. According to *Hasse*, the branches of the pulmonary artery leading to the tubercular cavities and infiltrations become obliterated, but new ones are formed in the parts of the lung that have suffered a loss in their principal vascular network. This increased vascular supply comes from the bronchial arteries and in part from the intercostal, the blood being carried off again by the bronchial veins and vena azygos. A disturbance of the circulation ensues, with which the partial dilatation and unusual development of the subcutaneous veins may have some connection.

Cavities, as is well known, may heal by calcification or by cicatrization. For both methods of healing, a number of years of time is undoubtedly necessary, and this readily accounts for the rarity with which they are observed in the autopsies of infantile cadavers. Calcification never occurs in children; dense, puckered places, on the other hand, are often seen conjointly with still-existing cavities, and are, most probably, to be regarded as the cicatrices of smaller cavities. The tubercular lung of an infant is distinguished from that of the adult by the absence of pigmentation.

The *bronchial glands* are much more frequently the site of tubercles than the lungs. This is invariably the case when tuberculous degeneration exists in the lungs; but often, even where they are not implicated. Here the large yellow tubercle principally occurs, while the aggregated clusters of small tubercle are rarer, and the miliary variety is scarcely ever observed.

Generally, the whole gland degenerates into a large yellow tubercle, and attains to the size of a small hazel-nut, and even to that of a walnut. The tuberculosis mostly implicates several glands, so that the bifurcation of the bronchi becomes surrounded by a large tubercular mass. Only those glands lying external to the lungs attain to a considerable size: those accompanying the bronchi within the lungs barely become larger than an almond, or dispose themselves in semilunar channels about the bronchus. The glandular parenchyma, as a rule, has wholly disappeared, and nothing but a capsule, the former enveloping membrane of the gland, remains, to which a yellow tuberculous mass adheres all around. These seem to be less disposed to softening; remarkably seldom, at all events, are soft tubercles found in the glands, but, when that process does take place, it may begin in the centre as readily as at the periphery. In older children a partial

calcification may also occur. The influence of the tuberculous bronchial glands upon the adjacent organs is twofold, as *Rilliet* and *Barthez* very correctly have pointed out. They say that glands act either (1) by compression, or (2) by firm adhesions with the contiguous organs and consecutive perforation.

(ad 1.) Anatomists divide the glands that are situated external to the lungs into (a) tracheal glands at the side of the trachea down to its division; into (b) bronchial glands, lying between the bifurcation; into (c) cardiac glands, lying upon the base of the heart and large vessels; and into (d) œsophageal glands, within the mediastinum posticum, in the neighborhood of the œsophagus. All these glands may undergo tuberculous degeneration and enlargement, and then press upon the adjoining organs.

As regards the compression of the vessels, we find those which are liable to it to be the superior vena cava, the pulmonary artery, the pulmonary veins, and the vena azygos. Instances of the total obliteration of these veins by this means are recorded. I myself have never met with such, but only remember to have seen a constriction of a pulmonary vein with simultaneous tubercular degeneration of the bronchial glands. Compression of the vessels may give rise to hæmorrhage and œdema. Thus, for example, according to the authors above quoted, compression of the vena cava superior produced a hæmorrhage into the arachnoid sac, and œdema of the face. Pressure upon the pulmonary vein may very readily cause œdema of the lungs.

Impressions upon and flattenings of the trachea and its bifurcation are sometimes found, and are also produced by tubercular glands. They are not, however, capable of effecting any decided diminution of their calibre. Compression of the nerves is of greater importance, especially of the pneumogastric nerve. Sometimes the glands grow so closely around them, that it becomes an actual impossibility for the anatomical knife to separate them. Nevertheless, the nervous function does not seem to be interfered with, for, were it otherwise, more marked disturbances of the circulation and of the respiration would be observed in glandular tuberculosis than is actually the case. Compression of the œsophagus seems to occur but very rarely; a simple lateral displacement is sometimes observed.

(ad 2.) The bronchial glands within and outside of the lungs may become intimately united with the bronchi, and perforation of the walls of the bronchi may ensue from the softening that follows. According to *Rilliet* and *Barthez*, non-softening, hard, tubercular nodes are also capable of producing ulceration of the rings of the bronchi, and thus occasion perforation, a condition that has hitherto received but little attention from the pathological anatomist. In the lung

itself it is very difficult to distinguish a cavity from a perforated bronchus in a suppurating bronchial gland. These pseudo-cavities are always situated near the roots of the lungs, and outwardly their excavations are in connection with the rest of the tuberculous masses of the degenerated glands.

The authors referred to also speak of a tuberculous perforation of the pulmonary artery, and of the œsophagus, of which I have no personal experience.

Symptoms.—First of all, as regards the physical examination, it is important to understand that the percussion should be performed lowly; and the strokes follow each other very slowly, for otherwise the less-marked dulness will invariably be overlooked. In miliary tuberculosis, where both lungs are equally permeated by the minute tubercles, percussion, of course, affords less information; the percussion-sound in general is a little more tympanitic, but no inequality in the two pectoral moieties can be detected. The same holds good with tuberculosis of the bronchial glands, which are overlapped by the lungs and roots of the large vessels, and thus totally escape the physical diagnosis. On the other hand, extensive tuberculous infiltration may very readily be detected by careful percussion, but, as has already been stated, when treating of the pathological anatomy, the apices of the lungs are not so exclusively the site of these infiltrations. A circumscribed dulness is very frequently found farther down or laterally, which is also referable to tuberculosis, although in adults it seldom occurs in this manner. If caverns have already formed and evacuated their contents by the bronchi, the flat percussion-sound becomes a little more sonorous, and acquires a tympanitic pitch, a condition that by no means indicates improvement nor diminution of the tuberculous infiltration.

Nothing characteristic is detected by auscultation; the bronchial catarrh always attending upon this disease gives rise to far-diffused, large and small sibilant râles, which differ in no respect from those of a simple bronchitis. In large tubercular solidifications of the pulmonary substance there is always bronchial respiration, strong consonance of the voice and of the cough, and distinct abnormal propagation of the cardiac sound to parts of the lungs at a distance from the heart. Occasionally crepitating râles, or merely roughened respiration, is heard at the margin of the dulness. The cardiac impulse is remarkably strong in all tubercular children. When a solid tuberculous infiltration liquefies, and cavities are formed, the auscultatory symptoms likewise become changed, as has already been pointed out when treating upon percussion. Cavernous gurgling and râles now supervene, and the breathing becomes cavernous. Cavities, however,

in small children, as a rule, are not of such a size that these symptoms should always appear, and be perfectly characteristic.

As regards the functional symptoms, these will be found to be of various descriptions. The *respiratory acts* are almost always accelerated, most rapidly in febrile, acute tuberculosis, where the two factors, (1) the fever, and (2) mechanical obstruction in the air-passages, act in combination. They then rise from sixty to eighty in the minute. In chronic tuberculosis the acceleration is barely perceptible, and scarcely any dyspnoea is present. But, in the rapidly-developing and progressive form, great dyspnoea, even orthopnoea, and labored breathing, participated in by the *alæ nasi*, may become superadded. This, however, is to be ascribed more to the concomitant pleuritis and partial tuberculous pneumonia than to a constriction of space, in consequence of the tuberculous deposit. In general it may be assumed that the more acute and diffused the process in the lungs, the more accelerated and embarrassed are the acts of respiration.

The *cough* is the most constant of all the symptoms, for it is never absent altogether; it is feebler and less noticeable in acute miliary tuberculosis, where the same process in other organs, particularly in the brain, reduces the irritability of the nervous system to such an extent that these hydrocephalic children often will not cough for many days, although the *post-mortem* examination may show that both lungs are found permeated by miliary tubercles, and the bronchial glands metamorphosed into cheesy masses.

The cough is not only the most constant, but also the earliest of all the symptoms. It never ceases completely during the entire course, although there may be short remissions which are liable to mislead one to the formation of a deceptive prognosis. At first it is dry, short, and hacking, but recurs frequently; later, when large extents of bronchi are implicated, it becomes moist, and is attended by convulsive paroxysms. These paroxysms have great similarity to those of whooping-cough, but the characteristic, loud, and prolonged inspiration at the end of the cough is always absent; nor does the expectoration of large quantities of glairy mucus set in after several weeks. These spasmodic coughs, as a rule, have their foundation in the tuberculous enlargement of the tracheal glands, which exercise a constantly-increasing pressure upon and irritation of the trachea, and consecutively upon the larynx. It may also be occasioned by profuse secretion alone, as is often enough observed in adult patients suffering from simple broncho-blennorrhœa. When the latter cause exists, the paroxysm ceases as soon as the mucus has passed the larynx, but this cannot be so easily decided in children, since they immediately swallow it. In tuberculosis of the bronchial glands, on the other

hand, the paroxysms may continue for an indefinite time, and exist without any expectoration, and, as a rule, cease only when the exhaustion has become extreme.

The *expectoration*, which in adult tuberculous patients supplies such an excellent index, cannot be relied upon at all in children up to the fifth or sixth year, for they invariably swallow the mucus coughed up from the larynx. But occasionally, even in young children, after a violent paroxysm of coughing, a white, fine-frothy foam will be seen to rise to the tongue, and even between the lips. This, however, can only be regarded as simple secretion of the bronchi affected with catarrh, and is by no means pathognomonic of tuberculosis. Children over seven years old, in whom, before the age of puberty, phthisis pulmonalis is very rare, expectorate like adults, and the pus evacuated from the vomica is in all respects similar. The rare occurrence of hæmoptysis has already been particularly mentioned, in connection with hæmorrhage of the lungs generally, on page 306.

If the children are large enough to indicate the place where they feel the pain, they will almost always describe its site to be at the præcordia or the sternum, only extremely rarely in the lateral parts of the thorax. It is absolutely necessary to ascertain whether any pains more or less violent exist, for the purpose of instituting a scientific treatment, for the more intense they are, and the greater the restlessness occasioned by them, the more rapidly the children sink. As tuberculosis is seldom limited to one lung, the alterations observed in the decubitus of such children are, therefore, less constant. They mostly lie on the back, and only very seldom choose a constant lateral decubitus. It is remarkable that, notwithstanding the extreme emaciation, the long duration of the disease, and of the continued fever, they rarely and only at a late date get bed-sores. The walls of the thorax exhibit a degree of emaciation disproportionate to that of the rest of the body, and a development of the subcutaneous veins takes place, and may be regarded as characteristic of tuberculosis. These veins, especially in the neighborhood of the sternum, from the first to the third rib, become largely dilated, and may swell up to the width of one line.

In all chronic diseases in which any impediment to the circulation of the blood exists in the lungs, consequently in extensive tuberculosis and cardiac affections in particular, a peculiar bulbous swelling of the tips of the fingers is observed, by which the nails become curved forward like claws. In the highest grade of this curving the fingers acquire the appearance of drumsticks. In this we possess a very valuable sign, because this bulbous thickening of the ends of the fingers is never congenital, and is never observed in healthy

children, but always denotes the existence of a high degree of stasis in the right side of the heart, which, as a rule, has its cause in the lungs.

Markedly enlarged bronchial glands, as has already been observed in speaking of the pathological anatomy, sometimes give rise to oedema of the face—a condition that is to be ascribed to local disturbances of the circulation, because, in dropsies originating in the dyscrasiæ, the feet are well known to swell first, and oedema of the upper extremities and of the face does not supervene until a long time afterward, while in this case that of the face alone is present. *Rilliet* and *Barthez* have shown, by several dissections in such cases, that compression of the vena cava by the enlarged glands has actually taken place. There is then also found a marked dilatation of the subcutaneous veins of the neck, and slight cyanosis of the lips and eyelids.

Pulmonary tuberculosis runs its course either as acute miliary tuberculosis, in which case the same process is also found established in other organs, especially in the brain and upon the peritonæum, and the various symptoms emanating from the other organs, completely overshadowing those of the lungs, or it runs a chronic course as in the adult, under the signs of phthisis pulmonalis. The first form will be discussed once more in speaking of the cachexiæ; the second has a duration of from two months to two years, and may also be arrested. I know children, the progeny of demonstrably tuberculous parents, who, in the early years of life, exhibited decided signs of developed pulmonary tuberculosis, such as distinct dulness over one or the other part of the thorax, bronchial breathing, sibilant râles, intense protracted bronchitis, emaciation, fever, etc., and nevertheless recovered, to all appearance, completely: the nutrition became reëstablished, the appearance of the child blooming, the fever and cough gradually subsided; but the dulness remained, and, with the least disturbance of the general condition, a new and obstinate bronchitis always recurred. But finally, in some cases, the process becomes general, and then the phthisical children perish under the symptoms of miliary tuberculosis.

In regard to the treatment, the reader is referred to the precepts which will be recommended for tuberculosis in the section on the dyscrasiæ.

(10.) CARCINOMA OF THE LUNGS AND OF THE MEDIASTINUM ANTICUM.—Carcinoma in general is an extremely rare affection in children, and that of the lungs in particular has been observed but a few times. In most instances carcinoma of the lungs was found in the cadaver, along with cancerous deposits in other organs, in the form of white or grayish-red nodules of the most variable sizes. They

are situated both in the deeper portions and upon the periphery of the lungs; they are flattened down when deposited close to the pleura, and, like cancer of the liver, become umbilicated in the centre. The symptoms observable during life are reduced to bronchitis and dyspnoea, and are usually supplanted by those of carcinoma in other organs.

Carcinoma of the *mediastinum anticum* I have observed twice—once in a boy five years of age, and once in a boy six years of age. Since, in both cases, the whole anterior mediastinum was filled up with it, and the pleura, lungs, and pericardium were united by it, a description of the symptoms at this place will therefore not seem improper.

The development of this carcinoma seems to be tolerably rapid; at any rate, both of these children manifested the signs of embarrassed respiration for a few weeks, and yet, at the percussion that was soon after performed, a marked dulness was already observable over the sternum, extending laterally to both sides of it. The main index is, therefore, the aforesaid dulness, which, in the course of the malady, rapidly increases, not only by the growth of the carcinoma, but also by the dropsical effusion which is poured out into the pleural sac. That the exudation which gives rise to the dulness is not of a fluid nature, may be very easily demonstrated. The cardiac sound is heard over it almost as loudly as when the heart itself is auscultated; the sibilant râles, too, originating in the catarrhal bronchi, are distinctly audible over the cancerous tumor. The functional disturbances mainly depend upon the direction in which the cancer has most extended. The large venous trunks must have been compromised in both the cases I saw, for oedema of the face and hands was present, and the veins of the neck were markedly dilated. The children suffered from constant orthopnoea, on account of the extremely distressing compression of the anterior sections of the lungs, and breathed easiest when they curved the back and flexed the head forward, which attitude was also retained during sleep. The dorsal surface of the thorax gives, in these cases, a sonorous tympanitic percussion-sound, and, as this part of the lung must perform a double duty on account of the compromised anterior portion, the respiratory sounds are heard extremely intensified, and frequently masked by sibilant râles. The heart is displaced outwardly and downward, and, in one of the cases I saw, a blowing systolic murmur was heard without any material alteration of the heart or its valves being found at the autopsy by which that murmur could be explained. The pulse is very much accelerated, the appetite not wholly gone, and the emaciation, consequently, never becomes so extreme as in tuberculosis. Finally, much to the relief of

the patients and of their relations, the brain also becomes affected, coma or delirium supervenes, and the patient soon succumbs.

At the autopsy I found, in one case, a medullary carcinoma, which filled up the whole anterior mediastinum, and extended over the anterior part of the right lung, without having occasioned secondary nodules in any other organ. In the second case, a cystosarcoma, of the size of a large fist, simply compressed, but did not involve the lungs and heart. In both, marked hydrothorax, but only slight ascites, were present.

The dyspnoea of these children, which was extremely distressing to themselves, and for others to witness, could temporarily be mitigated in a very surprising manner by large doses of morphia, gr. $\frac{1}{2}$ to $\frac{1}{2}$ pro die.

(11.) WHOOPING-COUGH (*Tussis Convulsiva—Pertussis*).—Whooping-cough is an epidemic, contagious bronchial catarrh, with peculiar convulsive paroxysms of cough. *Hippocrates* has not described it accurately. The delineations of the epidemics of the former centuries are not exactly applicable to the group of symptoms as it is now observed, and only since the eighteenth century have more correct views been entertained in regard to this disease in the different countries where it has prevailed. Besides the denominations above given, it has received a number of others, such as *coqueluche*, *affection pneumo-gastrite-pituiteuse*, *broncho-céphalite*, *catarrh convulsif* (in France); chin-cough (England); *pertussis*, *tussis suffocativa*, *spasmodica*, *strangulans*, *clangosa*, *ferina*, *blauer Husten* (blue-cough), *Schaafshusten*, *Eselshusten* (Germany). We have to deal here with no simple anatomical alteration, but with an acute cosmical disease, and, in fact, from the class of the so-called atmospheric pestilences.

Symptoms.—Three stages of whooping-cough can be distinguished with tolerable accuracy—(1) a stadium catarrhale, (2) a stadium convulsivum, and (3) a stadium decrementi.

(1.) *Stadium*. The phenomena of the *stad. catarrhale*, or prodromum, or invasionis, are those of a simple bronchial catarrh, sometimes complicated with gastric symptoms. Some hoarseness, tickling of the throat, dry cough, sneezing, profuse flow of mucus from the nose, lachrymation and redness of the eyes, are together or singly observed in almost every child with commencing whooping-cough. If febrile symptoms supervene, as frequently happens, such as hot skin, frequent pulse, depression, general *malaise*, and loss of appetite, then we have a perfect picture of the stage of incubation of measles, a fact which, when whooping-cough and measles prevail simultaneously in one place, we shall do well to keep in mind, on account of its bearing on the prognosis. The cough, from the very commencement, assumes

a peculiar, hollow, metallic clang, soon becomes paroxysmal, and, if no preëxisting pulmonary affections are present, is always totally dry. This stage lasts from three days to three weeks, is more or less distinctly marked, and can be observed in every case of whooping-cough.

(2.) *Stadium*. The *stad. convulsivum* or *nervosum* is distinguished by the cough recurring in violent paroxysms, and which is of such a peculiar character that it is never forgotten again when it has once been heard. Somewhat older children have a premonition of the occurrence of the attack. They experience a tickling sensation in the throat, oppression of the chest, feel nauseated, breathe anxiously and quickly, sit upright in bed, or run, when they are awake, to a chair or some other support, in order to be able to offer a stronger resistance to the attack. The paroxysm itself consists of a great number of short, rapidly-recurring, not perfectly uniform, spasmodic coughs, and is at length interrupted by a protracted, whistling, sipping attempt at inspiration. The French designate this whistling inspiration by the word "reprise." Immediately after the first one, the convulsive expirations begin anew, last ten to fifteen seconds, whereupon another "reprise" follows, and thus these two acts alternate with each other several times in such a manner that an entire paroxysm, from the beginning to the reappearance of the normal respiration, may last from one to fifteen minutes. At the beginning of the paroxysm, the single cough-exclamations follow each other with the greatest rapidity, and without any intervals, and the child seems to be in imminent danger of dying by suffocation. And in fact, during the fit of coughing up to the "reprise," no air whatever gains entrance into the lungs, a fact of which one can easily convince himself by auscultating the dorsal surface of the thorax. At the "reprise" the glottis is evidently in a state of momentary constriction, either in consequence of spasm, or of paralysis, as has been already more thoroughly explained during the study of croup, and all the auxiliary respiratory muscles of the neck and abdomen are called upon to perform an active part. Serious stag-nations of the circulation are produced by the choking acts of coughing; the blood stagnates in the pulmonary artery, and then occasions dilatation of the right side of the heart and of the entire peripheral venous system, a condition that is especially distinctly to be seen in the large veins of the neck. Finally, the children become bluish red over the entire head and face, from which also the designation of "Blauhusten" (blue-cough) has originated. The eyes become injected, and protrude somewhat from their sockets. The face swells up, and is covered with a cold perspiration; the movements of the heart and of the pulse are feeble and unequal; the urine and fæces are often involuntarily ejected by the violent contractions of the ab-