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 antomopathological 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 nursling 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 dyspnœa 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

suffered croup six times in early life. Three times the child was treated by the then family physician by venesection, and the other three times by leeches, the cicatrices of which were still visible in large numbers on the neck, and, on every occasion, numerous emetics were administered. The results of this oft-repeated, energetic treatment were—in the case of one of the children, a boy—that he has been very much dwarfed in body, is constantly ailing, and is also very slow in developing his mental faculties. When one of his younger sisters fell sick with croup, as the mother supposed, she sent for me, but, instead of croup, I found only a feverless catarrhal laryngitis, with hoarseness, croup-cough, and croupy breathing. Under a simple treatment, with solution of carbonate of soda (ʒj to water ℥iv), a tablespoonful every hour, all the symptoms subsided in a few days. In the course of two years, this affection recurred in this child several times, yet the same treatment was always adopted, with the same favorable result, and the child has not been disturbed in its development in the least. The shrewd mother maintained that the croup-attacks of her older child differed in no respect from those of the younger, except that the former was always a much longer time in recovering from each attack; this difference, as well as defects of development, she no doubt justly attributes to the former methods of treatment.

The *prognosis* in well-declared croup may be set down as fatal. It is most unfavorable in purely fibrinous croup occurring in hitherto healthy, well-developed children. Such children enjoy no advantage over feebler ones in this disease, except that they are often able to resist its destructive force a day or two longer, but they perish just as surely. In diphtheritic croup, especially after measles, a recovery now and then takes place, upon which the treatment, as we will see further on, has no very remarkable influence. Where collapse, cyanosis, and an uncountable pulse have supervened, there speedy death may be prognosticated with certainty.

Treatment.—There is no disease, with the exception of epilepsy perhaps, in which so many remedies and methods have been recommended as in croup. This analogy is not only remarkable in regard to the diversity of the remedial agents, but also in regard to their efficacy in these two diseases.

The older school of the present century, which regarded every patient suffering from an inflammation as lost, unless a large quantity of blood could be extracted, insisted, of course, that in laryngeal croup—the most acute of all inflammations—venesection and leeches should be employed. This was carried out to such an extent that even the jugular vein was advised to be opened, because from it

more blood could be obtained, and only the difficulty attending the arrest of the bleeding from it served to prevent this measure from being generally adopted. In phlebotomy, one and a half ounces of blood were counted for every year of life, twice as many leeches were always applied as the child numbered years, and the region of the sternum was preferred to the neck, because on the latter no compression could be exercised, and it might, therefore, be difficult to arrest the hæmorrhage. I am not able to speak of the effects of venesection from my own experience, for I have never seen a child with croup treated in this manner. But it is now discarded as inadmissible, even by the advocates of venesection in general. I have often already noticed the effects of leeches, and must candidly confess that they do decided harm. The patients are very much frightened at them, and strive, with all their might, against their application. As a result, the dyspnœa and suffocative attacks are rather aggravated than diminished, and collapse is generally hurried on. But, if the physician err in the diagnosis, a very possible occurrence in the early stages of the disease, and it is only in this stage that any benefit is claimed for the application of leeches, there is great liability of applying them in cases of laryngeal catarrh. This would be not only a useless application, for the disease gets well without them, but one which would probably materially retard convalescence.

Emetics in croup have always found decided favor with most physicians, although the entertained theories of their action have been as various as the size of the doses and manner of employing them. While some seek a specific effect in remedies which produce emesis —in *tart. emetic.*, in *cup. sulphur.*, and even in ipecacuanha—others regard the act of vomiting, induced by these agents, as the essential result. The advocates of the first doctrine disputed for a long time with each other whether *tart. emetic.*, or *cup. sulph.*, *alum*, or *zinc. sulph.*, were the best remedy; whether the disease must be attacked by larger or minute doses. Under these circumstances, many extravagant, absurd, and protracted therapeutical torturings of children with croup took place. These unfortunate victims of incessant dyspnœa had, therefore, to struggle through the last days of life against an equally unbearable condition, viz., constant nausea, i. e., against an artificially induced sea-sickness. Nauseants, therefore, having proved inefficacious, to continue to administer them in small doses is unjustifiable.

It has also been claimed that it was difficult to make children with croup vomit, and that, therefore, they required larger doses for that purpose. But this supposition has reference only to that stage of croup which precedes the agony of death, in which the pulse is nearly

imperceptible, and collapse is supervening. At the invasion, however, of the disease, they will vomit from any emetic like other children, and an infusion of ipecacuanha (ʒj of the root to ℥j of water) will induce it. It cannot be denied that the act of vomiting, repeated one to three times, often has a very good effect upon the dyspnœa, by expelling from the larynx loosened membrane and accumulated mucus. Its effect is not curative, of course, for the exudations are usually reproduced, and the former dyspnœa, with all its accompanying symptoms, recurs. And yet, even when no membranes are expelled with the act of vomiting, temporary mitigation of the dyspnœa is nevertheless observed in many instances, so that the act of vomiting seems to have a favorable influence upon the inflammatory swelling of the glottis itself. For the purpose of exciting vomiting once or twice, ipecacuanha answers sufficiently well. The more powerful doses of *tart. emet.* or of *cup. sulph.*, that are given subsequently, it is true, produce more vomiting, but they seldom bring about any amelioration; on the contrary, they lead to rapid collapse. The sweetened infusion of ipecacuanha, which children take without any objection, has the additional advantage that it much less frequently induces diarrhœa than those mineral salts. I generally give such an emetic once or twice as soon as I come to a case of developed croup, but regard it as useless torture to nauseate the patients for any length of time afterward.

For a long time sulphuret of potassium enjoyed the reputation of being a specific against croup, and seems to have become famous mainly through one of the Napoleonic prize competitors, who sent in his work anonymously, having recommended it as the only remedy for croup. But the ineffectualness of this remedy has become apparent in so many cases that it is now altogether abandoned. Its dose was one-half to one grain every hour. Next to the emetics, mercury was the most frequently-used remedy. Blue ointment was rubbed in upon the neck, over a larger or smaller surface of the thorax, and calomel was given in larger or smaller doses internally. When the peculiar action of mercurial preparations is desired to counteract the inflammation of the laryngeal mucous membrane, its use is rational, and the treatment is sustained by manifold analogies; but, when calomel is given in large doses for the mere purpose of accomplishing a derivative action on the bowels, it is more injurious than the neutral salts, or small doses of drastic remedies. Of the few cases which I treated with mercury internally and externally, one recovered. That was a girl, five years of age, but in whom leeches and several emetics were also used, so that this result, as regards mercury, must be stated to be a very uncertain one.

The alkaline carbonates have been long recommended in croup, on account of their solvent properties, which they exercise over all animal substances, consequently also over croup-membranes. *Hellweg*, *Voss*, *Dorfmueller*, *Eggert*, *Hufeland*, and many others, have expressed themselves in their favor, and, lately, *Luzsinsky*, of Vienna, has appeared as a special advocate of carbonate of potassa. He gives two scruples, or one drachm, of this remedy in solution *pro die*, and ascribes to it specific effects. His therapeutic measures consist (1) in neutralizing the morbid admixture of the blood by the potas. carbon.; (2) in overcoming the localization of the inflammation in the larynx, by a blister on the upper part of the sternum, kept in a state of constant suppuration; (3) in moderating the dyspnœa and the cough-paroxysms by opium; and (4) in cauterizing the existing membranes with nitrate of silver, and in causing their expulsion by emetics.

Although I am unable to confirm the specific effects of carbonate of potassa—for, of five children which I treated very scrupulously according to *Luzsinsky's* method, I was only able to save one—still, this method of treatment has much advantage over the older method with leeches and emetics, for by it the children are not tortured, and, to say the least, just as many, and probably more, are saved by it.

The other methods of treatment, with quinine, with large doses of narcotics, by the hydropathic method, etc., each of which has a sufficient number of advocates and detractors, I have not tried, and therefore refrain from giving any decided verdict upon them.

The local treatment has already experienced manifold variations. Some wrap up the neck in dry, others in wet woollen cloths, or in moist sponges, or even in swallows' nests boiled in milk (a famous popular remedy). Others cause the neck to be coated with a layer of fat from all imaginable classes of animals, others again apply various counter-irritants, and still others maintain that the dyspnœa is less severe when neck and breast are entirely uncovered. The French physicians always place great value upon *Bretonneau's* cauterizations of the larynx. For this purpose a proper whalebone rod, with a bit of sponge secured to one end, is made use of. The sponge is dipped in a solution of lunar caustic (ↄss—ʒj to water ℥j) and then introduced into the pharynx, the tongue being depressed with a spatula as much as possible. The sponge is allowed to tarry upon the epiglottis, and by a slight pressure some of the solution is squeezed out upon it. No special admonition is necessary about the corroding of the larynx, and the slipping of the sponge into the glottis between the chordæ vocales, because for this purpose a spontaneous deep inspiration is requisite, during which the epiglottis rises high upward, which is hardly possible with the sponge in the mouth. The solution of

nitrate of silver has a decidedly favorable effect upon the inflamed mucous membrane wherever it comes in contact with it, causing it, as a rule, to cast off its false membranes in the course of twenty-four hours, and thenceforth it often remains free from further formation. But in genuine fibrinous croup I have seen no effects whatever from the cauterization of the pharyngeal mucous membrane, which indeed is generally unimpaired. Besides the solution of lunar caustic, powdered alum, red precipitate (one part to twelve of sugar), sulphate of copper, and calomel, have also been blown into the pharynx.

The air of the room in which these patients are confined should be pure and moist, and that is best secured by repeated ventilations, and by evaporating water in a shallow vessel.

As a *résumé* of what has already been said, I will here briefly notice the methods of cure advocated by the principal authors, without, however, committing myself to a belief in the efficiency of any individual remedy:

(1.) *Jurine.*—In the first stage, abstraction of blood, according to the character of the attack and the state of the system; after the first abstraction of blood, mild emetics, these to be continued in fractional doses during the second stage (in dyspnœa and suffocative attacks). Should the symptoms grow worse, sinapisms and blisters upon the neck, breast, etc., and moist atmosphere to assist the inspiration. In the second period, emetics in full doses, and subsequently strong expectorants and antispasmodics, according to circumstances.

(2.) *Goelis.*—Leeches, calomel in large doses, inunction of *ung. ciner.* upon the neck and breast; in the interval, *nitre;* early vesications; in dyspnœa, emetics.

(3.) *Hufeland.*—First his linctus emeticus (tart. emet. gr. j, ipecac. powder ʒj to ℥ijss mixture). Warm moisture, combined with saltpetre, and clysters of one tablespoonful of wine vinegar. When the dyspnœa becomes aggravated notwithstanding (just what actually occurs uniformly in genuine croup), sulphate of copper in emetic doses, in ¼ gr. doses every two hours, and so on at each exacerbation, inunctions of mercury on the neck, and counter-irritants.

(4.) *Luzsinsky.*—The diagnosis having been determined, a blister at least the size of a silver dollar upon the manub. sterni. Internally *sol. kali carbon.* (ʒj to water ℥iv), to be consumed in twenty-four hours. To cover the blister with epispastic paper and keep it suppurating as long as possible. In very severe dyspnœa, small doses of morphine; an emetic during severe suffocative attacks. Cauterization of the pharynx with nitrate of silver.

This last method, with the exception of the blistering, has the great

advantage of not torturing the patients, and therefore ought to be preferred to all others. But if after repeated trials it should become manifest that it is totally inefficient, then it would be inhuman to continue it. As a natural result of the ineffectualness of those remedies hitherto used in croup, new ones will probably be constantly tried.

Finally, a few words about tracheotomy. The idea of making a passage for the air through an opening in the trachea in persons who are about to suffocate from obstructions in the larynx, is very old, and as regards its practice in croup it is almost as old as the knowledge of croup itself, for *Home* pointed out this indication as early as 1765. Since that time, the operation has been performed from time to time, but always with unhappy results, so that the prize competitors of 1807 could only mention one successful case, but that was a case in which the diagnosis is said to have been questionable. In 1823 *Bretonneau* again set the operation in motion, and since that time it has been constantly performed and defended by some of the French physicians; but it is necessary to observe here, that the majority of the operations were performed in hospitals for children where contagious diphtheritis prevailed. While many of these croup patients operated upon recovered, it is also true that recovery without tracheotomy often took place. Up to the year 1842, *Trousseau* had operated 119 times, and out of that number obtained 25 recoveries. At this time the principle was advanced that the operation must be performed very early, whereupon the ratio became so favorable that 14 recoveries occurred out of 24 operations. According to another compilation, by *Isambert*, 47 out of 216 cases operated upon recovered, or 22 per cent. This doctrine loses much of its force by the circumstance that the operation must be performed so early in the disease that the practitioner, still less the surgeon, is unable to positively state if the case be one of croup or catarrhal laryngitis. In Germany, it is true, there are a few solitary advocates of the operation, *Roser* and *Passavant*, for example; but the majority of the physicians experienced in the treatment of the diseases of children, and also most of the German surgeons, do *not* perform tracheotomy in croup. In England the opinion is generally against it, and in France a reaction seems to be rising up against it, for *Bouchut* (*Gazette Médicale*, 1858, No. 41) has shown that for every 1,000 inhabitants in Paris, the number of deaths from croup increased from year to year, and was never so great as in the last decennium. In 1853 twice as many children died from croup as in 1837, and, from the years 1847–1858, on an average *five times* as many as in 1838; while, according to a proximative calculation, no such increase of the disease as fivefold has occurred. He lays the blame of this great mortality directly upon the present local treatment, the escharotic, and