

the slowness of their growth, by slight painfulness, and their chronic course. Cystic polypi very frequently return; fibrous polypi, when thoroughly removed, generally do not.

**Treatment.**—Internal remedies, as well as the local application of astringents, have proved to be totally useless; the only effectual treatment consists in twisting off and eradicating the polypus, care being taken to grasp it close to its origin, from the mucous membrane. A long, slender, serrated forceps is the best instrument for this purpose.

For the removal of fibrous polypi with broad pedicles, *Middel-dorpf's* galvano-caustic is very well adapted. The hæmorrhage produced by the evulsion of the polypus is readily arrested by injections of cold water, and the introducing of pieces of ice. After the removal of cystic polypi, drossils of charpie, smeared with red-precipitate ointment, should be introduced into the nares for several weeks, to prevent its return.

(4.) FOREIGN BODIES IN THE NOSE.—Children from two to eight years of age very frequently introduce extraneous substances into the nose. The most common are cherry-pits, small round pebbles, glass beads, peas, beans, and paper balls. In addition, insects, such as flies and bugs, gain an entrance into the nose while children are asleep, or a round-worm strays (probably during a fit of vomiting) into the nose. Generally, as soon as a child introduces a foreign body into the nose, it straightway tries to remove it by boring with the finger, and thereby only pushes it into the choanæ, where it finally becomes lodged. The irritation that is produced by these foreign bodies varies according to their composition. If some part of the surface is rough, painful swelling and coryza will soon be induced; beans and peas produce the greatest amount of irritation, they soon swell up in the moist warm cavity, and may even begin to sprout there. A remarkable case of this kind is recorded by *Boyer*, in which a pea germinated in the nose of a child and bore ten or twelve roots, one of which grew to three and a quarter inches in length.

The nose becomes very painful, and, without chloroform, no thorough examination can be made. The termination is most favorable in those instances where paper balls have been introduced into the nose; they soon soften and are discharged piecemeal. However, cases are also said to have occurred in which the foreign bodies produced severe irritation, delirium, meningitis, and death. The condition called rhinitis, in which successive deposits of inorganic salts take place around the foreign body, sometimes met with in the adult, is, so far as I know, unknown in the Pædiatrica.

**Treatment.**—A painless and yet in many instances a successfu

remedy is, the act of sneezing, which may be excited by a pinch of snuff, used in the sound nostril. Even when the extraneous body is not entirely expelled, it will nevertheless always be found to have been propelled forward, and somewhat loosened. As soon as it becomes visible, it may be extracted with a very fine dentated forceps or *David's* scoop. Soft bodies may also be crushed with a strong dentated forceps, when the single pieces will soon be expelled. The attempts at extraction should never be persevered in too long, because very severe swelling of the mucous membrane will thereby be produced. They may be repeated again in a few days. Under no circumstances is the nose to be split open hastily, as recommended by *Dif-fenbach*; the operation should be deferred until critical cerebral symptoms render it necessary, which, on the whole, very rarely occur.

#### B.—LARYNX AND TRACHEA.

(1.) CROUP (*Laryngitis* and *Tracheitis Maligna*).—It is not easy to find, for one and the same disease, so many and different appellations as for croup. The most current are: *Cynanche trachealis*; *angina laryngea exudatoria, sive polyposa, sive membranacea, sive strepitosa-perfida-mortalis*; *laryngea tracheitis exudativa, pharyngo-laryngitis pseudomembranacea*; *morbus strangulatorius*; *suffocatio stridula*; *membranous quinsy*. The shortest of all of these titles, croup, has received the preference, and in the Scotch vernacular properly expresses a white membrane found upon the tip of the tongue of sick chickens, in the disease called "pip."

In ancient times croup seems to have occurred very rarely; for not even one characteristic description can be found in the writings of the old physicians, whose accurate powers of observation no one will presume to question. *Baillou*, in 1576, according to *Fredrich*, is the first who mentions having undertaken a dissection of croup. The literature of croup received a great accession through the proclaimed *concoirs* of Napoleon I., occasioned by the rapid death of his nephew, the son of the then King of Holland, who fell a victim to this disease in 1807. Eighty-three dissertations on croup were sent in. *Jurine*, of Geneva, and *Albers*, of Bremen, received prizes, and many others were honorably mentioned; none, however, knew of any remedy by which the mortality of the disease could in any way be ameliorated. As Napoleon was chiefly concerned about the latter, and not in the enriching of the symptomatology or the pathological anatomy of croup, the writings of the entire *concoirs* must therefore be regarded as having disappointed him.

**Pathological Anatomy.**—Croup consists of a certain group of symptoms, which in different individuals always manifest themselves in the

same manner. We do not intend to be understood as saying that these symptoms are always indicative of the same anatomic-pathological alterations; on the contrary, there is abundant evidence that it may depend upon *three different* kinds of processes upon the mucous membrane of the larynx. The exudation poured out by the inflamed mucous membrane may be either (a) muco-purulent, or (b) simply fibrinous, or (c) diphtheritic.

(ad a.) The laryngeal mucous membrane, which, during life, is probably intensely red and strongly injected, does not generally retain that color after death, but is only slightly reddened; its inflammatory swelling, however, continues, and may be readily demonstrated by a perpendicular incision. This inflammatory thickening is also found in the glottis. The entire larynx and trachea are lined by a tenacious, yellowish mucus, which is with difficulty wiped away. In some places the inflamed mucous membrane displays small catarrhal abrasions, and its follicles are enlarged, so that, when the mucous membrane is rendered tense by bending or twisting the trachea, a minute bead-like drop of grayish-white mucus will rise out from every crypt. This muco-purulent exhalation may extend down into the very smallest bronchi.

(ad b.) With the condition just described, which, in fact, must necessarily be found in every dissection of croup, a fibrinous exudation of more or less thickness usually becomes associated, and may be readily peeled off from the inflamed mucous membrane without causing any actual loss of its substance. Microscopically these membranes consist of band-like fibrinous cords, between which numerous pus-cells are deposited. The latter did not originate in the fibrine, but were already previously present upon the mucous membrane, and subsequently became surrounded by the fibrinous exudation, and locked in by the coagulation that ensued. The membranes vary very much in extent. Sometimes very thin, cobweb-like, small patches are found at one or several places of the larynx; in other cases the membranes are of the thickness of the back of a knife, yellowish-white in color, covered on their upper surface by a cream-like coating, and line the entire larynx, trachea, and the bronchi of the higher order, so completely that they appear like a prepared connective, dentritic tubular system, and may be pulled out entire. The tonsils and pharynx are also occasionally seen to be coated with these membranes.

(ad c.) In diphtheritic laryngitis a grayish-white exudation into, *not upon*, some portions of the mucous membrane is poured out.

This grayish mass of exudation, beneath which the mucous membrane, as well as the epithelium, is soon destroyed, consists of an amorphous detritus, in which *no bands of fibrine* and but few pus-cells are found. It is not as easily pulled off from the mucous membrane as the simple fibrinous membrane, and generally covers also the palate, tonsils, and pharynx. The distinction between purely fibrinous and diphtheritic croup is entirely a microscopical one.

When the diphtheritic layer becomes detached during life, an ulcer remains behind, the margins and base of which soon become coated with a new grayish deposit. Diphtheria, according to *Virchow's* views, is to be regarded as a progressive inflammation, with partial destruction and sloughing, of the mucous membrane. Diphtheritic laryngitis occurs in an epidemic form, and frequently follows upon morbilli and scarlatina.

The pulmonary parenchyma is found altered in all the three forms. Usually the lungs do not collapse on opening the thorax, because the air in the bronchi is prevented from escaping by the mouth, by the large quantities of bronchial secretion; often diffused pulmonary oedema and very generally lobular, sometimes also lobar pneumonia or tuberculosis, are present.

The adjacent lymphatic glands of the neck and nape, as well as the bronchial glands, are often swollen and hyperæmic.

The rest of the organs, with the exception of venous stasis, exhibit no characteristic morbid changes.

**Symptoms.**—The prodromata of croup are seldom particularly significant. The children have a cough, sneeze, and suffer loss of appetite for a few days, and sometimes are less lively than usual; still, it also happens that they retire to rest perfectly well and serene, and, after sleeping the first hours of the night, suddenly wake up with a croupy cough, upon which the symptoms may develop themselves so rapidly that the physician who is called in on the following morning finds a complete, well-marked croup. This first stage, the stadium prodromorum, is not noticeable, simply for the reason that, in many cases, it does not occur at all, and, in still more, offers no pathognomonic symptoms whatever.

The commencement of croup is, with justice, dated from the moment in which the first morbid change in the larynx manifests itself through the voice and cough. The voice becomes hoarse and husky, constantly lower and lower, till it finally disappears so completely that their efforts to speak can only be heard in their immediate vicinity.

Even the most intense pain or anger does not enable the child to utter a loud sound. As soon as the voice becomes hoarse and rough, a respiration, audible throughout the room, supervenes. The sounds accompanying the breathing are best imitated by pointing the lips as if about to whistle, but, instead of whistling, you merely inspire and expire through the sharply-pointed lips. A sound is thus produced which is midway between an active breath and a whistle. In croup it approximates more to the active breathing than the whistling tone. The inspirations constantly grow more frequent, and finally the number of respirations may rise to sixty and more in the minute. They also become irregular, sometimes deep, sometimes superficial, and the accessory muscles of the respiratory muscular apparatus participate more and more in every act of respiration.

Simultaneously with the hoarseness and the loud breathing, a cough supervenes, the tone of which is so characteristic that, for brevity, it has been called "croup cough." It is a barking, toneless, dry cough, and has been compared, not inappropriately, to the first attempt at crowing of a young rooster. At first it is tolerably abrupt, and terminates with a single expiration; soon, however, it becomes a regular paroxysm of cough, which may last one and subsequently several minutes. In the first day of croup these severe cough paroxysms are rare, and recur only every four or six hours. Soon, however, they become aggravated in intensity, as well as in frequency, and are quickly induced by the least external irritation, by drink, or pressure on the tongue, for the purpose of examining the throat, etc. They abate, and even disappear altogether, at the approach of death. In consequence of this cough, children become livid in the face, the eyes protrude, staring and congested, from the sockets, the veins of the neck and head swell up into thick tense cords, the forehead becomes covered with perspiration, but the cough, notwithstanding the most violent exertions, remains totally aphonic, accompanied by the expectoration of only small quantities of frothy mucus. These paroxysms of cough are distinguished from those of whooping-cough, which are also interrupted by a whistling inspiration, by their suffocative character, aphonic tone, by the absence of expectorations, and vomiting. Moreover, in pertussis, the child is well immediately after the termination of the paroxysm, and the voice is natural, while croup patients are seriously sick, and the voice is as much aphonic afterward as before.

It is a mistake to ascribe the croupy cough and the loud breathing to true croup only, and to consider all the laryngeal affections in which this cough is heard as genuine croup. To this error, no doubt, a great

many of the recoveries from attacks of croup, in which a few leeches or some other therapeutic procedure rendered such "excellent service," are due. Very simple, mild cases of laryngitis often occur in which children have no fever at all, and retain their appetite, but which nevertheless are accompanied by the same hoarseness, the same tone of the cough, and the same loud respirations, for many days together. This condition may even become chronic, may be produced by hypertrophied glands growing around the trachea, and last for many years.

In genuine croup, an increased temperature of the skin is present from the very first, by which, in fact, the general disease manifests itself. The acceleration of the pulse is, in this disease, as in most infantile diseases, of little significance, since even a trifling catarrh will produce it. Croupy cough, hoarseness, and loud respirations, *do not* suffice for a diagnosis of croup; the symptom of *continuous fever* must be present. This consists, above all, in a marked, perceptibly-increased temperature of the skin, in loss of appetite, in augmented thirst, and in acceleration of the pulse.

Concerning the appearances of the mouth, authors of various countries differ according to the countries in which they have carried out their investigations. In France, particularly in Paris, where the diphtheritic croup seems to occur almost exclusively, it is a rare exception to find a child with croup who has not its posterior pharyngeal wall, tonsils, and palate, of a dark-red color, covered with tenacious mucus, and even with diphtheritic exudation. In the many patients with this disease whom I have had to treat in Munich, I have hardly seen a membrane, rarely any thick mucous coating, and only a moderate degree of redness of the posterior parts of the mouth. The case is different again in middle and north Germany, where membranes are often found upon the tonsils, and severer pharyngitis is observed, while English authors consider croupous angina as an exceptional occurrence. The reason for these diverse statements is found in the diversity of the anatomo-pathological process. In the one case, croup is produced simply by a plastic exudation within the larynx, which does not generally extend above the epiglottis; in the other by diphtheritis, which almost always occurs simultaneously upon the tonsils.

Auscultation of the lungs always reveals widely-diffused sonorous râles, but the whistling laryngeal breathing is so intense that it completely obscures the vesicular breathing. If the croup has existed for one or two days, circumscribed or more extensive dulness and bronchial breathing, especially over the back, will also be found, due to lobular or lobar pneumonia. In rachitic children, acquired atelectasis and rachitic carnification of the lungs rapidly increase in circum-

ference, and become surrounded by pneumonic infiltration. The expectoration, as has been already stated, is mostly slight, a frothy white mucus, but occasionally croupous membranes are coughed up during the paroxysms, representing sometimes single patches with fringed borders, sometimes entire closed tubes of greater or less calibre, according to size of the air-tube from which they have been detached. With the expulsion of such membranes, little or but a temporary amelioration takes place, and the prognosis consequently does not improve in the least. This is now a well-established fact, and yet physicians do not cease to torture the poor croupy children with emetics, and triumphantly pull out a membranous piece from the vomited matter, and, when death ensues notwithstanding, as it usually does, "the doctor is supposed, at any rate, to have done his duty."

Slight compression of the larynx generally causes severe pain, while deglutition is only embarrassed and painful when the tonsils and fauces are also implicated, a condition usually not present in this country. The bowels are generally constipated, and the urine is normal, or slightly reduced in quantity.

If the symptoms hitherto depicted have lasted for one, or at the most two days, the effects of embarrassed respiration supervene. The lips, cheeks, and tips of the fingers, become cyanotic, the dyspnoea intense, the child sits upright in bed as long as its strength will allow, and keeps the head extended backward. All the accessory respiratory muscles are in a state of the utmost activity, so that the head, with every inspiration, is made to approximate the chest. With the desperation of deathly fear they tear the clothes from the breast, and pull at the neck as if they would try to remove the cause of their dyspnoea. The little hands, with cramp-like tenacity, grasp at the sides of the cradle, or some other firm object near them, so that the pectoral muscles may the better serve as respiratory muscles. They never remain long in one posture, and, by constantly changing their position, seek to obtain an endurable attitude. The pulse becomes almost uncountable, unrhythmical, and uneven. Several hours before death a remission of all the symptoms usually takes place, the dyspnoea diminishes, yet the respiration remains accelerated, the child again lies down upon the pillow, its expression of extreme anxiety has disappeared, and that of indifference or of unconsciousness has taken its place. The inexperienced parents usually regard this condition as a commencing improvement, but to the physician the clammy cold sweat, the increasing cyanosis, the unequal, uncountable pulse, prognosticate a speedy end.

As regards the explanation of the dyspnoea, and of the paroxysms of cough, it is usually assumed that the former is produced by the

croupy membranes, the latter by a spasm of the glottis. But against these suppositions weighty objections appear. The diligent physician, who does not omit to examine every child that dies from croup, knows that the thickness and extent of the croupous membranes do not stand in exact relation to the symptoms observed during life. Where, on account of the most violent dyspnoea, abundant membranous formations are expected, only a few, circumscribed, gauze-thin patches are present; and, conversely, where the croup produced less horrible symptoms, the whole larynx, the entire trachea, and even the bronchi, on dissection, are often seen to be lined with tubular membranes, of the thickness of the back of a knife. Consequently, it seems to depend more upon the degree of the œdematous swelling, which implicates the mucous membrane of the glottis, than upon the membranous formations. The œdema of the glottis, however, almost always escapes the notice of the pathological anatomist, on account of the change of its form that has taken place.

*Schlautmann* offers valid objections against the theory of spasm. He contends that, in such a kind of inflammation of the mucous membrane, a paralysis of the subjacent muscles takes place as a result of the œdema, and compares croup with the symptoms observed in animals after division of the pneumogastric nerve. When this operation is performed, it also causes the most violent dyspnoea, implicating all the auxiliary respiratory muscles; there is prolonged inspiration, accompanied by a noise, and short expirations. The deep, rough, hoarse tone of the voice, as well as the cough, much more probably indicates paralysis than spasm of the glottis. In the latter condition, the chordæ vocales are in a state of extreme tension, and, consequently, give high tones, not deep, rough ones. Again, in every inspiration, the chink of the glottis is dilated by muscular contraction, but, when this is abolished, it will flap hither and thither, like a loose sail, and exposure of the glottis, after division of the N. vagi, has demonstrated that the paralyzed glottis contracts in every inspiration, particularly when the act is a forced one. Thus the dyspnoea is greater in animals with paralysis of the laryngeal muscles when the animal is stimulated to deep inspirations. The case is similar in children affected with croup. So long as the child can breathe calmly, it is not much annoyed, but, during coughing, crying, and on waking from sleep, when deep inspirations always take place, the paralyzed glottis becomes closed, and the symptoms of the most violent dyspnoea are induced. Thus, then, the older view of spasm of the glottis is tolerably well refuted by this (*Schlautmann's*) statement, and must give place to paralysis, unless further physiological experiments should give this discovery a new signification.

Striking as the symptoms of croup are, still, the diagnosis is by no means easy, and, in this disease more than in any other, both intentional and unintentional errors occur. For the purpose of confirming the diagnosis of true croup, it is requisite that (1) the symptoms of continuous fever, hot, dry skin, rapid pulse, loss of appetite, and mental depression, be present; (2) croup cough, (3) hoarseness, (4) loud, croupy breathing; and (5) suffocative attacks. In this condition, the posterior parts of the mouth need not necessarily be altered, but in diphtheritis they are generally covered with a white, island-like exudation. If any one of the symptoms just enumerated is absent, particularly when the fever is not decidedly pronounced, then we have *no croup* before us, but a simple catarrhal laryngitis, without any dangerous swelling of the mucous membrane, a condition that has been called *pseudo-croup*, which, it is true, after several days, may run into the most complete genuine croup, and terminate in death. This is most probably the form in which, at the autopsy, no membranes, but thick, tenacious mucus, and redness and swelling of the laryngeal mucous membrane, are found; the symptoms during life, however, were not less violent than in the membranous form.

From the lack of harmony between the symptoms and the anatomopathological process, it seems to me that it may be justly concluded that croup is no local laryngeal affection, but a general disease, a toxæmia, perhaps, with localization upon the larynx, and that the laryngeal phenomena may stand in about the same relation to the whole disease as the typhous ulcerations to abdominal typhus. A further proof that diphtheria, at least, is no local affection, is derived from the formations of membranes upon a blistered wound on the sternum, for example, when a blister is applied, according to *Luzsinsky's* method, upon such a croupy child. The raw surface will become covered, once or twice daily, with false membrane, which has the greatest resemblance to those diphtheritic depositions upon the laryngeal mucous membrane. And only in this manner is it possible to explain why early and skilfully-performed tracheotomy can be so uniformly fruitless, for the trifling effects of this operative procedure, when practised in other laryngeal affections, cannot possibly be the cause of its total uselessness in croup.

*Occurrence and Course.*—The diphtheritic croup, which comes on particularly after scarlatina, is markedly contagious, and very frequently attacks several children of one family one after the other. In that form characterized by simple fibrinous depositions this contagiousness is not observed. The latter form occurs most frequently during the prevalence of cold, sharp north and east winds. I have, however, seen it at all times of the year, and under all conditions of the weather.

In this country croup is a rare disease, and the busiest physician meets with it six or, at the most, ten times a year. It, therefore, appears incomprehensible how so many physicians can speak of *epidemics of croup*. To constitute an "epidemic," the sickening of large numbers of persons is certainly necessary, and this is never observed by us as respects croup. The period of life most susceptible to croup extends from the first to the twelfth year, the majority of the patients being between the second and seventh year. In the nursing age it occurs extremely infrequently, and the histories of cases to which no *post-mortem* report is annexed, therefore, merit very little reliance, because it is very easy to confound it with spastic affections of the larynx, so common in this age.

The course of the disease is extraordinarily rapid. The shortest time I have known, from the invasion of the malady till death, was twenty-one hours; the longest, eight days. The termination is almost always fatal. I have never yet seen a child recover from the genuine fibrinous croup, but from the diphtheritic form three children out of twenty or twenty-five have recovered. In these cases, the children did not fully regain their strength till after many weeks; the hoarse voice and barking tone of the cough remained longer than the rest of the symptoms. Nothing could be seen of any expectorated nor vomited membranes, notwithstanding the most careful and constant watching. The symptoms began to subside in from eight to ten days from the beginning of the disease, and passed off gradually; their ability to partake of some lukewarm milk, without being subject to paroxysms of coughing, was slowly regained; the fever abated, the dyspnoea diminished so much that they were able to lie down, and to sleep a few hours at night. The urine was discharged in larger quantities, with copious precipitates of urates. For a long time they remained very pale, emaciated, and debilitated.

I am unable to answer the question, in regard to relapses of croup, from personal experience, for my three recoveries, one of which relapsed, will certainly not allow me to form an authoritative conclusion. The most experienced authors, such as *Valleix* and *Guersant*, express themselves against the possibility of relapses, but *Rost* relates a case, in which genuine croup occurred twice in the same child, and, on both occasions, eventuated in the expulsion of membranes. When some mothers relate that their children have had the croup five and six times, they no doubt announce the result of an intentional or unintentional deception on the part of the attending physician. I once attended the children of a family, the oldest of whom, it was said, had