Croup, its pathology and treatment.

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Tyler (S.)

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P[illegible]athology and Treatment,

BY

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FREDERICK CITY, MD.

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TREATISE ON CROUP.

This essay does not pretend to set forth any new views upon the pathology, and but little, if any novelty, in the treatment of croup. It is designed merely, to call the attention of the profession to the present attained knowledge of the subject, and to elicit *new views*, if there be any. In short, to get a resumĕ of the "*true experience* of the *practitioners*" of the country in reference to the real pathological condition, and the best mode of relieving a disease, whose ravages have made it a reproach to the science of medicine, is all that is aimed at.

Acute inflammation, of a very violent description, which attacks the larger portion of the air tubes, is situated, for the most part, lower down when it occurs in children, than in adults. That intense, violent, adhesive inflammation--inflammation, at least causing a portion of fibrin to be thrown out—which attacks adults usually affects the larynx : so that laryngitis is the disease of adults; and the disease of children, corresponding with this, is croup—cynanche trachealis, or more properly tracheitis.

The latter term is the most simple: and everybody knows what is meant by it. The disease has been called "Angina trachealis," because there is a quantity of lymph formed. In this country, it is usually called croup.

The following symptoms are those which my own observation and that of most authorities have found to be the most general:

It is marked by a, *generally*, rough, clanging, ringing cough; giving the idea of sound conveyed through a small brass tube—and independent of this cough, should there be much severity in the attack, there is sibillous respiration; but the sibillous sound is only heard in inspiration.

There are various modifications of this sound, it being rough, harsh, shrill, or hissing; the voice also is harsh, crowing, or almost entirely suppressed. There is great dyspnæa, and this is felt particularly during the period of inspiration.

These generally are the common routine of symptoms—deglutition is not impeded—there is no angina or pain, except at the lowest part of the throat, the larynx is perfectly free from it, but is *not so*, when laryngitis exists, for then pressure can hardly be borne by the patient; but in tracheitis or croup there is considerable pain caused by pressure upon the trachea. The expectoration is mucous most generally, but is sometimes intermixed with portions of fibrin and lymph.

In accordance with the violence of the disease is the degree of febrile excitement—during the first stage of which the face is florid, the pulse very rapid, and the countenance indicating great anxiety and distress. It is not unfrequent that the peculiar clanging cough of croup is heard for several days before the child is ill enough to make apparent its disease; and many mothers have been astounded when the physician has told them the child was in danger. There are two well-marked varieties of this disease; of which there are modifications, often seen by the practitioner, entirely different. It often occurs as an idiopathic and active inflammation of the mucous membrane or lining of the air passages and the febrile excitement is always then commensurate with the inflammation: again, it is preceded by high fever and the deposition of diptherite membrane in the trachea, and, as I have witnessed from autopsies that I have made, in the larger bronchiæ. Much disparity in the statement of the character of croup, among writers upon the subject, has undoubtedly arisen from their not distinctly defining the difference between, or the condition of, these two forms of the disease, and thereby leading the practitioner, who may be guided alone by his books, into error. In my judgment, the clearest and most accurate distinction of these two forms is given in the work of Drs. Elliotson and Stewardson, and my own experience strongly tends to confirm it. It is as follows:

PRIMARY CROUP.

1st. The air passages primarily engaged.

2nd. The fever symptomatic of the local disease.

3rd. The fever inflammatory.

4th. The necessity of antiphlogistic treatment, and the frequent success of such treatment.

5th. The disease sporadic, and in certain situations endemic, but never contagious.

6th. A disease principally of childhood.

7th. The exudation of lymph from the glottis from below upwards.

8th. The Pharynx healthy.

9th. Dysphagia either absent or very slight.

10th. Catarrhal symptoms often precursory to the laryngeal.

11th. Complication with acute pulmonary inflammation common.

12th. Absence of any characteristic odor of the breath.

SECONDARY CROUP.

1st. The Laryngeal affection *secondary* to disease of the pharynx and mouth.

2nd. The local disease arising in the course of another affection, which is generally accompanied by fever.

3rd. The fever typhoid.

4th. Incapability of bearing antiphlogistic treatment; necessity for the tonic, revulsive, and stimulating modes.

5th. The disease constantly epidemic and contagious.

6th. Adults commonly affected.

7th. The exudation spreading to the glottis, from above downwards.

8th. The pharynx diseased.

9th. Dysphagia, common and severe.

10th. Laryngeal symptoms supervening without the pre-existence of Catarrh.

11th. Complication with such changes rare.

12th. Breath often characteristically fœtid."

Any one, who will attentively observe the distinctions so well defined, cannot but admit that there is a great distinction to be drawn between these two forms of disease of the throat. In the one, the trachea is the seat of idiopathic, primary, and inflammatory disease; the other is dependent entirely upon sympathy, or in other words, a morbid state of the whole system.

As to the duration and progress of croup, it varies much; it may last for one day or several, and the patient may sink from exhaustion or be suddenly carried off by spasm.

In protracted recoveries the fibrinous expectoration often continues for weeks together. The most usual degree of recovery is gradual, but I have sometimes seen it occur almost immediately upon the application of remedial means which in general afford no relief at all.

The pathological condition of croup is described to be in the first place *redness*, and the inflammation so intense that a deposit of lymph lies upon the inflamed portion, and in this manner forms an impediment more or less complete to the egress or ingress of air.

In addition to the lymph so frequently observed, it is not uncommon to find pus-like and bloody matter in the air-tubes. Even in opening serous membranes it is often we discover lymph deposited on the diseased portion and with it a serous fluid so much altered as to resemble pus;—and sometimes pure pus itself.

The ages at which croup usually attacks children is between the period of weaning and that of puberty. It is true that occasionally we find a case of croup occurring in a young sucking infant; and there is strong reason to believe that the susceptibility to the disease is strengthened by weaning the infant too early. Children of a full habit of body with thick necks are certainly, as proved by observation, more liable to attacks of this disease than others. In reference to the causes of croup, it is hardly necessary to say much,as they are familiar to every one—cold and wet weather. Consequently we find croup prevailing more frequently in winter and spring than at other seasons of the year; and its occurrence in summer can always be attributed with correctness to some vicissitude of temperature, such as a cold damp day succeeding a warm and dry one. Locality also has its influence, as it is more usually seen on the water coasts, and in damp situations. The climate of the North from its sea breezes produces more of the disease, than the sunny genial climate of the South.

Notwithstanding the general prevalence, or in other words, the epidemic character of *tracheal* croup in certain seasons and localities, it is not a contagious disease; it is never communicated from one patient to another, from contact or presence in the room, as in those diseases which are considered contagious. Its epidemic character being due to the causes above mentioned, the fact,

that so many are attacked in a family, or community, at the same time or period, results from their exposure to the action of these causes at the same time.

Besides the causes of croup which have just been named, the writer of this essay has seen a violent case of croup produced in a boy of eight years of age, by the following accidental means—he placed his tongue upon a frosted pump-handle, on a very cold morning, which removed its entire skin or covering and then walked about during the whole day to catch the cold air to relieve him of his suffering; that night I visited him in an attack of what might be called *traumatic* croup. I relieved him more by the use of demulcent drinks, than the usual treatment, finding them to act as a coating to the sore surface—he was well in four days. There are various opinions as to the true nature of croup. That inflammation of the trachea exists, and is the disease called croup, no one acquainted with the subject denies, but why should lymph be deposited in this form of inflammation and not in others? why does it differ from common catarrhal inflammation or cold?

Some ascribe it to the early age of the patient, but this is certainly not a satisfactory explanation, from the simple fact, that we often see bronchitis extending through the air-tubes of every part of the lungs in persons of the same age, without this deposition of lymph, or even croup symptoms, and again sometimes this deposit occurs in the trachea of adults.

Many physicians consider the peculiarity of the inflammation of the trachea causing a lymphy deposit to be owing to an excess of albuminous matter in the blood; without depriving this fact of its influence as a probable cause, it does not of itself explain it; nor does the excess of inflammation account for it; for it is within the experience of every observant practitioner, that in many of the most violent and speedily *fatal* cases of croup it was impossible for any one to detect disease from any evidence of inflammation or general excitement of the system, showing conclusively that a large number of the worst cases of croup have been insiduously stealing on the victim, in the form of *sub-acute* inflammation.

But do not all who have closely observed the phenomena of

this disease, see that croup is *deeper* seated than bronchial inflammation. Catarrh affects every portion of the body, while croup is confined solely to the trachea.

This is evidenced by the facts of its symptomatology, its fixedness to the part; not wandering and creeping about; the great tenderness, and sometimes the swelling of larynx and trachea *externally;* in fact, all its characteristics—the constriction of a painful nature, the character of the product of the inflammation, coagulable lymph, the induration of the membranes after death in the incipient stages, and the great disposition to the formation of matter in adult persons, all strongly tend to confirm the belief that the inflammation is *deep-seated* or *sub-mucous*.

The fact of the greater plasticity of the blood, in an *inflammation*, or *healthy* condition, of a young infant or child, may explain in some degree the formation of the diptherite membrane; for the nutrient principle itself is stronger in youth than in old age—yet confine even the inflammation, as is often the case, to the mucous membrane, and we have only a catarrhal or bronchitic disease, and a well-defined mucous or purulent discharge.

The pathological history of croup is, very generally, well defined; the inflammation may have been deep-seated at first, or it may have been the result of cold, and the catarrhal symptoms *precede* the true tracheal disease. The increased sensibility of the muscular fibres of the throat certainly produces the constriction, which may at times be spasmodic, partly from the swelling of the bronchial tubes, all of which causes the harsh inspiration, cough and hoarseness. The deposition of lymph causes the head to be thrown back, from the fact that it is the only position in which the child can inhale air when the tubes are thus blocked up. In the bronchial form of croup, the deposition of lymph is a much rarer occurrence, but there is usually an effusion of liquid and purulent matter.

Functional disorder of the respiratory passages accounts for the collapse which ensues before death from croup.

The frigidity or coldness of the body, is due to want of perfect oxygenation of the blood, produced by the obstruction of breathing, and the *emphysematous* condition, by the difficulty of breathing.

According to the evidence of Prof. Wood, of Philadelphia, the name of croup owes its origin to Scotland, and comes from the word "*roup*", which signifies the noise made by a chicken with the pip. He objects to the term tracheitis, for the reason that it may lead us into a false opinion of the true pathology of the disease. He considers croup not to be necessarily dependent upon an inflamed condition of trachea, and further, that inflammation of the trachea or windpipe may occur, and not produce croup: he also thinks (and in *this* point I agree with him,)that the layrnx must be involved in the disease when it exists, from its locality—he lays particular stress upon the spasmodic affection of the interior muscles of the larynx; and further, that all the *prominent* symptoms of croup may present themselves without there being any inflammation of those parts of the respiratory passages which are necessarily so in true tracheitis or the usual croup, and that the inflammation of the trachea often occurs as the result of catarrhal affections in infants, without causing croup—thus, showing from his large and extended field of observation and experience, that it may occur in any portion of the air-tubes, but that if any part must necessarily be affected, it is the larynx, from its position for admission of air into every other portion of the respiratory organs. He considers it essential for two conditions to exist, to produce or constitute croup. First, a highly inflamed or irritated vascular excitement of the laryngeo-tracheal mucous membrane, but that this condition does not alone produce the croup, as it is, in his opinion, necessary for the second condition to exist, which is spasm of the interior muscles of the larynx; and that the inflammation of the same parts in adults, which is not so usual, constitutes the difference of the symptoms in the two different periods of life. The spasmodic contraction of the muscles of the glottis, which sometimes takes place, he considers to depend upon an entirely different pathological condition, as inflammation or vascular excitement is absent."

Two forms of this disease are often confounded, differing altogether in their character and much so in their final result. No one can doubt this, if the fact is considered that so large a number of the cases, commonly termed croup, are easily remediable when taken in time. Dr. Wood thinks the experience of this country

would show that not one in fifty patients die of ordinary croup, while the European authors inform us, that formerly the proportion of deaths was four out of five, and now, when the treatment is better understood, is not less than one half. The *product* of the inflammation of the two forms of disease differ entirely. In the more manageable form, mucus, pus, or muco-purulent-fluid is secreted in accordance with the degree or stage of inflammatory action. In the other or more fatal variety an albuminous or fibrinous exudation called diptherite membrane, is thrown out upon the surface of the air passages. The inflammation in the former cases being similar to that of common catarrh with the spasmodic condition superadded, in the other a peculiar condition of the blood exists, causing the membranous deposit, and moreover the amount of deposition does not depend upon the degree of inflammatory excitement, for often it is greatest when the febrile action is quite moderate, as the symptoms during life and the evidences after death frequently prove. A form of croup, called pseudo-membranous, may occur, which is nothing more than a blending together, if you may so speak, of a catarrhal inflammation of the larynx and trachea; and it may also present various modifications, one portion of the air passages secreting mucus, another depositing the membrane. The views of the pathology and treatment of croup, as stated by Dr. Wood are fully concurred in by my father, who has had an experience of more than forty years, and also by Dr. Wm. Waters, who was his partner in the profession for some years. Besides the mechanical cause of croup which I related in a former part of this essay, Dr. Dewees mentions another, occuring in the practice of Dr. Horne; he attended a child in a disease, which from the similarity of voice appeared to him to be croup. The child died, and when opened, a piece of shell which the child had sucked in with its breath, was lying across the trachea about an inch below the glottis, and the membrane was inflamed and dry; here, says Dr. Horne "was an artificial croup raised, from which we may evidently perceive how the voice is altered in the natural disease." This disease may commence gradually, with hoarseness which is perceived upon coughing and may continue without increasing for several days, or until the sudden application of some exciting cause, as a change of temperature; or it may come on

in a moment without any previous warning; when thus sudden in its appearance the most fatal consequences are to be apprehended, even with the most prompt treatment. The period of the day at which its attacks are most frequent are late in the evening or very *early* in the morning. Dr. Dewees considers it not sufficient that inflammation of the mucous membrane of the wind pipe produces croup; but, that there must be a *modification* of the inflammation. He also thinks that the *insidious* attacks of croup, if the *first* stage be neglected, are more generally fatal, than the most sudden forms. It is for this reason that parents should never neglect a child where it shows any symptons of hoarseness, as *it* is acknowledged by all observers to be the only *premonitory* warning of the disease." As before remarked the first indication of this disease in its earliest stage is a peculiar sonorous hoarseness, when the patient coughs, but at this time does not alter the voice in speaking. This hoarseness may or may not be accompanied with or preceded by catarrhal symptoms; when it is not accompanied by these symptoms, the circulation is slightly, if at all affected or disturbed; nor the respiratory system to any degree hurried; the appetite and digestion of the patient are good and spirits cheerful: yet in these very simple cases, not unfrequently in a few hours, we find them almost incapable of drawing a breath, and often dying. In these insidious attacks, however, the extremities are generally cooler than usual and there is some pallor of the countenance: but we are never sure that in the sudden attacks any of these symptoms have appeared. The cough is of short duration, generally dry, and if any expectoration does take place, it is thin, of a white color and very small in quantity—the throat usually shows nothing upon inspection—the tongue is nearly natural, the back part *may* be slightly furred, but is not *necessarily* so. After a longer or shorter duration of these symptoms, an aggravation takes place, which constitutes the second stage. The hoarseness is now increased, and affects the voice; it is more ringing, and shows itself at every effort to speak—the croup is more frequent and longer, and exhaustion and difficulty of breathing follows each attack of it: the face is suffused with a deep blush, which goes off as the circulation acquires its equilibrium; but leaves

a deeper redness of the cheek than before. The circulation now becomes very hurried as a general rule; the child is drowsy, and falls into disturbed slumbers, from which it is aroused by the cough and great oppression—it throws its head back or raises itself, if old enough, into a position to gain air more freely—if it does not die in this state, it passes into the third, or, as Dr. Dewees calls it, the congestive stage. Now, the expectoration attendant upon the cough is a thin frothy mucous affording no relief; the cough recurs more frequently and is more permanent, ever threatening strangulation; no position is easy. The flush passes away and the face assumes a dark livid appearance, extending often to the neck. The lips partake of the same alteration, and the tongue becomes very black. The forehead shines and the skin has a stretched appearance, extending around, and it is wet with cold clammy perspiration, as is indeed every part of the body. The pulse is small, fluttering and wiry or contracted. The heart beats with a violence which is audible. The respiration seems to be kept up more by the action of the thoracic and abdominal muscles than by the usual process of breathing. The voice is a mere whisper. Thirst is generally exceedingly great and no quantity of drink is sufficient to allay it. The countenance is full of anguish, the eyes brilliant and seem to implore relief, which neither science or affection can afford, and the poor sufferer, to use the language of Dewees, expires with a look full of supplication and anguish. The duration of the course of the disease is various, continuing sometimes for days, at others, terminating in a few hours. The constitution of the patient modifies its duration considerably; the period of application of remedies, their nature, influence upon the system, &c. From the fact that post mortem examinations sometimes reveal that death was caused by a membrane producing suffocation and at other times none is found—various opinions have been suggested as to the pathology, some declaring spasm the cause, others the deposition of the above named membrane—some by both causes combined. Doubtless, in our opinion, all three are correct in certain cases. Dr. Dewees thinks spasm only takes place in the last mentioned condition. Some have even gone so far as to deny that a membrane is ever formed; but they certainly have never

investigated the disease after death by post mortem examinations. Some say it is not a membrane, though they admit the presence of a foreign body. They call it inspissated mucus. This membrane sometimes extends even into the bronchial ramifications. There is every reason to believe from the history of the majority of the cases of croup, that if the application of appropriate remedial agents are early resorted to, the disease would be checked. That these agents are not resorted to early is principally owing to the ignorance of parents, generally, of the *consequences* of the neglect of the premonitory symptoms, and to this fact a great many fatal cases can be attributed. It is very certain, as proved by general experience, that the symptom of hoarseness in children cannot be neglected without endangering life. The following pathetic language of Dr. Dewees, who was so justly celebrated and esteemed for his skill as a physician and his virtues in private life, are very expressive of the above: "we can call to mind but too many instances of fatal issue, when this friendly warning was unheeded, because its tendency was not understood.

Our anxiety to abridge this terrible disease, has led us to dwell upon the point longer than would be necessary for the mere medical reader; but we hope he will excuse us for our cautions, which though not necessary to him may be very important to others. It has been our misfortune to have witnessed but too much of this disease, and unhappily too much in our own immediate family. We were early instructed in all its phenomena; and but too sorely taught its deadly tendency. Our misfortunes made us more than vigilant; made us tremblingly apprehensive of everything connected with this disease, especially its formation. But perhaps we have derived advantages from our losses; and most happy shall we be, if they can be made subservient to the general good. For many years nothing could exceed our horror, when called to attend a case of croup. for our too faithful ears could not forget the appalling sound of its breathing; alas, they were instructed by instances of such endearment, that memory was almost a curse. Thus we say that this and almost any premonitory symptom of croup should never be neglected."

Without speaking at present of the treatment of the first stage

of croup, suffice it to say, that if it is not attended with relief, we have the symptoms of the second stage of croup, which is often the period at which the physician first sees the patient, and generally presents more than one of the two following conditions; first, when the disease is completely formed as regards the trachea, but without the arterial system being much affected; or, secondly, where the arterial system is much exalted in consequence of the inflammation of the trachea. In the second stage of the disease, the organs of respiration are more forcibly affected; the cough is more frequent, and sometimes indeed incessant; the hoarseness is not so great or deep as in the first stage, but more sonorous and vibrating; there is no expectoration, or if any, it is serous, and affords no relief by its discharge. There is a partial flush of the face and occasionally it is even pale; the nostrils are dry; the cutaneous surface is below the natural standard; the eyes are injected, the pulse is frequent and small, the respiration is laborious and the difficulty increases hourly. Should the disease not yield pretty early after the formation of the second stage to the suitable remedies, there is effusion to relieve the vessels, and this condition forms the third stage of croup. It is in this stage that generally the deciduous or diptherite membrane is formed, filling the trachea and obstructing the process of respiration. This effusion, as has been said before, is not alone confined to the trachea, it sometimes extends even into the ramifications of the bronchial tubes. The fact of this membrane being thus extensively diffused, has a very important bearing upon the value of tracheotomy for the relief of this disease, which will be discussed hereafter. It is almost needless to say that the third stage of this disease is almost an hopeless one, for very often the membranous deposit is expelled, and affords relief for a short time, but is speedily renewed. It is but a short time since I had a case in which the diptherite membrane was expelled perfect in form, showing the impressions of the ring-like cartilages of the trachea, nine times within forty-eight hours, and *at last*, the case terminated fatally by suffocation. Though there was in this case no autopsy made, I have every reason to believe from the symptoms that the deposit extended into the smaller ramifications of the bronchiæ, and tracheotomy would have been perfectly futile, even

if it did not extend that far, as its performance would not have been capable of preventing the regeneration of that false tissue. The common indications of the third stage are to remove this deposit and to prevent its reformation; of the means best calculated to produce this effect, we will speak hereafter. Upon this point Dr. Watson remarks, that "there seem to be just two predicaments in which there is a chance that tracheotomy may be performed with use. They perhaps are rare; yet they have been noticed by several observers. The one is where the præternatural membrane extends but a very little way down the trachea, and is chiefly extending or *confined* to the *larynx:* and the other, when there is no membrane at all, or only a slight coating in some part of the trachea, the impediment to the breathing having arisen mainly from a thickening of the mucous membrane." In speaking of the true and spurious croup, Watson makes the following significant remarks, "the practical fact which you have to consider or remember is, that croupy breathing may occur, and return in paroxysms, when there is no croup. And the practical *lesson* which you have to learn is, how to discriminate between these two apparently similar, yet different forms of disease. I have already specified the distinctive characters of cynanche trachealis. The complaint that copies it, may be known by its sudden accession and its sudden departure; by the freedom of breathing in the intervals between the paroxysms; by the absence of fever, of preceding *hoarseness*, and of any abiding cough. The diagnosis, easily enough reached, when these points are sufficiently attended to, will be still more sure, if you discover enlarged glands in the neck." This well described difference between these two forms of the disease have been frequently observed by myself, and have been a guide to me in the treatment of the patient. In reference to our knowledge of this disease, as acquired by observation and experience, not only of ourselves, but of others, Dr. West in his recent able work on diseases of children says, that it may be anticipated, that by this time it should be very definite and settled; he says further, "that with reference to many of the more important points in the history of the malady, writers are now, indeed, pretty well agreed: but croup, like many other diseases that depend to a great degree on atmospheric and telluric causes,

is modified in many of its symptoms by peculiarities of air, water, and situation. The affection assumes one character among the poor of a crowded city, and another among the children of the laborer in some rural district. If therefore you find that my account of the disease varies in any respect from the description given by some writers, or from the results of your own experience hereafter, do not too hastily assume either that your teacher has been mistaken, or that your own observation has been incorrect. The difference may be nothing more than a fresh exemplification of the old story of the shield, silver on one side and golden on the other, about which the Knights in the fable quarrelled."

Like all diseases that are in any considerable degree influenced by local and atmospheric peculiarities, croup has periods of epidemic prevalence. Many of the most valuable essays or works upon croup were owing to the Emperor Napoleon having offered a prize for the best essay upon the subject, at the time of the death of the Crown Prince of Holland, his nephew. Dr. West says that when the diptherite membrane is first formed it adheres very closely to the mucous lining of the air passages; but that after a time a secretion of puriform matter takes place, which detaches the deposit from its connections; and that it is at this period it is usually expelled by expectorations; and also that it takes place more frequently from the interior of the trachea than of the larynx. He also concurs in the general testimony, that the bronchiæ are perfectly free from the disease.

In the early stage of croup, auscultation will reveal to the ear of the experienced practitioner the free entrance of air into the lungs accompanied by a peculiar stridulous noise in the larynx. If the lungs do not become involved in the disease you will hear no other sound; but let the disease advance far, and you have the same sounds, or rather want of them as are presented in cases of emphysema; the resonance on percussion will be loud but the respiratory murmur very feeble. When the disease extends to the substance of the lungs we have the mucous or sub-crepitant rale very perceptible, though the resonance on percussion may not be so loud, particularly on the lower part of the chest. The best period to apply the ear for the purpose of discovering the difficulty

or facility of the entrance of air into the lungs, is when the child makes a deep inspiration, and the constant cough which attends croup affords frequent opportunities for so doing, as it is generally after such a spell, that the patient takes the deepest inspiration. There are though many exceptions to, or rather variations in these sounds which nothing but practising the ear can make one acquainted with.

The treatment of croup, which Drs. Elliottson and Stewardson recommend as most efficacious, is as follows: to bleed from the arm, or jugular vein; and to apply leeches or blisters over the throat. They prefer leeches to blisters, and *general* to *local* bleeding. They also consider it necessary to give mercury to a great extent and freedom; children will bear a larger quantity of the metal, in proportion, than adults, and it would be right to give a child every two or three hours, as much as it would bear without vomiting or purging. They think it a much better practice than the administration of emetics. Many it is true are relieved by emetics, but a much less number than by the other method. The writer of this essay is of opinion, from repeated observation, that, independant of the antiphlogistic action of the mercury, it possesses a mechanical power over the disease, from the absorption of the metallic globules, which by their friction over the trachea and larynx, in the course of its progress through the circulation, wears away the plastic deposit. I have seen so many cases cured, of the membranous form, when, for days together, no other remedy was used, but very small doses of calomel, that I am constrained to believe that it was by this mechanical action of the metal. I have also found the local application of ice to the throat very beneficial. In the opinion of the gentlemen named above, tracheotomy is but a temporary measure; it may relieve the breathing for a while, but cannot arrest the inflammation or prevent the reformation of the membrane; and its failure they, I think, very properly attribute to the extension of the disease through the larynx, trachea and bronchial ramifications, which are of course not even reached by the operation. The use of seneka they think is not proper as a general thing, and never efficacious unless in the sub-acute stage. This disease is liable to recur frequently; Drs. Elliottson and Stewardson say, they have known children to

have six or seven attacks of croup. I know quite a number of children who have had twice as many. In the lighter forms of this disease they think the parts are thrown into a state of spasm, and that a mild emetic in such cases produces relief; if not, and the child continues in a state of morbid irritability, they recommend the use of iron; the sesquioxide is the form they prefer, and it to be administered in treacle, or the sulphate in sugar or tea. Prof. Wood, of Phila., treats croup in the following manner:—making, though, two divisions of treatment; one for the catarrhal croup, the other for the pseudo-membranous form. In the treatment of the catarrhal variety he recommends strongly in the first instance the administration of an emetic and that in large doses; the choice of the emetic depending upon the violence of the attack; when it is mild and there is not much febrile action he gives ipecachuana; in the more severe forms tartar-emetic. Dr. Wood agrees with Drs. Elliottson and Stewardson as to the efficacy of seneka in the advanced stage of croup but not in the early periods. This remedy seems to be a great favorite with Dr. Archer, of Maryland. Dr. Wood also recommends the warm bath in the early stages of croup and thinks that the treatment just specified will answer in a majority of cases, only adding an occasional dose of some mild purgative to keep the bowels open. Should the antimonial produce purging he says it should be stopped, as he has seen fatal consequences produced by its prostrating the system beyond recovery; and the stools of the patient thus affected by the medicine resembled the discharge of cholera. The remedy he most relies upon should these fail, is mercury given in small doses every hour or two; but should the patient not be seen until the period, at which these remedies may rationally be presumed to act beneficially, has passed, he urges the use of stimulants, and stimulating expectorants, such as the decoction of seneka, assafœtida by the rectum and mouth, carbonate of ammonia, wine-whey, valerian, musk, etc., and the external application of counter-irritants, as mustard, cayenne pepper, etc.

For the pseudo-membranous form, he recommends the application of nitrate of silver early, as he thinks it may arrest the inflammation in its passage downwards; but when it has once taken place in the larynx it would be useless to make the attempt. He

opposes depletion in this variety of croup, upon the ground that the exudation is not so much the result of any high degree of inflammation as of some peculiar condition of the blood, which venesection or local bleeding would not affect; and indeed does much injury by prostrating the vital powers. Blisters are also objectionable in this form of the disease, from their tendency to slough; and should local depletion be deemed necessary he advises leeches. He also deems, in this condition, the use of small portions of mercury as best adapted to remove the membrane and to *prevent* its reformation. This plan of treatment originated with American practitioners. Mercurial frictions are also recommended by Dr. Wood as adjuvant to its internal use, and in his experience he has found it rarely,if ever,to salivate. In children of feeble or scrofulous habit, he advises its use to be very limited for fear of effects that in other habits would not take place; but in very desperate cases of the disease the remedy should not be rejected on account of some hazard from its employment. Dr. Dewees treats croup, in the three different stages he describes, as follows: in the first stage, he uses the external application of turpentine, hartshorn, or mustard. Should this not relieve the hoarseness, he repeats it, and gives a dose of Cox's hive syrup occasionally as an expectorant, or, if necessary, in a sufficient dose to produce emesis, but he considers that rarely necessary if the complaint is taken early and the throat well rubbed; as a laxative to the bowels he recommends castor oil, his regimen of diet consists of barley water and flax-seed tea, and he strongly insists upon keeping the patient in a moderate temperature, and to wear flannel over the throat.

In the second stage, he recommends the use of a brisk emetic of the tartrate of antimony, and is decidedly opposed to bloodletting, as he thinks it "always injurious, or certainly never beneficial." He approves of the combination of calomel with the emetic in this stage of the disease, should the bowels require evacuation, and after its free action the continuance of the hive-syrup in suitable doses; in reference to the use of general depletion in this form of croup, we think we can, without doing wrong to, or injuring the fame of a meritorious physician, convict Dr. Dewees, by his own work, of a very glaring inconsistency in the treatment of this disease by depletion; for instance, in section

1578 page 469 of the edition published in 1832, by Lea & Blanchard, he says, "In this situation, we have thought the remedy so exclusively relied upon by many, namely blood-letting, always to be injurious or never beneficial." The latter part of this clause has been quoted before by myself. "We therefore cannot recommend it agreeably to our present impressions; we never now employ it, either *generally* or *locally*." In section 1581, page 470 of the *same* edition, he says, "in this second stage of the disease, the symptoms are rarely so appalling as in the first, though of the same general character. The disease is less masked and we consequently have a more open enemy to deal with. In *this condition* we almost *exclusively* rely upon *blood-letting* to make a first impression; and there are few, who have not witnessed with what promptitude and success, this is sometimes effected—with this statement of the Professor's own language we will drop *his* treatment of the second stage and pass to the third, or the formation of the diptherite membrane. The effusion producing this membrane, he says, is not confined to the trachea in all instances,—the bronchial vessels relieve themselves in the same manner; and this sometimes throughout the whole lungs; as far at least, as the naked eye can trace them. It is of much importance to recollect this highly important pathological truth; since it will have a strong bearing on the question of an operation, whenever this may be agitated. The indications in this stage, he says, are first, to remove the obstructing lymph from the inflamed surface of the trachea. The following statement of the Doctor, I have seen corroborated more than once, and particularly in a case which I have mentioned in a former part of this essay, "the membrane has been more frequently removed from the trachea, than its removal has been attended with success to the patient, after its discharge; Michaelis (Chepere, case 10, page 65) relates a case of death after the membrane was twice discharged by emetics, nor is this surprizing, since by the removal of the obstruction, we do not remove the disposition to subsequent effusion; and as long as this continues, there can be no security against new formations. In the case I have alluded to above, as occuring in my own practice, the membrane was discharged nine times, but still reformed and produced fatal suffocation. The general medicinal

treatment advised by Dr. Dewees, in this form of the disease, consists of emetics and particularly the strong decoction of Polygala seneka, and should it act too freely on the bowels, he advises a small dose of laudanum to check it. As to his opinion of the value of the operation of tracheotomy, we think we have sufficiently indicated it above. Dr. Watson, of London, says, "the mortality will differ according as the disease is detected early and treated vigorously or otherwise." And with respect to treatment, there is no specific remedy for this, any more, than for any other inflammation—we must put in force the general principles upon which the treatment of inflammation is founded; adapting them, however, to the malady in question, by those facts in particular which the experience of the best observers have collected for our guidance." He places most confidence in the use of venesection tartarized antimony, and calomel. In reference to the last named article, he says, "Its usefulness appears to have been fully borne out by the test of experience; and the well-known virtue belonging to mercury, of preventing or arresting the effusion of coagulable lymph in other textures, has formed one cogent reason for its adoption in this disorder, of which the principal or chief peril results from the pouring forth of the albuminous part of the blood." He doubts the propriety of the application of blisters; and when used they should be placed across the upper part of the sternum and not on the throat. He also considers the operation of tracheotomy, notwithstanding some very few successful cases have been reported, as absolutely hopeless in the very largest majority of instances. His other remarks upon this operation have been I think quoted before. Dr. West observes, in his work on diseases of children, in reference to the treatment of croup, "that in no disease is the prompt employment of appropriate treatment more important than in croup, since in none does the use of remedies become sooner unavailing." He also thinks that local depletion is a very poor substitute for general blood-letting in the early and idiopathic form of croup; and also that the blood should be taken from the jugular vein instead of the arm, as it flows more freely from it. After the general bleeding has been resorted to, he employs local depletion and the use of small doses of tartrate of antimony frequently repeated—should this treatment abate the

disease though not relieve it altogether, he urges the use of calomel internally in small doses, and mercurial friction, but considers the action of these last named remedies too slow to overtake a disease which tends so rapidly to a fatal issue. Should the croupal symptoms recur with any violence, Dr. West says, he would abandon the calomel treatment and resort to emetics with great energy—my own experience leads me to doubt very strongly the propriety of this opinion. In the second stage of this disease he advises a different plan of treatment, but says there is a slender hope of success. We must make an attempt to arouse the child from the state of collapse into which it is sinking, by placing it for a few minutes in a hot mustard bath, and emetics of copper should at once be administered. The sulphate of copper has been considered by some writers to possess a specific influence over croup. Dr. West says he cannot take this view of its action. In this stage of the disease he considers it very necessary to bring the system as speedily as possible under the influence of mercury; with this view he gives a grain of calomel every hour to a child from two to three years of age; and at the same time recommends the rubbing into the thighs of the patient, a drachm of strong mercurial ointment, every two hours; should diarrhœa supervene the calomel must be omitted, or given more sparingly—but the inunction must be used even more frequently. In this stage of the disease he places great reliance upon the decoction of seneka, in combination with the carbonate of ammonia, and tincture of squills every two hours. He thinks that no other remedy or combination of remedies has appeared to be so useful as a stimulating expectorant at this time. Much difference of opinion prevails among writers of high repute as to the proper time for employing counter-irritation in cases of croup, and still more as to the part to which this counter-irritation should be applied.

Dr. West thinks, that when the disease has been checked by anti-phlogistic means, and the symptoms have lost something of their severity, much good is done by the application of blisters to the upper part of the sternum. But if on the other hand, croup has reached an advanced stage,unchecked by previous remedies, blisters seem nearly if not altogether useless, and should then be

applied to the throat. Of the operation of tracheotomy he remarks, "that its *probable* utility should suggest itself to the earliest observers of the disease very naturally; but that for many years after it was first advocated by Dr. Homes the value of the operation was not even put to the test, and even a long time after it was tried, but one instance of successful result was recorded. In the year 1825, M. Bretonneau performed the operation successfully upon a little child in the last stage of croup, and since that time the operation has been performed nearly two hundred times, and about one fourth of the patients recovered. By far the greater number of these cases of success occurred in France, but in England the result of almost every instance of the performances of tracheotomy in croup, has been so unfavorable, that the operation is scarcely looked upon as a justifiable proceeding; and the great discrepancy that exists between French and English writers must be attributed to the different character the disease presents in the two countries. Dr. West says that "in France, croupal symptoms are induced in the majority of cases by the extension to the larynx of false membrane originally deposited on the fauces and soft palate, while the *wind-pipe* itself is comparatively seldom in a state of active inflammation, often altogether unaffected; and the bronchitis and pneumonia, which in this country so often and so seriously complicate the disease, are there of less common occurrence. In estimating the results of tracheotomy in France, it must likewise be borne in mind that in *many* instances the operation was performed on patients whose disease would probably have been amenable to other treatment, and that in some cases the trachea was opened without the previous adoption of any treatment whatever; and *quite* in the *early* stage of the affection." It is very plain to the mind of any strict observer, that this early performance of tracheotmy is impracticable in private practice; it may be done in hospitals, and we must base our conclusions in reference to the operation, upon a due consideration of the circumstances under which alone we are likely to have the opportunity of performing it. Dr. Stokes, in his work on diseases of the chest, Dublin edition of 1831, on page 220, makes use of the following very true remarks. "There is always that kind of feeling connected with a surgical operation in acute diseases, which prevents its

being performed, or even proposed and assented to, unless under nearly desperate circumstances, and when all other means have failed." Hence its general failure; and those cases in which it has been successful, we have the strongest ground and authority for believing, could have been relieved by other means.

Dr. Ryland, surgeon to the town Infirmary of Birmingham, says on page 105, of his work on diseases of the larynx and trachea, that "in attempting to cure croup, the indications are, first to diminish the inflammatory action, and to allay the fever when present; secondly, to prevent or put a stop to the excretion of albuminous matter; thirdly, to effect the expulsion of any false membranes that have already been formed; fourthly, to alleviate spasmodic symptoms and prevent their recurrence; and fifthly, to strengthen aud support the failing powers during the last stage of the disease;" and further "that several of these indications may be accomplished by the same means, and some of them but too frequently require no consideration at all, as, amongst the poorer classes of patients, the disease is seldom seen until the stage of collapse has commenced. The mode of treatment must adapt itself, not only to the period of the disease, but also to the varying constitutions of the different subjects." The first set of remedies that he advises are of the general antiphlogistic character; but the second indication, that of hindering altogether, or putting a stop to the false membranes, will, of course, be partly accomplished by the means above alluded to; but the removal of that state of system which causes the regeneration of these albuminous deposits or exudations is the most important part of the treatment. He strongly urges the use of calomel in small doses in this form of the disease, and that, directly that the patient becomes influenced by it, the lymph ceases to be deposited upon the trachea; and should it not be absorbed again into the system, it soon becomes detached by the secretion from the subjacent mucous follicles, and will be coughed up by degrees. In reference to the operation of tracheotomy he says that with regard to its general results when performed for the cure of croup, I have no hesitation in saying that they are so unfavorable as to warrant us in the strongest condemnation of it in almost *every conceivable* circumstance. My father who had been actively engaged in practice for near-

ly fifty years and consequently has had many opportunities for observing all the phenomena of this disease, and as he does in the treatment of other affections, pursue the dictates of a sound judgment and clear mind, has from that experience and judgment settled down upon the following plan of treatment of croup in its three different stages. In the first, if he is called in time, he gives proportionate doses of the mildest emetic, such as ipecachuanha, to be repeated every fifteen or twenty minutes, until free emesis is produced; it to be followed by a dose of calomel and oil, and has found it generally adequate to the relief of this stage of the disease. In the second, he relies mainly upon the repetition, every two or three hours, of small doses of the metal; and I have seen repeatedly instances of successful issue of the disease under this mode, in cases which for some time appeared entirely hopeless.

As to the operation of tracheotomy for the third and last stage of the disease, he has never performed it, believing it to be, as I have, I think, before shown it to be, from the very highest authority generally unsuccessful. Dr. Wm. Waters, of this place, who was for some years a colleague of my father in the practice of the profession, and has had a very large share of experience in the treatment of croup, advises the following plan: in the early stages and particularly in a mild form of the disease, he gives ipecachuanha as an emetic, but if the disease assume a severe character he administers tartar-emetic, and varies the medicine and the dose to suit the constitution of the patient. He then, after this treatment, advises the calomel and oil, and if the disease runs into the second stage, repeated doses of a small portion of the metal. As to the operation of tracheotomy for the relief of croup, I will give his experience after speaking of the warm bath and blisters in which he with many of the best observers seems not to place much confidence. It appears that he has performed the operation in two instances for croup, but at that period of the disease that prevented its being successful in the hands of any one. He also performed laryngotomy upon an adult for fibrous tumor upon the rima glottidis, which was of considerable relief for a while, but congestion of the lungs took place and the patient died. I am indebted to the Doctor for the following table of statistics collected by him from various periodicals some few years ago, previous to

the method pursued by H. Green, M. D., of New York, of topical application of a strong solution of nitrate of silver.

In the Middlesex Hospital there were fourteen cases operated upon and reported as cured; Dr. Physick, of Philadelphia, operated on three cases and none cured. Dr. I. R. Barton on one which died, Baudelocque on fifteen, none cured; Roux on four; none cured; and so on showing a large proportion of unsuccessful cases;

Dr. W. P. Johnston, of Georgia, in an essay published in the Medical Examiner for January 1839, on the subject of tracheotomy for croup, gives a number of cases of the operated which were given to him by M. Trosseau, while he was in Paris, and speaks very highly of its utility from the fact that according to that statement one fourth of the patients operated upon in France were cured. But I think that the cause of that proportion being relieved, is owing mainly to the fact that was stated previously namely, that the most were hospital cases and operated upo n in the early stage of the disease when probably other treatment would have relieved them, to say nothing of the different character of the disease in the two countries of France and England and indeed in others.

That the operation is generally, in France, performed in the early stages of the disease is proved by the assertion of a large number of the French authors themselves; and militate strongly against the statement, or rather conclusions which Dr. Johnston comes to from the accounts given to him by M. Trosseau, in the following language: "first,that tracheotomy, generally recommended by the French physicians and surgeons, should always be a last resource, inasmuch as it has saved a little less than one patient out of four, even when performed at the last extremity, and often under the most unfavorable circumstances; second, that double pneumonia and phthisis are almost the only positive contra-indications; that the extension of the disease to the Bronchiæ, and great feebleness on the part of the patient from profuse bleeding, or other causes, are unfavorable conditions, but that cures may even be obtained in such cases. Third, that as too great a loss of blood is always to be regretted, and its effect in curing or even in shortening the duration of the disease is questionable, we should employ venesection and leeches with much caution, and trust more

to local caustic applications, so generally recommended of late. Fourth, that the operation should be performed when the disease has reached its third stage, when death seems inevitable, and before the patient has become too much exhausted, the lungs congested &c., &c. Fifth, that the operation should be performed very slowly and cautiously,so as to avoid dividing the vessels as much as possible. Sixth, that the canula we employ should be of large size, and in proportion to the physical development of the patient. Seventh, that the minutest attention should be paid to the after treatment, as much depends materially upon this, as to the ultimate success. Eighth, that pneumonia, when it occurs, should rather be attributed to the state of the lungs of the patient at the moment of the operation; than to the immediate effect of the operation itself, and that were it otherwise, tracheotomy would still be insisted upon."

Dr. Horace Green, of New York City, in his work on the pathology of croup, published in 1849, says, in reference to the performance of tracheotomy in croup, that, "on the subject of tracheotomy in croup, I have but little to remark. Several times I have been called upon to perform the operation in the latter stage of the disease, but have *always* refused to do it; so difficult and *dangerous* have I considered the operation, *and so very small* the chances of *success* attending it, that in *no* case which has fallen under my care and notice have I deemed the performance of tracheotomy at all justifiable."

He prefers the following plan of treatment, " without stopping to describe the symptoms, or to discuss the etiology of membranous croup, we will proceed to a more critical examination of both the topical and the general remedies which are indicated in the treatment of their affection. Believing as I do, that topical medication is a measure of the highest importance in the treatment of membranous croup, I shall make no apology for giving to it a more extended consideration." M. Bretonneau was among the first to recommend and employ the nitrate of silver, as a topical remedy in the treatment of membranous croup. He made use however, of a very weak solution (4 grammes of salt to 32 grammes of water,) and directed its application to be made to the throat and the opening of the glottis. The instrument he employ-

ed, and his method of application, are thus described in a work by M. Berton, which has recently been published in Paris, and I believe republished in this country, "L' appareil est compose d' une ĕponge fine de la grosseur environ d'une noix, fixĕe an bout d'une baleine assez forte et recoubee, a la chaleur d'une bougie, a 5 on 6 centemitres de son extremite et presque au angle droit. L' eponge est imbibee d'une solution de nitrate d'argent (au degre 4 grammes de ce sel pour 32 grammes d'eau distillĕe.) Elle est introduite dans le fond de la gorge; l' epiglotte est soulevee et la solution exprimee au dessus de la glotte."

It will be observed from the above extract that M. Bretonneau makes no attempt to pass the instrument below the epiglottis. The sponge attached to the probang being saturated with the solution is introduced into the throat, the epiglottis is elevated (soulevee) and the solution expressed into the glottis. The topical application of a solution of the nitrate of silver in membranous croup, has also been recommended by Dupuytren, Trosseau, Guersant, Guich; Bouchat and other practitioners in France. In the thesis published by Guiet, in 1843, on the treatment of croup, he thus describes the method practised there, by Guersant in the "Hopital des enfants," for applying the caustic solution to the fauces, pharynx, and to the opening of the glottis in such a manner as to cause some drops of the solution to penetrate into the larynx: " L' eponge convenablement imbibee de la solution caustigue: et le malade solidment maintenu par une ou deux personnes vigoureuses, l' operateur abaisse la base de la langue, ave la main gauche, armee d 'un cuillere ou de tout autre instrument, en meme temps il porte avec la main droit la baleine dans la bouche; lui fait traversee rapidement cette cavite; porte l' eponge dans le pharynx apres l' avoir promenee sur les piliers et les amygdales s'il y existe des fauses membranes; la fait glisser profondement dans cette cavite le long de sa paroi posterieure, de maniere a la loger; si est possible, entre cette paroi posterieure et l'epiglotte; mais, quand il se sent arrete par l'orifice superieure de larynx il presse un peu sur cette eponge, de maniere a en faire suinter quelques gouttes de la solution caustique, et a en faire parvenir un peu dans le larynx."

Dr. Green observes that in employing the nitrate of silver as a

topical remedy in the treatment of diseases of young children, "I have not deemed it prudent or necessary to use a solution of the caustic of the strength recommended by Bouchat or Guiet; the the former employed a solution in the proportion of one of the salt to three of water; the other, in the treatment of membranous croup, made use of a still stronger and more concentrated solution, being of equal parts of nitrate of silver and water.

Ordinarily, I have applied in croup, a solution composed of from two scruples to a drachm of the salt, dissolved in an ounce of distilled water. A remedy of this strength I have applied freely to the fauces, pharynx, and *into the larynx* of young children, in a large number of cases during the last eight years, and in no single instance have I observed any indications of the danger of suffocation from its employment; on the contrary, I have repeatedly noticed, that much less bronchial irritation is produced by the application of the nitrate of silver into the larynges of young children, who are suffering from croup, than when it is introduced into those of adults who are affected by chronic diseases of the larynx.

Some few years ago, I performed the operation of tracheotomy upon a child six years of age; I was called at night to the patient, who resided three miles from the City of Frederick; I found that the child had been ill with membranous croup three days and that nothing had been done for its relief. I performed the operation in the usual manner; introduced the canula and the relief to the dyspnœa was very great, and in about five minutes after its performance, the patient expelled a tough membrane bearing upon its surface the impression of the ring-like cartilages of the trachea.

For some hours I was induced to believe the operation would result in a cure, but was deceived, as the membrane reformed and the patient died of suffocation the following morning. I have never repeated the operation since, believing conscientiously that it is rarely, *per se*, successful, and also from the fact, that all or a *very* large proportion of the best authorities to a great extent concur in the opinion, that in the latter stages of the disease it is useless, and when successful in the early stages there is every reason to believe other means of a different and milder character would have answered; and I must believe, that the reported fact of its

greater success in France than elsewhere, is owing, in my judgment, to its being performed in a large proportion of cases that would have recovered without it.

These views, I doubt not, conflict with those of some of my professional brethren, but with deference to them I think they are correct in the main, and particularly as to the value of tracheotomy for the relief of the disease which has formed the topic of this essay.

With respects of author

Dr Hall

Washington City

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