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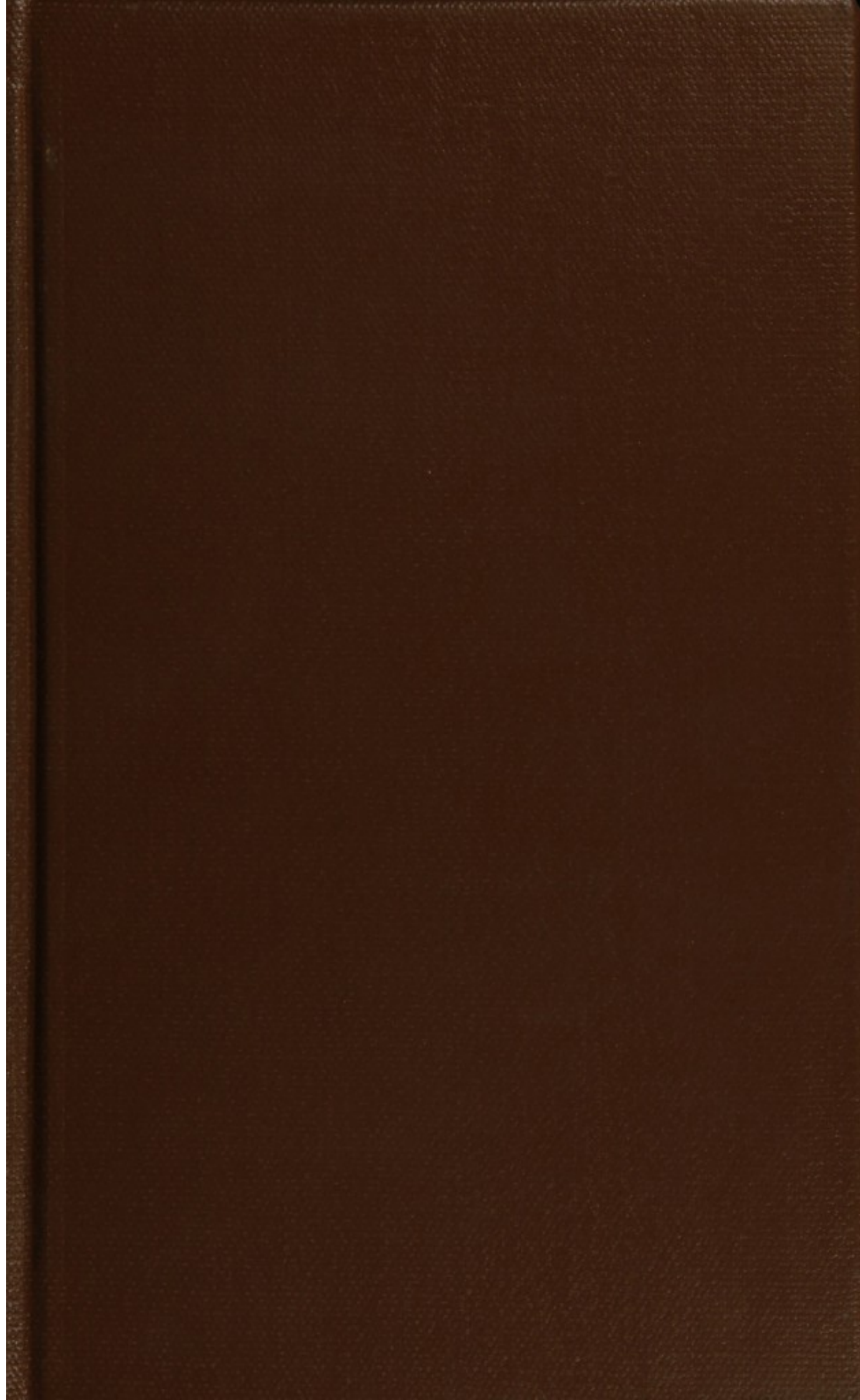
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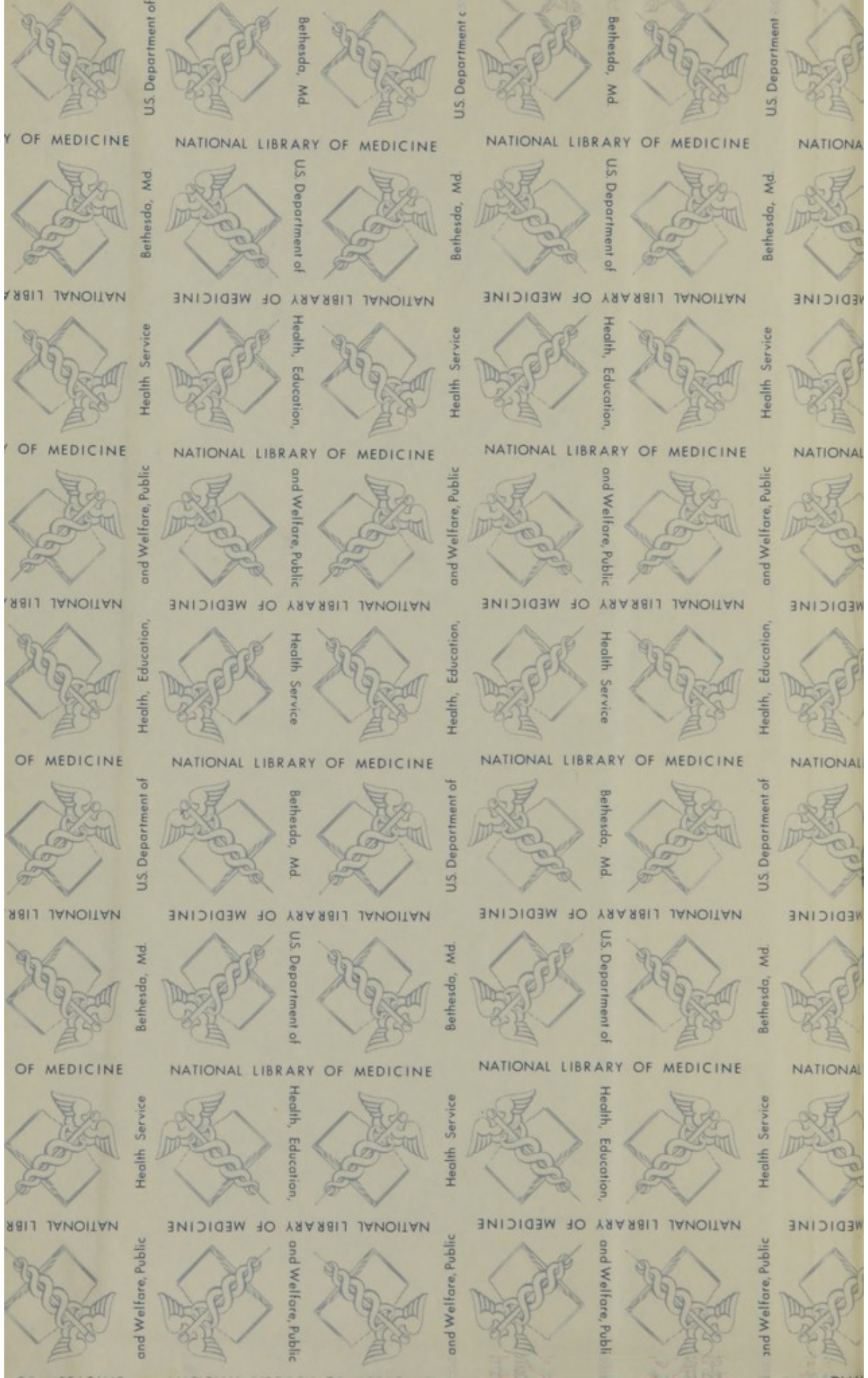
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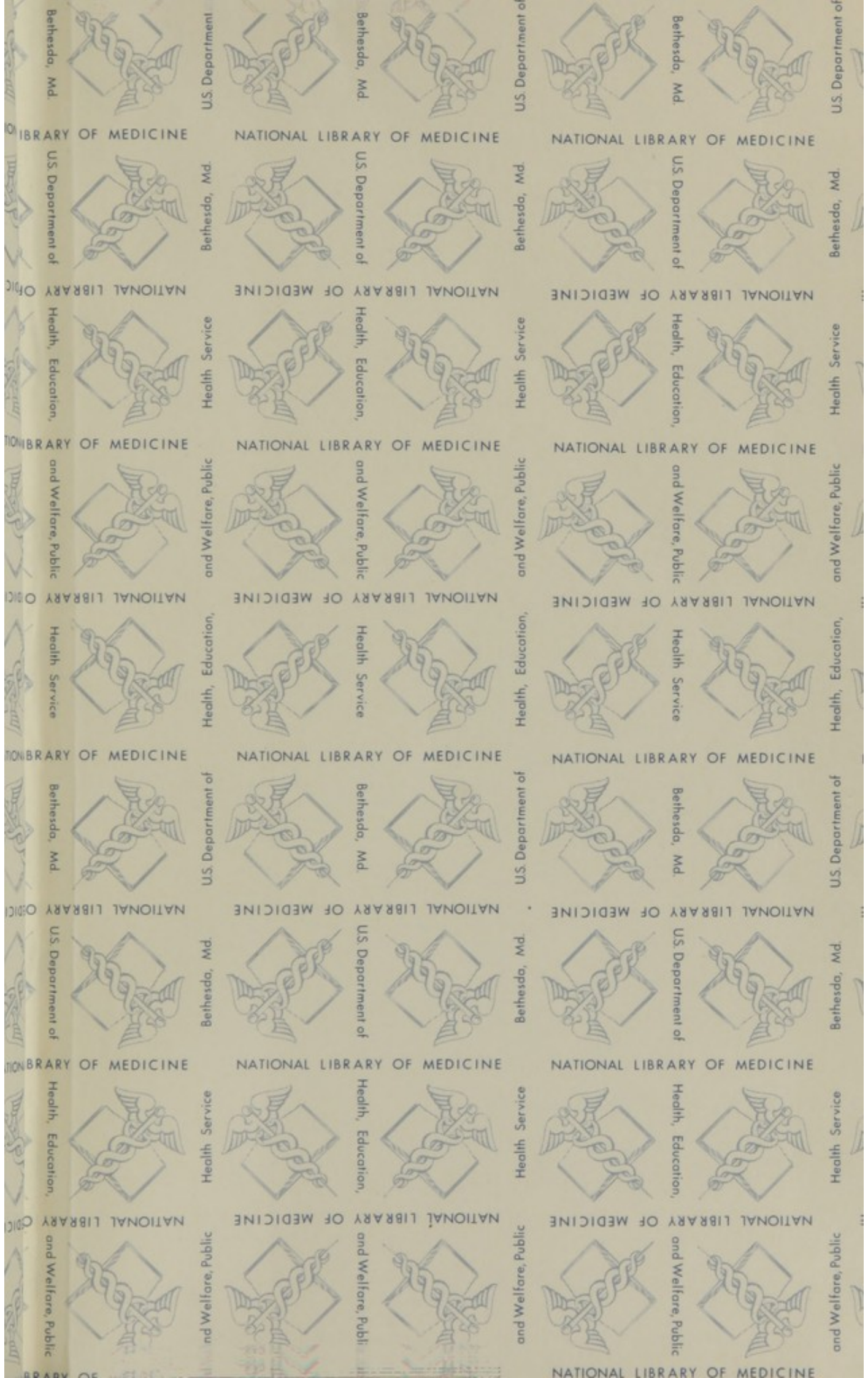
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DISEASES OF CHILDREN.

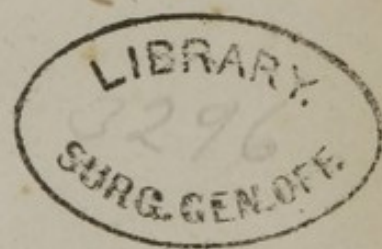
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DISSEASES OF CHILDREN

A
PRACTICAL TREATISE
ON THE
DISEASES OF CHILDREN.

BY
J. FORSYTH MEIGS, M.D.

LECTURER ON THE DISEASES OF CHILDREN IN THE PHILADELPHIA
MEDICAL ASSOCIATION; FELLOW OF THE COLLEGE
OF PHYSICIANS OF PHILADELPHIA



PHILADELPHIA:
LINDSAY AND BLAKISTON.
1848.

Annex

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By J. FORSYTH MEIGS, M. D.,

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TO

GEORGE B. WOOD, M.D.,

PRESIDENT OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA,

PROFESSOR OF MATERIA MEDICA AND PHARMACY

IN THE UNIVERSITY OF PENNSYLVANIA,

ONE OF THE PHYSICIANS OF THE PENNSYLVANIA HOSPITAL, ETC. ETC.:

This Work

IS DEDICATED AS A TRIBUTE OF RESPECT

FOR HIS HIGH PROFESSIONAL ATTAINMENTS

AND EMINENT PRIVATE VIRTUES,

AND AS A MARK OF GRATITUDE FOR HIS VALUABLE INSTRUCTIONS,

BY HIS FORMER PUPIL,

J. FORSYTH MEIGS.

TO
GEORGE R. WOOD, M.D.

REMARKS ON THE COURSE OF PHYLAXIA OF RHINOCEROS

EXAMINED BY NATHANIEL WILSON AND THOMAS

IN THE COURSE OF RESEARCH

ONE OF THE RHINOCEROS OF THE RHINOCEROS, ETC.

THIS BOOK

IS PRESENTED AS A TRIBUTE OF RESPECT

FOR HIS HIGH PROFESSIONAL ATTAINMENTS

AND EXCELLENT SERVICE TO THE WORLD

AND AS A MARK OF RESPECT FOR HIS PERSONAL CHARACTER

BY THE BOARD OF

J. FORESTH KEIGS

P R E F A C E.

THE motives which led the author of this volume of the Medical Practitioner's and Student's Library, to undertake its preparation, were the hope that the details of his own experience might prove of some utility, and the belief that a work on the Diseases of Children, executed upon a somewhat different plan from those already before the profession, might not be an unacceptable addition to the medical literature of the country.

In the preparation of the work no pains have been spared to make it both methodical and accurate, and as complete as the limits of the series would allow. The classification of diseases according to the systems which they affect, has been adopted by the writer as the most convenient. The divisions of each article are those employed by the most eminent among recent systematic writers. In the composition of the work the author has availed himself, as fully as possible, of every authority of importance placed within his reach, always, however, endeavouring to judge what came under his notice, by the knowledge derived from his personal experience in private practice. In this way he hopes that he has been able to select from the labours of others, whatever is most important to be known in the present state of medical science, and to reject what seemed fallacious or useless. The work

from which he has drawn most largely, is that of MM. Rilliet and Barthez, which was originally intended to have formed the basis of the present treatise. This plan was, however, abandoned very soon after the commencement of the work, from the impossibility, with proper justice to those writers, of introducing either the personal experience of the author, or a great amount of very useful material to be derived from other sources. He desires, however, distinctly to acknowledge his great indebtedness for valuable assistance obtained from their work, especially in regard to the symptomatology and morbid anatomy of several diseases brought under consideration.

In addition, the author has constantly consulted the works of Underwood, Dewees, Eberle, Stewart, Condie, Billard, Barrier, Berton, Bouchut, Brachet, and Valleix, on the diseases of children; the portion of the *Bibliothèque du Médecin Praticien*, devoted to the same subjects; Tweedie's *Library of Practical Medicine*, Copland's *Medical Dictionary*, the *Guide du Médecin Praticien* of M. Valleix, and the *Dictionnaire de Médecine Pratique*. Various treatises on the practice of medicine, and different articles in the medical journals, which it is here unnecessary to mention in detail, have also been consulted and quoted.

It is proper to remark in addition, that, in stating what he has himself observed, the author has endeavoured to do it with the greatest possible accuracy; and whenever the subject has concerned facts susceptible of numerical demonstration, he has invariably, if he has had the means, employed that method of statement, in order that the reader might be enabled to draw his own conclusions. Whatever may be the advantages or disadvantages of the numerical method of observation in medicine, it seems to him that it must be of vastly greater service in giving accuracy and certainty to the recorded results of treatment, than the plan

usually followed by the older writers, of merely stating their own generalizations (often no doubt loosely and carelessly drawn), instead of giving to the reader the facts upon which those generalizations were founded, and thus allowing him to judge for himself of their probable truth and correctness.

The author desires to state, in regard to the use of the first person singular throughout the work, that, in the words of Dr. G. B. Wood upon the same point, he "has been actuated by no spirit of egotism, but merely by a wish to express the fact, without affectation, in the shortest and simplest mode."

In conclusion, the writer is anxious to express his thanks to Dr. Alfred Stillé, of this city, for much valuable advice in regard to the preparation of the work.

Philadelphia, June 21, 1848.

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CHAPTER I

THE HISTORY OF THE UNITED STATES

- 1. The first settlement in America was made by the Spaniards in 1492.
- 2. The first English settlement was made in 1607.
- 3. The first American war was the Revolutionary War in 1776.
- 4. The first American constitution was adopted in 1787.
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R. B. Abbott

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A

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CLASS I.

DISEASES OF THE RESPIRATORY ORGANS.

CHAPTER I.

DISEASES OF THE UPPER AIR PASSAGES.

ARTICLE I.

CORYZA.

Definition ; synonymes ; forms ; frequency.—This disease, which consists in an inflammation of the mucous membrane of the nasal passages, is called in common language, cold in the head, or snuffles. Underwood describes what he calls coryza maligna, or morbid snuffles, which, he says, is very different from and a far more serious disorder than what is usually called snuffles. Dewees makes no reference to it. Eberle describes it under the title of coryza. He doubts whether coryza maligna ever occurs in this country, and takes his account chiefly from Underwood and Denman.

I shall make two forms of the disease, the *simple* and the *purulent* or *pseudo-membranous*. The first form generally occurs in connexion with some other disease, as bronchitis, pneumonia,

measles, scarlet fever, or pertussis. It sometimes exists, however, as an idiopathic affection, but is never dangerous unless it occur in new-born infants, and assume the purulent or pseudo-membranous character. It is so mild indeed, that it need not occupy our time, and is commonly spoken of as cold in the head, or snuffles. The other variety of the disease will constitute the subject of the present article, and is that called by Underwood, coryza maligna or morbid snuffles.

Purulent and pseudo-membranous coryza rarely occur as idiopathic affections, but are almost invariably connected with angina or other diseases. I met with one case, however, of the purulent form unaccompanied by angina or other disease, in 1841, in a child seven weeks old. The case proved fatal. I saw another fatal case of the same form, connected with simple angina, in 1846, in a child five weeks old. Besides these two cases, I have met with four others of the pseudo-membranous variety, accompanied by simple angina, in children between two and six years of age, all of which terminated favourably. The two varieties of the disease occur, however, as already stated, much the most frequently as secondary affections in the course of other diseases, particularly measles, scarlet fever, pseudo-membranous angina, &c. I shall not attempt in the present article to treat particularly of the cases which accompany the eruptive fevers.

Causes.—The causes of the disease in the two infants observed by myself were unknown. In one the nurse remarked a slight discharge of blood from the nose soon after birth, and the coryza dated from that time. The other, a feeble child, was attacked when two weeks old without any appreciable cause. The remaining four cases occurred in 1845 and 1846, during an extensive prevalence in this city of severe scarlet fever, measles, and pseudo-membranous angina and laryngitis, which makes it probable that they depended upon the epidemic constitution of the atmosphere. The cases of Rilliet and Barthez coincided generally with primary or secondary purulent or pseudo-membranous angina. From the account given by Underwood of coryza maligna, there can be little doubt that it was epidemic when observed by himself and Denman. The latter author states that in connexion with the coryza there was general fullness of the

throat and neck externally ; that the tonsils were tumefied, and of a dark red colour, with ash-coloured specks, and in some cases, extensive ulcerations ; and that some of the children swallowed with difficulty ; all of which symptoms clearly point to severe concomitant angina.

Anatomical lesions.—The Schneiderian mucous membrane is found reddened uniformly, or in points, rough, thickened, and sometimes softened. When pseudo-membrane is present, it exists either in fragments, or lines the whole extent of the nasal passages, and is mixed with mucous or muco-purulent fluid, in greater or less quantity.

Symptoms.—Coryza begins with sneezing and stoppage of the nostrils, soon after which the discharge, which is the pathognomonic symptom of the disease, makes its appearance. This consists of serous or mucous fluid in greater or less abundance, and usually of a yellowish colour, which, at first thin and without odour, becomes in slight cases, thicker and often purulent, with a peculiar, unpleasant, but not fetid odour. In severe cases, on the contrary, and especially when the pseudo-membranous exudation is present, the discharge is thin, and often contains small granular particles, which seem to be the detritus of the false membrane, while at other times it is ichorous or even bloody. When false membrane is present, it can often be seen upon examination of the nostrils in a strong light, to cover the mucous membrane in the form of thin adherent layers of a yellowish-white colour. The alæ nasi, and sometimes the whole extremity of the nose, are red and swelled, and the skin, which is tense and shining, presents an erysipelatous appearance. The upper lip is generally reddened, irritated, swelled, and sometimes excoriated, by the nasal secretions.

The *respiration* is generally difficult, nasal, and snoring. When the nasal passages are nearly or quite filled with the secretions, the child being no longer able to breathe through them as in health, is compelled to keep the mouth open. This is exceedingly inconvenient to children of all ages, as it causes great dryness and stiffness of the mouth, tongue, and throat, and in very young infants, who instinctively respire almost exclusively through the nostrils, is attended with such violent efforts, as to be a chief

or perhaps sole cause of the fatal termination of some cases. In one instance that I saw, the child was seized with attacks of suffocative breathing, which threatened fatal asphyxia, whenever the passages became much impeded. Under these circumstances the cleansing of the passages with a brush would afford complete relief, and, for a time, the little thing would appear to be quite well. Finally, however, death occurred in one of the attacks of dyspnœa, from sudden serous effusion into the lungs. The difficulty of respiration is greater, as I have stated, in proportion as the child is younger, and depends on the physiological fact, that at a very early age, respiration is performed almost solely through the nostrils, the child seeming incapable of keeping the mouth open, in order to compensate for their closure. I have never observed *cough* except in cases accompanied by angina. *Epistaxis* occurred in two cases of the pseudo-membranous form, in children between three and five years of age. The bleeding recurred on several occasions, but ceased so soon as the coryza was cured. Infants refuse the breast when the passages are much clogged, or suckle with great difficulty and at long intervals.

The character of the *general symptoms* depends much more upon the accompanying disease, in older children, than on the coryza itself, and it is unnecessary therefore to dwell upon them. In the two infants observed by myself, the principal symptoms were, in the case unaccompanied by angina, restlessness, weakness, emaciation, dry, harsh and wrinkled skin, and violent attacks of dyspnœa; and in the other case, in which angina was present, there were added to these, fever and somnolence. Berton gives the *duration* of the disease as from eight to fifteen days, according to its intensity. Rilliet and Barthez state that they saw a child two years old die in three days, and another of three years in the same time; but as one of these cases was complicated with angina and croup, and the other with pseudo-membranous angina, it is clear that the rapid death depended rather upon the accompanying disease, than the coryza itself. The duration, as observed by myself, in the two cases occurring in infants, was between two and three weeks; in its severe form, in the one unattended by other disease, and six days in the one accompanied by angina. In the other four cases, which occurred in older children,

the duration of the attack depended on the form and degree of the attendant angina. In one case it became chronic, and was accompanied by ulceration of the nasal passages.

The *prognosis* must depend on the age of the child, and the nature of the attack. In young infants, simple idiopathic coryza is never, perhaps, dangerous; while the idiopathic purulent or pseudo-membranous forms are extremely so. The only two cases of the latter kind that I have seen were fatal. The four cases in older children recovered without any difficulty. When it occurs in connexion with pseudo-membranous angina, or in the course of scarlet fever, the prognosis will of course depend on that of those diseases.

Treatment.—Simple coryza requires no treatment in children over two years of age, except attention to hygienic conditions. I believe that young children may often be preserved from attacks of spasmodic laryngitis and of bronchitis, by calling the attention of the mother to the strong tendency which exists during infancy and childhood to extension of disease, and advising, in cases of coryza, that the child should be secluded in the house, or else very warmly clothed, if sent out.

In infants, even simple coryza gives trouble, by causing obstructed respiration, and consequent restlessness. For these symptoms I have found nothing so useful as passing a small camel's-hair pencil loaded with sweet oil, some distance up each nostril, and directing the outside of the nose, the openings of the nostrils, and the upper lip, to be freely anointed with cold cream, simple cerate, or any soft and adhesive ointment.

In infants labouring under purulent or pseudo-membranous coryza, the indications for the treatment are to remove the secretions as they collect, and to subdue the inflammation of the mucous membrane which produces them. The first indication may be fulfilled by means of a brush made of long camel's hair, by throwing water from a small syringe into the nasal passages, or when the discharges are thin and fluid, by blowing strongly into the nostrils, whilst the tongue is depressed by a finger introduced into the mouth, so as to allow the secretions to pass out of the posterior nares into the fauces.

The second indication is to be fulfilled chiefly by the application of solutions of alum, nitrate of silver, sulphate of zinc or copper, and by insufflations of different substances in powder. The best application is probably the solution of nitrate of silver, which may be made of the strength of five or ten grains to the ounce, or stronger, to be made use of several times a day, with a brush. I have also employed injections consisting of solutions of alum, of from three to six grains to the ounce. It is recommended by Rilliet and Barthez to make insufflations of powdered gum and alum, or of gum and calomel in equal parts, several times a day. There is, however, it seems to me, an objection to this method of treatment, especially in infants, which is that the powders would necessarily tend to increase the obstruction to breathing through the nose, already existing. It has been proposed also to apply a few leeches to the mastoid process, or over the frontal sinuses. This might be done in hearty children.

In the form of the disease accompanied with angina, an essential part of the treatment must be that of the throat-affection. This will be considered in another place.

Case.—The subject of this case, a male, was born after an easy, natural labour, and appeared strong and well, with the exception of a little discharge of blood from the nose soon after birth and slight coryza, the latter of which continued until the child was five weeks old, when it became aggravated, and my father was requested to visit the infant. I saw it at the same time. It was small and puny; the skin was harsh, dry, and wrinkled, so that the child looked like a little old woman. It was very weak, and had constant secretions from the nostrils of thick, dark-coloured pus. When the discharge collected in sufficient quantity to obstruct the passages, the respiration became exceedingly difficult, as the little thing seemed incapable of breathing through the mouth, and at such moments it seemed as though the child must die of asphyxia. If the nostrils were cleared by any means, by syringing, by the use of a brush, or by blowing into them in the manner already described, the respiration would become easy and natural, until the discharge collected again, when the same scene recurred. During the paroxysms arising from the closure of the nasal passages, the

child was entirely unable to take the breast, but after being relieved, had no difficulty whatever; the mouth was either kept shut, or if open, the tongue was observed to be pressed spasmodically against the roof of the mouth, so that it was impossible for more than a very small amount of air to pass through it; the respiration was laboured, and accompanied by a loud snoring or nasal sound. There was no other marked symptom, except a nearly constant flatulent distension of the epigastric region. On the day before death, the infant seemed better, appeared to have gained flesh, and looked more intelligent, so that the mother was greatly encouraged; but the next day it was seized during one of the paroxysms of suffocation, which did not seem to be worse than many preceding ones, with copious discharges of bloody and frothy serum from the mouth and nose, and died in about three quarters of an hour.

At the post-mortem examination we were not allowed to examine the nasal passages or throat. The stomach and bowels were healthy, but much distended with gas. The peritoneum was healthy, but contained a considerable amount of clear yellowish serum. There was serous effusion in both pleural cavities, but no traces of inflammation. The lungs were healthy, with the exception of some ecchymosed points, and general infiltration with sanguineous frothy serum. The trachea and bronchia were natural. The heart was larger than usual, but healthy in other respects.

ARTICLE II.

PSEUDO-MEMBRANOUS LARYNGITIS.

I shall describe three forms of laryngitis,—the pseudo-membranous, spasmodic, and simple or erythematous.

It seems evident from the recent works on diseases of children, that there are two distinct disorders, which have until within a few years, and which are even now by many in this country, confounded together under the appellation of croup. In fact it is the

custom in many parts of the United States, to apply the term croup to all the affections of the larynx characterized by dyspnœa, hoarse spasmodic cough, and croupy respiration; whereas there are four different maladies which present in a greater or less degree the symptoms just mentioned. These are: pseudo-membranous laryngitis, or true croup; spasmodic laryngitis, or false croup; simple laryngitis; and laryngismus stridulus, or spasm of the glottis.

Underwood describes pseudo-membranous and spasmodic laryngitis as a single disease, under the title of suffocatio stridula; Dewees under that of cynanche trachealis, or croup; and Eberle of cynanche trachealis, tracheitis, or croup. Underwood evidently describes laryngismus stridulus in his chapter on inward fits; Dewees has nothing in regard to it; while in Eberle's work it is easily recognised under the title of carpo-pedal spasms.

Definition; synonymes; frequency.—Pseudo-membranous laryngitis is an acute inflammation of the mucous membrane of the larynx, attended with exudation of false membrane.

It is the croup of the French writers, and is called in this country slow, creeping, true, membranous, or inflammatory croup. The term given above seems most suitable, as expressive of the real nature and seat of the disease, and I shall therefore make use of it in contradistinction to that of spasmodic laryngitis or spasmodic or false croup, which is a much more common and less dangerous form of disease.

The frequency of the disease is very considerable. During the ten years preceding 1845, there occurred in this city, according to Dr. Condie (*Dis. of Child.*, Note, p. 88), 3977 deaths under fifteen years of age, from bronchitis, croup, pneumonia, whooping-cough, and other diseases of the respiratory organs. Of this number, 1149 were from croup alone; and as spasmodic croup is seldom a fatal disease, it is reasonable to conclude that much the larger number of these deaths were from the disease under consideration. It is rare, however, it seems to me, in comparison with spasmodic laryngitis, or as it is called here, croup. During the last five years, I have seen twelve cases of primary pseudo-membranous laryngitis, and in the same period, thirty-one of primary spasmodic laryngitis, of which

I have kept a record, and a considerable number of additional cases of which I have no written account.

Predisposing causes.—*Age.*—The disease is most frequent between the ages of two and seven years. Of the twelve cases that I have seen, ten occurred between two and seven years of age, and the other two at eighteen months and eleven years, respectively. As to *sex*, it is said to be more frequent in boys than girls. A feeble, delicate *constitution* is thought by some to be a powerful predisposing cause, though this is contrary to the experience of Rilliet and Barthez.

Of the twelve cases referred to all but two occurred in healthy, vigorous children, and these two were neither very weak nor very sickly, but presented a rather more delicate appearance than usual. *Season* appears to exert some influence as a cause, since the disease is apt to be most prevalent in spring and autumn. It is either sporadic or epidemic, resembling in this respect pseudo-membranous angina. When epidemic it is very generally connected with angina, while the sporadic cases frequently begin in the larynx, and often run their course without implicating the pharynx. During the latter part of the year 1844, the whole of 1845, and a part of 1846, the disease prevailed extensively in this city, and was in many cases accompanied by the pharyngeal affection. During those years, and particularly in 1845, measles and scarlatina also prevailed to a great extent, especially the former.

Is the disease *contagious*? In the article on pseudo-membranous angina, it will be stated that some of the most distinguished authorities unhesitatingly pronounce that disease contagious. In regard to the one under consideration, more doubt is expressed, and both M. Valleix, and Rilliet and Barthez, say that additional facts are necessary to determine this point. My own experience has never given me the least reason to suppose that it is propagated in this manner, as I have not known it extend from one child to others in the same family.

The *exciting causes* are but little understood. The only ones which seem to have been ascertained with any certainty, are the application of irritating agents to the laryngeal mucous membrane, and exposure to cold; and even these are questioned by the most

accurate observers. In none of the cases that I have seen, could the exciting cause be even suspected.

Anatomical lesions.—The false membrane may cover the whole of the mucous membrane of the larynx, and extend into the pharynx, trachea, and even bronchia, or it may be confined to the larynx, forming a complete lining to the cavity of that organ, or consisting merely of patches of various sizes, with intervals of mucous membrane between, destitute of exudation. It would seem that the membrane is confined to the larynx and trachea in about two-thirds of the cases, while in the other third it implicates the bronchia. The proportion of cases in which the pharynx is attacked is uncertain. According to M. Valleix, M. Hache found false membrane on the tonsils in only half of the cases.

The false membrane is generally of a yellowish-white colour, and from a fifth of a line to a line in thickness. Its consistence is generally considerable, and it is usually somewhat elastic. The free surface is usually covered with puriform mucus, while the inner surface is adherent with various degrees of force to the mucous membrane beneath. It consists, according to Hasse, mainly of fibrine blended with mucus in various proportions. (*Patholog. Anat., Syden. Soc. Edition*, p. 278.)

The mucous membrane presents various shades of redness, or is violet-coloured, or even blackish. In other cases it retains its normal characters, a circumstance which has given rise to the opinion entertained by some persons, that the disease is not inflammatory, though it is altogether probable that this condition is consecutive to the formation of the exudation. The membrane is sometimes brittle, friable, and thickened, and in rare instances softened.

Bronchitis and lobular pneumonia are frequent complications of the disease; the other organs are healthy in the great majority of cases, with the exception of venous congestion.

In the secondary croup of measles the appearances are very similar to those observed in primary cases, while in that of scarlet fever the exudation differs in being less consistent and less uniformly spread over the diseased part. In the last-named malady

the membrane is thinner, less adherent, and softer, and in some cases puriform, soft, and of a grayish colour. It is usually poor in fibrine, and prone to decomposition. The mucous membrane is generally discoloured and softened.

Symptoms.—It is highly important to ascertain the proportion of cases in which the disease commences in the larynx, and those in which it begins in the pharynx. It is difficult, however, to determine this question in the present state of knowledge upon the subject, as it has not been carefully examined by a sufficient number of observers. Rilliet and Barthez state that a majority of the cases observed by themselves, and also of those of M. Hache, commenced in the larynx. M. Guersent, on the contrary, (*Dict. de Med.*, t. ix. p. 339) asserts that in nineteen-twentieths of the cases, it begins in the pharynx, and I have heard some physicians in this city assert that the diagnosis between the disease and common or spasmodic croup, cannot be considered as positive during life, unless the pharynx contains an appreciable amount of pseudo-membranous exudation. From this I entirely differ, and believe, on the contrary, that the disease may exist in the larynx without at all implicating the pharynx in some cases, while in a considerable number the pharyngeal complication is exceedingly slight. Of the 12 cases that I have seen, the attack commenced with angina only in 3; in 2 of the remaining 9 there was no angina; in 3 there were no pharyngeal symptoms, so that the state of the throat was not examined; whilst in the remaining 4, all of which began with laryngeal symptoms, there was fibrinous exudation in the pharynx, confined however entirely to the tonsils. It is probable that the disease is most apt to begin in the pharynx in epidemic cases, while in those which are sporadic, it most frequently begins in the larynx.

When the disease begins in the pharynx the early symptoms are the same as those of pseudo-membranous angina. After a longer or shorter period, from one to seven days usually, according to the nature of the epidemic, the malady extends into the larynx, causing cough and hoarseness, and then follows the same course as when it commences in that organ. When, on the contrary, it begins in the larynx, the invasion is marked by hoarse-

ness of the voice, and hoarse, croupal cough, which often continue for one, two, or three days, until the disease has made considerable progress, before the parents deem it necessary to send for a physician. In one case that came under my observation, the child was playing about the room at a time when he had hoarse, whispering voice and cough, and stridulous respiration. In another I was not called until the evening of the third day, though the child had had stridulous cough and respiration for two nights, but, as he always seemed better in the morning, it was not thought necessary to send for me until after he had become violently ill. In a third there was hoarseness of the voice and slight croupal cough during the afternoon of one day and the ensuing night, and the next morning fully developed croup, with fibrinous patches on each tonsil.

These symptoms are not generally accompanied by fever at first. The appetite is usually unimpaired, the thirst scarcely augmented, and the child, though somewhat dull and languid, is disposed to be amused at times. In other and severer cases, on the contrary, the disease becomes aggravated much more rapidly, and may soon lead to a fatal termination.

The change of the *voice* is the first symptom observed in the cases which begin in the larynx. It was always described to me as hoarse, like that which is heard in an ordinary cold. As the disease progresses, the voice becomes more and more hoarse and difficult, until at length it is reduced to a mere whisper. The degree of the hoarseness varies however to a very great degree, the diversities depending probably upon the amount of the spasm of the larynx at the moment, and upon the state of the exudation. I have several times observed it to become much stronger and clearer after the operation of an emetic, in consequence no doubt of its relaxing effect upon the glottis. The *cough* is peculiar. At first slightly hoarse, it becomes, as the case goes on, very hoarse and hollow, and then short and smothered. It is variable in frequency and is apt to occur in paroxysms, which are often very troublesome from their frequent recurrence. Towards the termination of the disease in fatal cases, or whenever the case is very severe, it is altogether different from what it was at the beginning, becoming short, instantaneous, and smothered, so that it might very well be called

whispering. As the case advances it is accompanied by stridulous respiration, in which a hoarse, rough, hissing, or crowing sound is produced by the rush of the air through the constricted larynx. This sound is usually heard at first only during forced inspirations, and is therefore noticed first during the long inspiration which precedes coughing. Next it is heard during the violent respiratory movements which accompany the act of crying; and as the larynx becomes more and more clogged with the exudation, it occurs during both inspiration and expiration, in every respiration, and is so loud as to be heard over the whole room, or even in adjoining rooms.

The *respiration* is natural in the early part of the attack, but as the voice and cough assume their characteristic features, and the stridulous sound is established, it becomes more frequent, rising to 28, 32, 40, and 48, in the minute. At first easy and natural, it assumes during the height of the symptoms, and especially in fatal cases, the most frightful orthopnœa I have seen in any disease. Every movement of inspiration requires the whole force of the inspiratory muscles to lift the walls of the chest, and enable the air to find its way through the narrow and obstructed glottis; each expiration, instead of being short and easy, as in health, and in nearly all other diseased conditions, requires a slow and laborious contraction of the expiratory muscles to expel from the lungs the air which they contain, and which hisses through the larynx with a sound nearly as loud as that produced during inspiration. The orthopnœa just described occurs sometimes in paroxysms, but at other times is constant. In only one of my cases did it assume the form of paroxysms, and in that the patient recovered. In the others, both favourable and unfavourable, it was constant, or at least the variations were slight, and dependent chiefly upon the action of emetics.

When the orthopnœa occurs in paroxysms, the expression of the child is that of the most terrible anxiety, or of the wildest terror. In one instance, the face became deeply red, then blue, livid, and finally pale and white, and for a moment life seemed extinct. In the other cases, in which dyspnœa was constant, the face was of a dusky

red colour, the expression anxious and haggard, and the child either laid on its side with the head thrown far backwards in a state of somnolence or was constantly changing its position, from restlessness, without noticing anything around it.

There is no *expectoration* early in the disease, or it consists of white or yellowish viscous mucus. At a later period, there is often expectoration of false membrane, sometimes in the form of a complete tube, or much more frequently, of small irregular fragments, mixed with mucus, or with the matters ejected by vomiting. To detect the membrane, the substances expectorated or vomited ought to be placed in water, when it detaches itself from the mucus and other matters, and is easily recognised. It is not present in all the cases. Thus, of the 12 cases observed by myself, it was expelled by vomiting or coughing only in 3; in 6 it was known to be present by the character of the symptoms and by its existence in the pharynx; in 2, there was expectoration of masses of viscid, yellowish fibrine; and in the remaining cases, there was no positive evidence of its existence. M. Valleix (*Guide du Med. Prat.*, tome i., p. 330) states that of 51 cases, in which the symptoms were very carefully observed, no traces of the exudation could be discovered either in the expectoration or in the matters rejected by vomiting in 26, though their existence was proved by post-mortem examination.

Auscultation.—Barth and Roger (*Trait. Prat. d'Auscultation*, 2d ed. p. 255 and 261) describe, as a sign of croup with floating false membrane, a kind of vibrating murmur, or *tremblement*, as though a moveable membranous veil were agitated by the air, which can be heard when the stethoscope is applied over the larynx or trachea. If this sound is heard only in the larynx, and not in the trachea and bronchia, it indicates the plastic exudation to be of small extent, and likely to be rejected by expectoration, and the prognosis is favourable. In the other case, on the contrary, it shows the disease to be of considerable extent, and the prognosis becomes much more serious. The vesicular murmur of respiration is masked by the laryngeal stridulous sound, when this is present. When absent, the respiration is natural, or altered according to the state of the lung.

There is a slight *febrile movement* at the onset, or a day or two after the appearance of the earliest symptoms. When the disease is fully established, the fever becomes violent, and the pulse rises to 130, 140, 160, or even higher. It is generally regular and strong at first, but as the case progresses, becomes small, feeble, and very rapid. In one of the paroxysms that I witnessed, it became so rapid that it could not be counted, and at last ceased to beat at either wrist for a few instants. The heat and dryness of the skin are very moderate at first, but increase as the disease reaches its maximum, to diminish afterwards gradually, and in fatal cases, to be replaced by coldness, with copious clammy perspirations. The strength is not diminished at first, but as the disease progresses, is more or less so in proportion to its violence and duration. The *digestive organs* are but little disturbed by the influence of the disease, with the exception of diminution or loss of appetite, and moderate thirst during its violent period. Spontaneous vomiting or diarrhœa are rare, though both sometimes occur. The tongue is moist, and generally covered with yellowish-white fur. Pain in front of the larynx has been noticed by several authors. I have never observed it.

Tumefaction of the sub-maxillary glands, which is a frequent symptom of pseudo-membranous angina, ought always to be sought for, and if present, lends additional support to the diagnosis.

In favourable cases the recovery is sometimes very sudden in consequence of the expectoration of a tubular-shaped membrane. This is a very rare event, however, and recovery does not always follow. In general the recovery is slow and gradual. After free vomiting, after the expectoration of fragments of false membrane mixed with mucus, or, as happened to myself in two cases, after the expectoration of masses of tough, yellowish fibrine, or lastly, after the rejection of mucoid and frothy sputa only, the symptoms gradually ameliorate; the stridulous respiration slowly subsides, and at last disappears; the cough, which was short, hoarse, and smothered, became louder, stronger, less hoarse, and, what is still more favourable, loose; the aphonia moderates, but very slowly; the fever disappears; appetite and gaiety return; and after a variable length of time, the child enters into full convalescence.

The hoarseness of the voice very generally continues for several days after all the other symptoms have lost their dangerous character, and sometimes lasts for weeks. In one case, the voice was still weak and hoarse on the tenth day, and in another during the seventh week. (See a paper on croup, by the author. *Am. Jour. Med. Sci.*, April, 1847.)

Duration.—Death has been known to occur on the first, second, and third days, but such cases are rare. The duration of the disease may be stated at from three to thirteen days, as its most common term. The cases seen by myself, lasted from five to fourteen days.

Diagnosis.—The diagnosis of the disease, when it follows pseudo-membranous angina, presents no difficulty whatever. When, on the contrary, it commences in the larynx, as we have seen that it often does, especially in sporadic cases, it may be confounded with stridulous laryngitis or sporadic croup, and with simple laryngitis. The mode of distinguishing between them will be described under the head of the two last-mentioned affections.

Prognosis.—Pseudo-membranous laryngitis is a very fatal disease. Rilliet and Barthez state that its common termination is in death. M. Valleix says that “to speak in general terms, it is fatal when not treated energetically.” Guersent (*Loc. cit.* p. 365), after a careful consideration of the statements of different authors, says: “In fact, true croup is one of the most dangerous of all diseases, and is generally fatal.” He adds that he has seen at least a hundred cases of spasmodic croup, without a single death, while of ten children attacked with true croup, it is scarcely possible to save two. The degree of mortality is very strikingly different in different epidemics. Thus of sixty cases observed by M. Ferrand in the villages about La Chapelle Véronge, not a single one escaped. Other writers speak of having cured three or four in forty, and others nearly all. Dr. Bard, of New York, says, that of sixteen cases, seven died. Of the 12 cases that I have seen, 6 died. Of the 12, 3 commenced with violent pseudo-membranous angina, of which 2 died. The remaining 9 began in the larynx, and of these 4 died, and 5 recovered. From personal experience I would conclude that the sporadic are less dangerous

than epidemic cases, though the mortality is frightful even in those.

The danger is great in proportion as the child is younger and more feeble, in proportion to the rapidity of the case, and to the degree of the dyspnœa or orthopnœa. The most unfavourable symptoms are: loud stridulous sound heard both in the inspiration and expiration; laborious and prolonged expiration; whispering voice or complete aphonia; congestion of the face and neck; somnolence; weak, rapid, and irregular pulse; cold extremities; and cold clammy perspirations. The favourable symptoms are: expectoration of false membrane; diminution of the stridulous respiration; the change from whispering to hoarseness or clearness of the voice; looseness of the cough; moderation of the fever; improvement of the temper and moral state; and amelioration of the general condition.

The case should not be abandoned as hopeless until life is actually extinct. I myself saw a child recover after momentary suspension of animation, by asphyxia, on two occasions, and though these attacks were followed by a dreadful illness of two days. (See paper by the author. *Loc. cit.*)

Treatment.—I am desirous, at the beginning of my remarks upon the treatment of the disease, to express the opinion, that none is *likely* to succeed, unless it be applied early in the case, and by this I mean, in the course of the first, or at the latest, second day. And not only should it be commenced early, but the most powerful remedies ought to be applied at this period, in their full force. The very moment there is good reason to suppose that a case will prove to be one of this disease, the most energetic means ought to be brought to bear upon it, and if this be done from the first, or even second day, I cannot but hope that a considerably larger proportion of recoveries may take place, than has heretofore been thought possible. Of seven cases that were treated in the manner I shall recommend, from an early period in the attack, five recovered. Of five cases not so treated, only one recovered. Of the latter cases, I saw three in consultation, late in the attacks, and the other two several years since,

before I fully understood the importance of early and energetic treatment.

In the study of the treatment, it will be necessary to rely chiefly upon the works which have been published since the distinction between the two forms of croup has been correctly drawn, for it is impossible to place much dependence on the assertions of previous writers, inasmuch as their opinions as to the effects of treatment have been formed from indiscriminate experience in two very opposite maladies. It is only necessary to recollect the enormous difference in the mortality of the two affections, to be convinced that the success of such or such a plan in the one, is no fair argument for its probable success in the other. Thus M. Guersent has seen a hundred cases of spasmodic laryngitis, without a single death; while he believes that of ten cases of pseudo-membranous disease, scarcely two can be saved. I have a record of thirty-one cases of spasmodic croup, and have seen a considerable number of cases besides, of which I have no notes, without a single death; whilst of twelve cases of true croup that I have met with, six proved fatal. The most important objects to be held in view in the treatment are, it seems to us: to prevent, if this be at all possible, the formation of false membrane; after its production, to cause its dissolution, or render it less adherent; to provoke its expectoration; to prevent its reproduction after it is once expelled; to subdue the inflammatory diathesis which exists; and to allay the painful symptoms.

Bloodletting.—Many authors award to bloodletting the first place in importance amongst the remedial means in our possession, and it seems to be regarded by many in this country as an indispensable agent in the cure. Moreover, there are not a few who believe that, when promptly and boldly resorted to, it will seldom fail in arresting the disease. Underwood says (*Bell's Ed.*, p. 273): "Bleeding is always necessary, if the physician be called at the commencement of the disease, or stridulous noise; and if the patient be visited too late to endure this evacuation, I believe no hope can remain of his being benefited without it, unless the infant be very young; which, however, in another view, cannot but add to the danger." Dewees recommends it very highly

in fully developed cases attended with fever, and advises it to be repeated if the symptoms persist. Eberle says (*Dis. of Child.*, p. 356): "Without doubt, however, the remedy upon which our principal reliance should be placed, for the removal of the tracheal inflammation is bloodletting." Dr. Condie (*Dis. of Child.*, 2d edit., p. 305) recommends it as the most effectual remedy in arresting the disease, and says that "the practitioner, who in violent cases, neglects this important measure, and places his hopes on any other remedy, or combination of remedies, will have but little reason to flatter himself upon his success in the management of the disease." Unfortunately for us, the value of the opinions just quoted is very much diminished by the fact that the authors who emit them, have not clearly distinguished between the two varieties of the disease, so that their experience is derived in part at least from the effects of the remedy in spasmodic croup; and, as it is now well known that that disease is very readily cured in the vast majority of cases, it is easy to understand the confidence they express in the utility of any means which they may have employed.

But if we examine the works of those who have made the distinction between the two diseases, we shall find different opinions from the above, expressed, in regard to the efficacy of bloodletting.

Guersent (*Loc. cit.*, p. 373) asserts that bleeding has not the power of arresting the progress of this specific inflammation,—that the disease continues with greater or less rapidity under the influence of general and local bleedings, and almost always terminates fatally, though the detractions of blood may have been pushed to the utmost limit. Bretonneau is of opinion that it has no effect in preventing the formation of the false membrane. Valleix (*Loc. cit.*, p. 353) says: "From the examination of a large number of cases, I am convinced, with M. Bretonneau, that bleeding, whether general or local, is not a powerful curative means, and that it does not obviously arrest the progress of the disease." Rilliet and Barthez (*T. i.*, p. 262) are of opinion that bloodletting ought to be resorted to only in vigorous children; in the early part of the attack in sporadic cases; and in those in which the febrile reaction is violent, and the suffocative symptoms strongly marked; while it

ought to be abstained from in epidemic and adynamic cases ; in young, pale, and lymphatic children ; when the fever is slight ; the dyspnœa moderate ; and lastly, that it ought never to be employed in the advanced stage of the disease. Dr. Wood (*Treatise on the Pract. of Med.*, vol. i. p. 788), in his remarks on the treatment of the disease, says : " Depletion, in this variety of croup, is much less efficient than in the catarrhal." He adds that the utmost to be expected from it is, that it may moderate the severity of the inflammation, and thus probably diminish the amount of the effusion.

I proceed now to state the results of my own experience as to its effects. It was employed in two of the three cases which began as angina ; in one the child was bled once and leeches once, and recovered ; in the other, leeches were used and the case terminated fatally ; in neither of them could I perceive that the depletion exerted any positive control over the symptoms of the disease. In the third case, no bloodletting was employed, and it also proved fatal. Of the nine remaining cases, all of which commenced in the larynx, it was employed in all. Of them, two of the subjects were eighteen months old ; two, two years ; four, three years ; and one, six. All were bled from the arm, and in two, leeches were applied to the neck besides. A single venesection of four ounces was employed in seven, while in two, a venesection of about the same amount was performed three times in each. Of the nine cases five recovered and four died. The two cases bled to the largest amount (three times each), recovered. In one of these there were small patches of fibrine on each tonsil, and rejection of false membrane by coughing and vomiting.

The immediate effects of the bleeding in the second series of cases were decidedly more beneficial than in those following angina ; they were diminution of the fever and dyspnœa. In none, however, was the relief from bleeding so great as that which followed the free operation of an emetic, and be it remarked, that emetics were freely employed in all.

Emetics.—This class of remedies is recommended by all writers, and is generally acknowledged to be one of the most, if not the most important, of all the means employed. M. Valleix

(*Loc. cit.*, t. i. p. 358), has demonstrated their importance more fully than any other writer. He states that of 53 cases of the disease, tartar emetic and ipecacuanha were chiefly relied on in 31, of which 15 were cured; whilst of the 22 others in which they were parsimoniously given, not a single one recovered. He states other facts in regard to these cases which are highly interesting and important. Thus of the 31 cases treated with powerful emetics, false membrane was rejected during the efforts of vomiting in 26, and of these, 15 or nearly three-fifths recovered. In the 5 others of the 31, on the contrary, no membrane was expelled, and they all terminated fatally. Again, of the 22 cases in which emetics formed but a secondary part of the treatment, 2 rejected false membrane, and of these one recovered; while of the 20 others in which no false membrane was expelled, not one escaped.

Of the cases that I have seen, emetics formed a principal part of the treatment in one of the three which commenced as angina, in one they were used to a slight extent, and in the third not at all. The first one recovered, the others died. In none of them was there rejection of false membrane. They were used energetically and frequently repeated, in 8 of the 9 cases commencing as laryngitis, 5 of which recovered. The remaining case, in which they were used as secondary means, proved fatal. In 3 of the 8 cases, fragments of false membrane were rejected, and in a fourth, a mass of viscid yellowish fibrine. Of the 4, 3 recovered. In none of the remaining 5 was there any expulsion of false membrane, and of these, 3 died.

It seems to me that these facts are sufficient to show that emetics exert a most powerful and beneficial influence on the disease, and that they ought, therefore, to enter into the treatment as principal remedies.

The emetics generally employed in Europe and this country are tartar emetic and ipecacuanha, which are given in the usual doses to produce full vomiting. I have been in the habit of employing a substance as an emetic, which, so far as I know, was first recommended for that purpose by my father. The substance to which I refer is the alumen of the pharmacopœia. In an article published by my father in the *Med. Examiner*, (vol. i. p. 414,

1838), he says he has been "accustomed to make use of an emetic, which, so far as I can learn, is very little employed, but which, from the certainty and the speediness of its operation, ought to be more generally admitted into the list of available medicines for this particular case at least. I have been familiar with its effects for more than twenty years, and my confidence in them increases rather than diminishes by time." He adds, "I think that I have never given more than two doses without causing very full vomiting; but I have often given large quantities of antimonial wine and ipecacuanha, without succeeding in exciting the efforts of the stomach."

The alum is given in powder, in the dose of a teaspoonful, mixed in honey or syrup, to be repeated every ten or fifteen minutes until it operates. It is very seldom necessary to give a second dose, as one operates in the majority of cases very soon after being taken. I have known it to fail to produce vomiting only in two instances, both of which were fatal cases. In one the disease had gone so far before I was called, that no remedy had any effect upon the stomach. In the other, it was administered several times with full success, but lost its effect at last, as had happened also in regard to antimony and ipecacuanha. The reasons for which I prefer alum to antimony, or ipecacuanha, are the following: antimony, when resorted to as frequently in the disease as I am of opinion that emetics ought to be, is too violent in its action; it prostrates many children to a dangerous degree, and is, I fear, in some cases, itself one cause of death. It acts injuriously upon the gastro-intestinal mucous membrane, when used in large quantities, and for any length of time. Again, it is very apt to lose its effect, and to fail to produce sickness. Ipecacuanha is a much safer remedy than tartar emetic, but its operation is often too mild, and it also ceases to produce any effect after it has been used several times. The advantages of the alum are that it is certain and rapid in its action, and that it operates without producing exhaustion or prostration beyond that which always follows the mere act of vomiting. It does not tend like antimony, and in a less degree ipecacuanha, to produce adynamia of the nervous system; an effect which, in some constitutions or states

of the constitution, or when it has been exhibited frequently, is often attended with injurious or even dangerous consequences. I have given alum in the dose above mentioned, twice and three times a day, for two and three days, without observing any bad effects to result from it. The alum was given in all the cases that I have seen, in which emetics were used, and was the only one employed when it was found to produce full vomiting, with a single exception,—one of the cases accompanied by violent angina,—in which ipecacuanha was substituted because of its smaller bulk. I have already said that it failed to produce vomiting only in two instances. It was the emetic employed in the three cases in which fragments of false membrane were rejected, and in that in which the yellow viscid fibrine was expelled. Although it did not occasion the rejection of membrane in the other cases, it operated most speedily and efficiently.

Sulphate of copper has been highly recommended by several writers for its emetic operation, and by some German physicians, as exerting a specific influence upon the disease, in addition to its emetic effect. As an emetic it may be given to a child two or three years old, in the dose of from half a grain to a grain every fifteen minutes, until it operates. To obtain its specific action it is continued afterwards in doses of a quarter of a grain every two hours.

There is another remedy which has been proposed as an emetic by Dr. Hubbard, of Hallowell, Maine. This is the turpeth mineral, the subsulphate or yellow sulphate of mercury, the hydrarg. sulphas. flavus of our Pharmacopœia. Dr. H. recommends it on the grounds of promptness and certainty, of never producing catharsis, and lastly of not being followed by prostration like that occasioned by tartar emetic. The dose is two or three grains for a child two years old, to be repeated in ten or fifteen minutes, until it operates. He says that if the first dose fails, the second usually acts as soon as it reaches the stomach. I have made trial of this remedy in two cases. The first was one in which alum and tartar emetic had lost their power from frequent repetitions. The orthopnœa was intense, and as I believed that the only chance of escape for the child was the operation of

an emetic, I proposed the subsulphate. The age of the child was three years. Three grains diffused in syrup were administered, which operated powerfully within a few minutes, and when I saw the patient one hour after, the distressing symptoms were considerably ameliorated. The improvement did not last, however; the child died in a state of exhaustion very soon after. The other case was that of a boy nine years of age, in whom the alum had operated fully, but as it failed to dislodge the membrane, and his situation was desperate if not relieved, I made trial of the turpeth mineral. Six grains were given in two doses, at fifteen minutes interval, but they produced no effect whatever. The case terminated fatally, and the whole larynx and trachea were found filled with a thick membrane.

I conclude these protracted remarks upon emetics with the statement, that from what I have read, and from personal experience, I am induced to regard this class of remedies as the most important that we have to oppose to this fearful malady. The emetic, whichever it may be, ought to be given at least once, generally twice, and sometimes three times in the twenty-four hours; the period and frequency of their administration to be determined by the stage and urgency of the symptoms, and the constitution and present strength of the patient.

Calomel.—Dr. Samuel Bard states that Dr. Douglas of Boston, who published in the year 1736 an account of the angina suffocativa, was the first to recommend the employment of mercury in the disease. Bard says that he was induced to try mercurials after reading Dr. Douglas's little essay, and adds, "the more freely I have used them, the better effects I have seen from them." He gave calomel in the quantity of thirty or forty grains in five or six days, to children three or four years old; "not only without any ill effects, but to the manifest advantage of my patient; relieving the difficulty of breathing, and promoting the casting off the slough beyond any other medicine." He recommends that the first one or two doses be combined with an opiate. He considers mercury as the basis of the cure.

Since it has been so highly recommended by American practitioners, mercury has been extensively employed and relied on by

European physicians. Bretonneau gave it in large doses, and Rilliet and Barthez recommend it in the same way. Valleix, on the contrary, doubts whether there are any cases of true croup on record, cured by calomel alone.

Calomel was freely used in 8 of the 12 cases observed by myself. Of the 8 cases, 5 recovered, and 3 died. Of the 4 cases in which it was not used, 3 died. The largest quantity exhibited in any one case, was between forty and fifty grains; the smallest, eight. It ought to be observed, however, that it was given in very large doses in the three fatal cases; in one between forty and fifty, in another forty, and in the third between twenty and thirty grains. In the successful cases, the quantities given were forty, twenty-two, twenty, sixteen, and eight grains.

It is proposed by some to give it in very large and frequently repeated doses. I would recommend it in most cases in the quantity of two grains every second hour, to children over two years of age. If the symptoms were very violent, and the danger imminent, I would give three or four grains every hour, for three or four hours, and then administer an emetic of alum. If the child is very restless, and if the calomel purges, it would be proper to combine a small quantity of Dover's powders with each dose.

The administration of calomel in large doses, has not been followed by bad consequences in any case in which I have used it. Nevertheless, it has been known to produce gangrene of the mouth, and necrosis of the maxillary bones, and the practitioner cannot be too careful to suspend it as soon as may be consistent with safety. I would never administer it in this way without first informing the parents of the possible danger to which it exposes the child, and asking their consent to its employment.

In addition to the remedies already mentioned, there are some which are supported by high authority at home or abroad. Amongst them are the sulphuret of potassium, polygala seneka, and different alkaline preparations, especially the carbonate of potash. There is much difference of opinion amongst French writers as to the merits of the sulphuret of potassium, some praising it highly, while others deny it all efficacy. I have never used it, and can therefore have no personal opinion in regard to its

utility. As to the carbonate of potash and seneka, they may be useful as adjuvants, but I am clearly of opinion that they should never take the place of emetics and mercurials; for, as time, above all things, is precious in this disease, I would never use feeble remedies, to the exclusion of those which are generally acknowledged to be more powerful.

Revulsives often prove useful in allaying restlessness and moderating the violence of the suffocative attacks. Sinapisms and mustard poultices applied upon various parts of the cutaneous surface, and mustard pediluvia, are amongst the best. The warm bath is often highly beneficial in the same way. Blisters are sometimes used, but flying sinapisms are preferable.

Antispasmodics are recommended, and are doubtless useful in some cases. The best in the world is, we think, the operation of an emetic; and after this some preparation of opium.

Hygienic Treatment.—The child ought to be warmly clothed and confined to bed. The diet should consist only of the mildest fluids during the violence of the attack. If the patient becomes weak and feeble, milk, pure or mixed with water, may be allowed; or light broths may be given. Towards the termination of favourable cases, the diet must be improved slowly and cautiously. If great prostration occurs, the powers of the constitution must be supported by stimulants and tonics, as wine whey, milk punch, and quinine.

Summary of the treatment.—My own conclusions in regard to the treatment are: that bloodletting is a valuable remedy, when resorted to in proper cases, and at the proper moment. In the form which begins as angina, and which is generally epidemic, it ought to be used with more caution than in that which commences as laryngitis. In the latter form, which is usually sporadic, it ought to be used more freely, especially in vigorous and hearty children. In children over two years of age, I would take from three to four ounces of blood from the arm, once, twice, or three times in two days, according to the strength of the child, and the degree and obstinacy of the fever. In both forms of the disease, emetics, and I would recommend the alum in preference to any other, should be given once at least, very often twice, and in violent cases, three times in the twenty-four hours, so as to

produce vomiting attended with a good deal of effort. At the same time, I would give, as a general rule, two grains of calomel with a quarter or half a grain of Dover's powder, every two hours, taking care not to give a dose for an hour before, nor after the time selected for the exhibition of the emetic. In cases in which there is loud stridulous respiration, heard both in the inspiration and expiration, in which previous treatment has had no effect, and in which there is threatening of speedy death, I would give four grains of calomel every hour, until three or four doses have been taken, and direct the exhibition of an alum emetic, after the last dose.

Seven of the twelve cases so often referred to were fairly treated by the mixed method just described. One I saw with Dr. Rutter of this city, two with my father, and four I attended myself. Of the 7, 2 died, and 5 recovered.

Tracheotomy.—The operation of tracheotomy has been seldom resorted to in this country, and is, I believe, held in slight favour amongst us. Nevertheless, it is recommended as useful and expedient by many of the most accomplished French physicians and surgeons, and is frequently resorted to as offering an additional chance for life. M. Valleix, (*Loc. cit.*, t. i.,) expresses himself strongly in its favour, in very violent cases of the disease. He states that the success of the operation has, thus far, been as great as that of any treatment devised. He founds this assertion on the results furnished by 54 cases of unquestionable pseudo-membranous croup, great care being taken to select only the cases in which the diagnosis was positive. Of the 54 cases, only 17, or about a third, recovered, and this he states as precisely the result, according to himself and M. Bricheteau, of the operation. But, as he remarks, the operation was performed in the great majority of the cases under the most unfavourable circumstances, and not till after all other treatment had been vainly tried, and the severity of the symptoms and commencing asphyxia, announced impending death. For these reasons he is of opinion, that a single cure under such circumstances, is of more weight than several obtained in cases where all the resources of the art has been applied from the commencement.

For further information upon this subject, and for the method of performing the operation, I would refer the reader to the article on tracheotomy by M. Valleix (*Guide du Med. Prat.* t. i. p. 386); to the one by M. Trousseau, in the first volume of the work of MM. Rilliet and Barthez; and to that by the same author in the *Dictionnaire de Médecine* (t. ix. p. 381).

ARTICLE III.

SPASMODIC LARYNGITIS.

Definition ; synonymes ; frequency.—Spasmodic laryngitis is a superficial inflammation of the mucous membrane of the larynx, accompanied by spasmodic contraction of that organ, occasioning violent attacks of threatened suffocation.

It is the disease commonly called in this country croup, or by those who make the distinction between it and pseudo-membranous laryngitis or true croup, spasmodic croup. I prefer the term spasmodic laryngitis, used by Rilliet and Barthez, because it is expressive of the essential characters of the disease. It is the stridulous laryngitis of Guersent and Valleix; the stridulous angina of Bretonneau; the acute asthma of infancy of Millar; and the spasmodic croup of Wichmann, Michaelis, and Double. It is not the laryngismus stridulus described by the English authors, Kerr, Ley, and Marsh, which is the same as the thymic, or Kopp's asthma of the Germans, and spasm of the glottis of the French. It is called by Dr. Wood, in his recent work on practice of medicine, catarrhal croup.

Spasmodic laryngitis is one of the most frequent of the diseases which occur during childhood in this country. It is so common in this city, that almost all mothers who have had any experience in sickness, keep some remedy for it in their houses, which they are in the habit of resorting to upon their own judgment. I met with fifteen cases of the disease during the winter months of 1846-7, and in the last three years have seen thirty cases, of which I

have kept a record, besides a considerable number of which I have no written account.

Predisposing causes.—Age is a powerful predisposing cause. It is said to be most frequent between three and eight years of age. From personal observation I should suppose it to be most common between one and four years of age. Of the 30 cases referred to, 3 occurred within the year, 11 between 1 and 2 years, 7 between 2 and 3, 6 between 3 and 4, and 3 between 4 and 5 years of age. It is also said to be more frequent in boys than girls. Of the 30 cases that I have seen 18 occurred in girls, and 12 in boys.

The disease is undoubtedly a sporadic one, and is asserted by some authors to occur also in the epidemic form. It is generally believed to be hereditary in certain families, and of this I myself have no doubt. I am acquainted with one family in this city, in which the children for three generations were extremely liable to it; with another in which the grandmother and grandchildren were frequently attacked; and with a third, in which the father and children showed the same predisposition in the most marked manner. The idea is, moreover, entertained by many people in this community.

The state of health of the child does not seem to have much influence in the production of the disease; I have seen it occur indifferently in the weak and strong. It is most common during cold weather.

Exciting causes.—By far the most frequent exciting cause is the action of cold; either the passage from a warm into a cold atmosphere, or prolonged exposure to cold. I was assured on one occasion, by a very intelligent lady, that her little daughter had, at the age of two years, a well-marked attack of croup, after a severe and long-continued fit of crying from some contrariety.

Anatomical lesions.—M. Valleix (*Guide du Med. Prat.* t. i. p. 290) says that the accounts of the anatomical lesions are very vague, and that these are generally stated to be very slight. A little mucus, and slight redness have been observed in some cases, but authors have usually been satisfied with stating the larynx to be free from any alteration. Dr. Wood (*Treat. on the Practice of Medicine*, vol. i. p. 779) says: "In some rare instances, no signs

of disease are discovered in the mucous membrane, and the patient has probably died of spasm, consequent upon high vascular irritation or congestion, the marks of which disappear with life." I am unable to describe the lesions found after death from personal knowledge. It appears to me, however, from the study of the disease, that it must depend on slight inflammation of the laryngeal mucous membrane, for how else can we account for the fever which so often accompanies it, the hoarseness of the voice and cry, which often remains for some time after the total disappearance of the paroxysm, and the loose catarrhal cough which very generally follows the attack?

Symptoms; duration.—The invasion of spasmodic croup is generally very sudden, for though it is often, perhaps in the majority of cases, preceded for a few hours or a day or two by slight coryza, hoarseness and cough, these symptoms are seldom noticed at the time, and the child is not supposed to be sick until it is seized with the attack of suffocation, which is pathognomonic of the disease. This attack occurs in much the larger number of cases during the night, and very generally wakes the child from sleep. Of the 30 cases observed by myself, it occurred in the night in all. The period of the night at which it takes place is very irregular; of 19 cases in which the time was noted, it was before midnight in 11, and after midnight in 8; which agrees very closely with the statement of Rilliet and Barthez, that it has been observed most frequently at 11 in the evening. The duration of the attacks varies considerably, and depends a good deal upon the treatment employed. They may last from a few minutes to several hours; but seldom less than half an hour or an hour. The number of the attacks also varies. In some cases there is but one, though very generally there are several. When the attack occurs early in the night, it is very apt to recur again towards morning, and, unless means of prevention are used, on the following night also, and even, though this happens much more rarely, on the third night. As a general rule, the first attack is the most severe.

When the paroxysm comes on, the child is wakened from sleep by the sudden occurrence of symptoms apparently of the

most alarming and dangerous character. These consist of loud, sonorous, and barking cough; of prolonged and laboured inspirations, accompanied by a shrill and piercing sound, to which the term stridulous is applied; of rapid and irregular respiration, amounting often to violent dyspnœa, or seemingly impending suffocation: the child, alarmed and terrified at its condition, and at the fright of those around, its countenance expressive of the utmost anxiety, cries violently between the attacks of coughing, and begs to be taken on the lap, or sits up or tosses itself upon the bed, struggling apparently with the disease, which seems for the moment to threaten its very existence. The voice and cry are hoarse, and sometimes almost extinguished during the height of the paroxysms, but become distinctly audible, and often nearly natural, in the intervals between them; differing in this respect from pseudo-membranous croup, in which they remain permanently hoarse or whispering. I have never heard, in this disease, the whispering voice and the short smothered cough of true croup. The face, head, and neck, are at first deeply flushed, and as the paroxysm becomes more violent, assume a dark livid tint, which afterwards passes into a deadly paleness, if the attack be long continued. These changes in the coloration depend upon the arrest of the respiratory function and consequent partial asphyxia. The pulse is frequent during the paroxysm, and the skin heated. After a longer or shorter period, generally from half an hour to an hour, the respiration becomes more tranquil; the stridulous sound disappears entirely, unless the child be disturbed and made to cry, when it again becomes distinct; the cough is less frequent and less boisterous, and the child generally falls asleep. The attack is very apt to recur towards morning, as has been stated, and if not then, the following night. The patient often seems perfectly well the day after the first paroxysm, with the exception, perhaps, of slight cough. This is no reason, however, for supposing that the disease will not return in the course of the second night, which is almost sure to happen, unless measures be taken to prevent it. The cough generally continues for a day or two, but soon loses the peculiar character expressed by the term croupal; it becomes less frequent and more loose, and the child is com-

monly well again in two or three days. Sometimes, however, the cough lasts for several days, becoming gradually less frequent, until at last it ceases entirely.

There is very little fever in moderate cases, for though the pulse is accelerated, and the skin warm during the paroxysm, these symptoms disappear very soon after that is over. In severe cases, on the contrary, there is usually considerable fever, the pulse being frequent and full, and the skin hot. The febrile movement is most apt to occur after the first paroxysm, as a consequence, apparently, of the slight catarrh which remains after the attack.

In the few fatal cases on record, the paroxysms have generally become more frequent and more violent by degrees, and death has occurred from suffocation. In other instances, death has been the result of prostration, which has probably depended on imperfect hæmatisis.

Recurrences of the disease are very common, children sometimes having several attacks in a single winter. This is not the case in true croup. I have never known a child to have a second attack of that disease.

The *duration* is exceedingly variable. Sometimes there is a single attack during the night, and the child seems well afterwards, with the exception of slight cough, lasting two or three days. More generally, there is a return in the course of the second night, or, much less frequently, the third, after which the proper croupal symptoms disappear entirely, though the child may continue to cough for several days longer. The cough usually becomes loose and catarrhal after the last paroxysm, though in some few instances, I have known it to retain its hard, barking sound, and to be accompanied by slight hoarseness for eight or ten days. The average duration may be stated at from one to three days.

Nature of the disease.—Authors hold very different opinions as to the nature of spasmodic laryngitis. We have already seen that it is confounded by Underwood, Dewees, and Eberle with the pseudo-membranous form of laryngitis. Dr. Cheyne (*Cyclop. Prat. Med. Art. Croup*), treats of the two affections as one and the same disease, differing only in their degree of violence. Dr. Copland (*Dict. of Prac. Med. Art. Croup*), describes spasmodic croup as a variety

or modification of true or membranous croup. He supposes that the modifications of true croup are attributable to "the particular part of the air-passages chiefly affected, to the temperament and habit of body of the patient, and the intensity of the causes." It seems to me, however, that these views as to the nature of the two diseases can scarcely be correct, and I am induced by personal observation to regard them as distinct affections, which may, in the great majority of cases, be distinguished from each other at a very early stage, by a careful observer. The comparative fatality of the two diseases alone is sufficient to establish a wide difference between them. Thus, of twelve cases of the pseudo-membranous form that I have seen, six died; while of thirty cases of the spasmodic form of which I have kept a record, and a considerable number of which I have no notes, not one was fatal. M. Guersent states that of ten cases of the former disease, scarcely two escape; while of upwards of a hundred of the latter that he has seen, not a single one was fatal. (*Dict. de Med.* t. ix. p. 365.) The different effects of treatment in the two affections again, points out a wide difference in nature. While true croup is almost inevitably fatal, unless it is attacked at a very early period by the most energetic remedies, by bloodletting, calomel, and emetics, the spasmodic form seldom resists the exhibition of an emetic, a warm bath, nauseating doses of ipecacuanha or antimony, or, in the severest cases, a small detraction of blood by leeches. When we add to these circumstances, the differences in the mode of invasion; in the cough, voice, and cry; the fever; the duration; the state of the constitution; all of which will be carefully described in the article on diagnosis: it seems to me very difficult to resist the conclusion that they are two distinct disorders, and not, as has been generally supposed by English writers, degrees or modifications of the same.

As to the precise nature of spasmodic laryngitis, I have been led to adopt the opinion that it depends on slight inflammation of the mucous membrane of the larynx, attended with violent spasmodic action of that organ. The spasm of the larynx appears to be the result of disordered action of the excito-motory innervation of the part, the irritant which is productive of the morbid

innervation being, in all probability, the slight inflammation of the laryngeal mucous membrane, which has been already stated to constitute one element of the malady. The nervous element predominates in the early part of the attack, but towards the conclusion, the spasmodic symptoms disappear entirely, and we have left only those which depend on the laryngeal inflammation.

Diagnosis.—Unquestionably the disease with which spasmodic laryngitis is most likely to be confounded is pseudo-membranous laryngitis, true, or inflammatory croup. The only certain means of distinguishing them are the presence of pseudo-membranous exudation in the fauces, or the rejection of false membrane from the larynx in the latter affection. But, though these are the only positive single signs, the two diseases may be distinguished with very great certainty by a comparison of the different symptoms as they arise. The most important are: the invasion, in one sudden and almost invariably in the evening or night, in the other, slow and creeping, the paroxysm occurring indifferently day or night; the cough, in one hoarse and boisterous, in the other hoarse and frequent at first, but rare and smothered towards the end; the voice, in one hoarse, but never scarcely whispering, and if so, only during the height, in the other hoarse at first, and soon permanently whispering or entirely lost; the cry, in one hoarse and stridulous only at the moment of the paroxysm, in the other permanently so; the respiration, in one stridulous and difficult only during the paroxysm, and in the interval perfectly natural, in the other, at first natural, becoming by degrees permanently stridulous, and attended by the most violent dyspnœa and orthopnœa, with remarkable prolongation of the expiration; the fever, in one very slight and generally observed only during the nocturnal paroxysm, in the other much more considerable and permanent; and, lastly, the duration, in one seldom more than two or three days, in the other rarely less than six, and very often eight or ten days. M. Trousseau states that the *hoarse, sounding, croupal* cough, is not a sign of the presence of exudation in the larynx, but rather of its absence; but, on the contrary, “when the cough, croupal at first, becomes less and less frequent, and ends with being nearly insonorous with suffocation, there is true croup, that is to say with

plastic exudation in the larynx.” This is precisely my own experience. The rare, insonorous cough of M. Trousseau, is the condition which I have expressed by the term smothered.

In order to render the diagnosis still clearer, I add the following table, which is altered from one given by Rilliet and Barthez.

SPASMODIC LARYNGITIS.

Begins with coryza, and hoarse cough, or more frequently by a sudden attack of suffocation in the night. Fauces natural, or merely slight redness, as in simple angina,

After the paroxysm, the child seems well; the fever disappears, or is very slight. Voice natural or only slightly hoarse; not whispering.

If the paroxysm returns, it is during the following night, and it is less severe; the hoarseness disappears; the cough becomes loose and catarrhal.

Duration seldom more than three days.

Very rarely fatal.

It may be confounded also with laryngismus stridulus, and with simple laryngitis. The signs by which it is to be distinguished, will be stated in the articles on those diseases.

Prognosis.—Spasmodic laryngitis is very rarely a fatal disease. It has already been stated that of 30 cases of which I have a record, and of a considerable number of which I have no notes, not one died; while M. Guersent makes a similar statement in regard to upwards of a hundred cases. That it does sometimes terminate fatally, however, there can be no doubt. This is the opinion Rilliet and Barthez have arrived at, after careful study of the subject. These authors quote in proof of it, amongst others, two cases from the work of Jurine, in one of which an autopsy was made,

PSEUDO-MEMBRANOUS LARYNGITIS.

In epidemic form, begins as pseudo-membranous angina. In sporadic form, invasion of slight hoarseness for a day or two. There is fever, increase of the hoarseness, with hoarse, croupal cough; in half the cases, pharyngeal exudation, and a little later paroxysms of suffocation.

The fever continues; stridulous respiration; prolonged and difficult expiration; cough hoarse and smothered; voice hoarse and whispering.

The dyspnoea and suffocation increase; the voice and cough are smothered or extinguished; stridulous respiration persists.

Duration seldom less than five or six. The hoarseness continues for several weeks.

Fatal in the majority of the cases.

and no false membrane discovered. Copland (*Loc. cit.*) remarks that in the few cases of the more purely spasmodic forms that he has had an opportunity of examining, an adhesive glairy fluid, with patches of vascularity on the epiglottis and larynx, and a similar fluid in the large bronchi, were the only alterations observed.

The favourable symptoms in the disease are: diminished violence of the paroxysms; clear and natural, or merely hoarse voice; loose, catarrhal cough; disappearance of the fever; and absence of disposition to returns of the disease, or its return in a milder form each time. Unfavourable symptoms are: obstinate continuance of the paroxysm in spite of the usual remedies; returns of the paroxysm after the third night, especially if their violence increase rather than diminish; severe nausea or vomiting; feeble, soft pulse; and weakness of the voice, with other signs of exhaustion, even though the paroxysm may have ceased.

Treatment.—Guersent (*Loc. cit.* p. 367-368) states that demulcent and mucilaginous drinks, with stimulating manuluvia and pediluvia are the principal means that ought to be employed in the treatment of spasmodic laryngitis, or pseudo-croup. He proscribes the use of emetics and leeches as unnecessary in most cases, and is of opinion that they have come into general use in the management of the disease, in consequence of its having been generally confounded with true croup. In a paper on croup by my father, Dr. Charles D. Meigs, (*Med. Exam.*, vol. i. p. 398,) may be found the following statement in regard to the spasmodic variety: "The croup sound often ceases entirely, and never returns, after the exhibition of a small quantity of ipecacuanha, or any other emetic substance, even when no emesis is produced." He says in another place that, "a foot bath with mustard, and an emetic of ipecacuanha, is in general all that is necessary for the cure."

My own experience in regard to the treatment is contained in the following remarks.

Emetics.—The great majority of cases will recover perfectly well under the use of emetics alone, or in combination with warm baths and revulsives. In cases attended with violent dyspnœa, hoarse cough, and loud stridulous respiration, the emetic should be

given until it produces a full effect. In milder cases, in which there is merely loud croupal cough, with an occasional stridulous sound, nauseating doses alone will generally suffice. Of the 30 cases observed by myself, this was the only treatment employed in 29, with the exception of some mild revulsive to the neck, a mustard pediluvium, and occasionally a warm bath.

The most suitable emetic is, as a general rule, ipecacuanha. The best preparation for children is the syrup, of which from twenty to thirty drops may be given to those two years of age, to be repeated every ten or twenty minutes until vomiting is produced, or until the paroxysm is relieved. In very violent cases, the Syrupus Scillæ Compositus, which is more active in its effects in consequence of the tartar emetic which it contains, might be preferable; about twenty drops of this may be given, and repeated every ten or fifteen minutes, until vomiting or the resolution of the paroxysm is obtained; but, in its employment, care should always be observed not to continue it for too long a time, lest it produce the injurious effects of tartar emetic. When the dyspnœa is very urgent, or when other means fail to produce emesis, I have found nothing so effectual as the powdered alum, in doses of a teaspoonful mixed with honey or molasses. (See *treatment of pseudo-membranous laryngitis*.)

A simple and good method of treating the paroxysm is that recommended by my father, in the paper referred to. It is to direct a small teaspoonful of powdered ipecacuanha to be diffused in a wineglassful of water, and given in doses of a teaspoonful of the mixture every ten, fifteen, or twenty minutes, according to the urgency of the symptoms. This is a plan of treatment often resorted to by parents in this community, where the disease is so common, and so well understood, that there are few mothers who have several children, and who have had some little experience, who do not know how to treat a nocturnal attack of spasmodic laryngitis.

After the paroxysm is relieved, it is a good plan to direct five or ten drops of the ipecacuanha syrup to be given every two or three hours during the following day; or, if the child seem perfectly well in the morning, we may begin with these doses in the

middle of the day, and continue them until bed-time. By this method, the recurrence of the paroxysm during the second night may, I think, often be prevented, and the cough is rendered free and loose much sooner than when the disorder is left to pursue its natural course.

Baths.—The warm bath is a very prompt and useful remedy in the disease. In all very violent cases, it ought to be resorted to immediately. It should be used also whenever the emetic fails to relieve the urgency of the symptoms, and in cases attended with much disturbance of the circulation. The temperature of the water ought to be about 96° of Fahrenheit, when the child is first immersed, to be raised gradually by the addition of hot water, to 100° or 102°. The child may remain in the bath from ten to twenty minutes.

Bloodletting.—Depletion can rarely be necessary in spasmodic croup. The only cases which would call for it are those in which the symptoms tend to assume the features of the grave form of simple laryngitis, or of pseudo-membranous croup. Under such circumstances the method of treatment would be the same as that proper for those affections, to the descriptions of which the reader is referred for further information.

In one case only of the 30 that came under my observation was any form of depletion resorted to. That occurred in a girl, six months old, who was leeches in front of the larynx, because the action of an emetic and the use of the warm bath had failed to relieve the paroxysm. The child was quite well on the following day.

Revulsives.—The only revulsives that it is necessary to employ, are mustard pediluvia, or mustard poultices applied to the interscapular space; and even these are often needless if the emetic be given. Blisters, which are recommended by some of the French writers, can only be proper, it seems to me, when the symptoms resemble those of grave simple laryngitis, or of true croup.

Purgatives are required only when constipation is present, or when there is fever on the second and third days, showing a considerable amount of laryngeal inflammation. Under the latter

circumstances, some mild remedy of this class may be resorted to with a view to its evacuant effect. I have never had occasion to resort to any of the *mercurials*, and believe them to be unnecessary. *Antispasmodics* and *narcotics* are recommended by some writers. They may be useful in cases occurring in children of highly irritable and nervous temperament, but I have uniformly succeeded in obtaining a cure without them. The ones generally employed are assafœtida, musk, or opium.

Hygienic Treatment.—The child should be placed for the time in a warm room, and warmly clothed. If old enough, it ought to be kept as much as possible in bed during the paroxysm. If so young as to prefer the lap of the nurse, it should be clothed in a long loose wrapper in addition to its usual night-dress. It is very important to confine the child for one or two days after the nocturnal paroxysms to a warm room, in order to prevent, if possible, an attack on the second or third nights. The diet must be simple and of easy digestion, so long as there is any disposition to recurrence of the disease. It may consist of preparations of milk, of bread, rice, or of thin chicken or mutton water. Meat and most vegetables had better be avoided, until the convalescence is fairly established.

Prophylactic Treatment.—It is certain that much may be done by wise attention to physical education, in preventing attacks of the disease in children who have shown a liability to them. I would strongly recommend, with this view, attention to the following advice given by M. Guersent, who says (*Loc. cit.* p. 381): “It is possible to a certain extent, to prevent attacks of pseudo-croup, by fortifying the constitutions of children, by means of exposing them well clothed to a dry and elastic atmosphere, particularly if they can be kept in constant movement. But of all the precautions which have been found unquestionably advantageous, that which seems most useful is to make them sleep in well-ventilated, dry, carefully closed chambers, having a south exposure, and always without fire. I have several times been convinced of the utility of this habit in families the children of which were subject to this kind of catarrh.” Dr. Eberle says that the custom of clothing children with their necks and the upper part of the breast bare, certainly renders them liable to the disease, and men-

tions the fact that in the country, and especially among the Germans, who cover the neck and breast, croup is a very rare disease. During a practice of six years amongst that class of people, he met with only one case of the disease.

It seems extremely probable that the custom which prevails extensively in this city, of dressing children between the ages of one and four or five years, in such a manner as to expose the whole of the neck and the upper half of the thorax, (for the dresses are made so low and loose, that half the chest is uncovered), and to leave the arms bare from the shoulders, and the leg from the knee to the ankle, will account in some measure at least, for the very great frequency of the disease amongst us. I would, therefore, strongly recommend all who desire to preserve their children from the disease, to adopt the habit of dressing them with the same attention to comfort and health which they observe in regard to themselves, that is to say, to cover the body and limbs sufficiently to afford protection against our severe and fickle climate.

If the child is pale, weak and feeble, and unable to bear exposure to the outer air, it may generally be restored to much better health, by careful attention to diet, and by the steady and long-continued use of some tonic remedy. The diet ought to consist of bread and milk, and of meat and the simpler vegetables, as potatoes and rice. The tonic most generally suitable is quinine, of which a grain may be given in pill or solution, twice or three times a day, while at dinner or lunch, or both, the child should be made to drink from a dessert to a tablespoonful of port wine, mixed with water. This method ought to be steadily persevered in for from three to six weeks or longer.

ARTICLE IV.

SIMPLE LARYNGITIS.

Definition ; frequency ; forms.—This disease consists of simple erythematous inflammation of the mucous membrane of the larynx,

sometimes attended with ulceration, but unaccompanied by exudation of false membrane. The frequency of the disease, during infancy and childhood, is very considerable, so much so that not a winter passes without my meeting with a good many well-marked cases. I shall describe two forms of the disease, the *mild* and the *grave*.

Predisposing causes.—The disease occurs at all periods of childhood, but seems to be more frequent under than over five years of age. Of 48 well-marked primary cases that I have met with, 39 occurred in children under, and only 9 in those over that age. Of the former class, 10 of the children were under 1 year, 12 between 1 and 2, 9 between 2 and 3, 4 between 3 and 4, and 4 between 4 and 5. Rilliet and Barthez state, however, that grave primary cases are most apt to occur after the age of five years. The only three grave cases that I have seen, occurred between the ages of one and two years in one instance, and between five and six in the two others. Of the 48 cases, 29 occurred in boys, and 19 in girls; which agrees with the experience of the authors just mentioned. As to the influence of the seasons, it may be stated that it is by far most common in the fall, winter, and spring months.

The only *exciting* causes of the disease which appear to have been ascertained with any certainty, are the action of cold, the positive influence of which cannot be questioned; the inspiration of irritating substances, such as gases, smoke, powders floating in the air, etc.; and violent efforts of crying. Rilliet and Barthez state that they have twice known erythematous and ulcerative laryngitis to follow long-continued and violent crying; and Billard also cites this as a cause. I am acquainted with one case in which a slight attack of the disease appeared to have been brought on solely by loud and obstinate screaming; but, on the other hand, I have known many children to scream most violently for a much longer time, with colic, and yet worse with earache, without any such effect being produced.

The disease is very apt to occur in the course of other maladies, and particularly of measles, small-pox, scarlet fever, bronchitis, and pneumonia.

Anatomical lesions.—The anatomical alterations may consist of simple inflammation of the mucous membrane, with its various

effects, or of the same changes in connexion with ulceration. The latter class of lesions is almost always confined to secondary cases. In the former class, the mucous membrane varies in colour between a deep rose and violet red, which may be either uniform or only in patches. In severer cases, the tissue is at the same time softened or roughened, and sometimes thickened. When redness, softening, and thickening are present, the disease is generally confined to certain parts, and usually to the epiglottis and internal portions of the vocal cords; but when redness alone exists, it generally affects the whole of the larynx, and sometimes extends to the trachea. In cases attended with ulcerations, these alterations exist in connexion with what have already been described. The ulcerations are generally small, few in number, very superficial, linear in shape, and are almost always found upon the vocal cords. They are so slight often as to escape observation, unless a very careful examination is made; and this, perhaps, explains the circumstance of so few persons having met with them in the simple, acute disease.

Symptoms; course; duration.—The *mild form* generally begins with an alteration of the *voice or cry*. In infants the change in the cry alone exists, so that to detect the disease, it is necessary to hear the child cry. In older children the same alteration of the cry is present, but there is in addition a change of the voice, consisting of various degrees of hoarseness. These symptoms may be so slight as to be observed in the cry only when it is strong and forcible, and in the voice so as to strike only the ear of one accustomed to be with the child; or they may be so marked as to be heard in the faintest cry that is uttered, and in the voice so as to be evident in a moment to the most careless observer; or there may be complete aphonia. They are often intermittent in this form, and are generally most marked in the after part of the day and during the night. Simultaneously, or very soon after, *cough* occurs. This is generally hoarse and rough, and early in the attack, dry; at a later period it usually becomes loose, and as this occurs loses its character of hoarseness. The frequency of the cough is variable, but usually moderate; as a general rule it is most frequent in the evening, and early in the morning, parti-

cularly in infants and young children. The disease is almost always preceded and attended with some coryza, which, in the early stage, is marked by sneezing and slight incrustations about the nostrils, and at a later period, by mucous and sero-mucous discharges. The *respiration* remains natural, except that it is sometimes nasal, and sometimes a little accelerated. There is rarely any fever, or it is slight, and occurs only at night. There is no pain in the larynx. In some cases, the hoarseness of the cry, voice, or cough scarcely exists, or is but slightly marked, and the only symptoms are dry, hard, teasing, and paroxysmal cough, which, from its sound, evidently proceeds from the larynx, and resembles very much that produced by the tickling of a foreign body in the throat. This form of the complaint is very common in our city, and, as it occurs chiefly in infants and young children, is particularly troublesome at night, by keeping the child awake. It is apt to run on for two, three or four weeks, or even longer, occasioning much trouble to the parents; the attack always terminates favourably, unless it runs into the severe form.

The *grave form* may begin as such, or result from a sudden aggravation of the mild form. In either case it begins with hoarse, frequent cough, difficult respiration, restlessness, and more or less violent fever. Pain in the larynx, which often exists in adults, is rarely complained of by children, except those over six or seven years of age. As the case progresses, the symptoms either continue as they have just been described for a few days, and then gradually subside, or rapidly assume dangerous and frightful characters, similar to those of pseudo-membranous laryngitis or true croup. The respiration becomes very frequent and difficult, and, after a time, attended with the stridulous sound which accompanies obstruction of the glottis; the cough is hoarse, dry, and croupal; there is little or no expectoration; the voice grows more and more hoarse; the fever continues, but the pulse becomes rapid and small; the dyspnœa is very great, and all the symptoms indicate threatened asphyxia. If no favourable change takes place, the dyspnœa becomes suffocation; the cough is rare and short; the voice is a mere whisper, or is lost entirely; the pulse becomes small, extremely rapid, and then imperceptible; the counte-

nance, at first livid and congested, assumes a pale, cadaveric appearance; the features are contracted; the child becomes comatose or delirious, and death occurs from slow asphyxia, or sometimes in an attack of general convulsions.

In favourable cases, on the contrary, the dyspnœa, and especially the stridulous sound, diminish; the cough becomes less hoarse, loose, and loses its croupal character; expectoration of mucous sputa takes place in older children, whilst in younger, the loose gurgling sound produced by the discharge of the sputa into the fauces, is heard at the termination of each cough; the voice becomes clearer and stronger; the fever diminishes; the child regains its spirits and disposition to be amused; and soon all dangerous symptoms have disappeared, and the recovery is established.

In nearly all the cases that have come under my observation, I have found, upon examining the fauces, more or less decided inflammation of the tonsils, soft palate, and pharynx. In cases following a rather chronic course, from two to four or six weeks, which are rarely accompanied by fever or hoarseness, except at the invasion, and sometimes in the evening, the pharyngeal mucous membrane presented a roughened, thickened appearance, and the tonsils and uvula were more or less enlarged and tumefied.

The *duration* of the disease varies according to its form and the circumstances under which it occurs. The mild form, when primary, lasts from a few days to one or two weeks, and when it becomes chronic, as I have known to happen in several instances, has lasted from two to four or six weeks. The grave primary form lasts usually from seven to eight days, but sometimes runs its course in from three to five, and in one instance proved fatal in twenty-four hours. The duration of secondary cases depends, of course, upon that of the disease during which they occur.

Diagnosis.—The diagnosis of the mild form of the disease is very easy. The hoarseness of the cry, voice, and cough, the redness of the mucous membrane of the pharynx, and the absence of general symptoms, will distinguish it from any other affection. In somewhat severer cases of this form, in which the

cough is more frequent and harassing, the general symptoms more strongly marked, and the respiration somewhat hurried and oppressed, they may at first view present the appearances of bronchitis or pneumonia. The absence of the physical signs of these affections, will show at once by negative evidence, the true nature of the case.

The only real difficulty in the diagnosis is the distinction between the grave form, and pseudo-membranous laryngitis or true croup unconnected with angina; and this, it would appear from all evidence, cannot in some cases be made with absolute certainty. The only certain and undoubted sign by which to distinguish them, is the presence of false membranes in the expectoration. The existence of this symptom is proof positive of pseudo-membranous disease, but its absence is no proof that the case must be one of simple inflammation; for, even though the membrane has been exuded in large quantities within the larynx, it is not always thrown off by the effort of coughing or vomiting. To show the difficulty of the diagnosis, I will cite the case quoted by M. Valleix (*Loc. cit.* t. i. p. 211) from M. Hache, of a child supposed to be labouring under true croup, who was sent to the Children's Hospital in Paris, in order to have the operation of tracheotomy performed. The absence of false membrane in the expectoration, and a slight remainder of clearness of the voice, occasioned the suspension of the operation. The child died, and no pseudo-membrane whatever was found in the larynx. The only lesions were moderate redness of the mucous membrane, without tumefaction, and without narrowing of the glottis; so that the fatal termination must be ascribed to spasmodic constriction of the glottis, or to tumefaction of that part which had disappeared after death.

Nevertheless, though the diagnosis is difficult, it can generally be made out with considerable certainty by attention to the following points. The pseudo-membranous form of the disease is often preceded or accompanied by the presence of false membranes in the fauces, which is not the case in simple laryngitis; the symptoms of invasion of the former disease are less acute than those of the latter, the fever being less violent, and the restlessness and irritability less marked, than is usual in the simple affec-

tion, in which the general symptoms are severe from the first. The hoarseness of the voice and cough follow a different course in the two diseases; the progress of these symptoms being slow and gradual in the membranous, and much more rapid in the simple form. The fever is violent throughout the attack in the simple inflammatory disease, whilst in the other form it seldom reaches a high degree of intensity. Lastly, the presence of portions of false membrane in the expectoration, in connexion with the laryngeal symptoms, affords positive proof of the existence of true croup.

In some cases, in which there is little or no hoarseness of the voice or cough, the symptoms strongly resemble the early stage of whooping-cough. I have met with five instances, in which it was difficult not to believe for two and three weeks, that the attack was really one of that disease. In one of these the resemblance was so close, that for several days there was a distinct hoop during the fit of coughing, and vomiting at the close of the paroxysm. The grounds for deciding that the case alluded to was not pertussis were, the facts that the attack came on like laryngitis, after measles, and that the paroxysms occurred only at night. In the other cases a correct diagnosis was arrived at only by attention to the state of the fauces, which are almost always more or less inflamed and thickened in laryngitis, whilst they are not so in pertussis, and by watching the progress of the sickness.

Prognosis.—The prognosis is always favourable in the mild form of the disease. I have never known of a fatal instance. The grave form is, on the contrary, exceedingly dangerous. It is impossible, in consequence of the uncertainty of the diagnosis between it and the pseudo-membranous disease, and because of the few well-authenticated cases on record, to estimate the degree of danger with accuracy. It is, however, frequently fatal. Great imminence of danger is shown by high intensity of the stridulous sound, especially as heard in the expiration; by great severity of the dyspnoea or suffocation; by lividity or extreme paleness of the face; by smallness and rapidity of the pulse; by coldness of the extremities; and by delirium or convulsions.

The three cases of the grave form that came under my notice recovered.

Treatment.—The treatment of the mild form ought to be very simple. Seclusion in a warm room, careful management of the clothing, slight reduction of the diet if there be any fever whatever, a pediluvium at night of simple water, or of water containing a little mustard, the application of some slightly stimulating liniment to the front of the neck and throat twice a day, and the occasional internal administration of some gentle expectorant and anodyne dose, constitute all that is necessary in the great majority of cases of this kind. The best internal remedies are a few drops of syrup of ipecacuanha with paregoric, laudanum, or solution of morphia, given every evening as the child is put to bed, or occasionally through the day also, if the cough is troublesome. A combination of syrup of seneka with that of ipecacuanha, will often be found very serviceable.

In the more chronic and tedious cases, the use of carbonate of potash or alum, as recommended in the article on whooping-cough, has succeeded in my hands, after expectorants and anodynes had entirely failed. In two cases in which all these remedies had failed to do good, I succeeded by touching the fauces at first twice, and afterwards once a day, with a solution of nitrate of silver of from five to ten grains to the ounce. The pencil should be pushed low into the pharynx, in order to apply the wash as near as possible to the margin of the glottis. The only treatment used in connexion with this, was the administration of a small dose of anodyne at night, and careful regulation of the hygiene of the patient.

The grave form of simple laryngitis demands, on account of the rapidity of its progress, and its dangerous character, a prompt and active treatment. The antiphlogistic system ought to be resorted to from the first, in its full force. The remedies most to be depended on are bloodletting, calomel, and emetics.

Bloodletting is recommended by all writers. It should always be resorted to unless contra-indicated by great feebleness of constitution, either congenital or acquired as the result of previous sickness. Venesection is preferable to leeching whenever it can be performed. The quantity of blood to be drawn must depend

of course on the age and strength of the child. From four to six ounces may be taken from a hearty child of four years of age. If no visible impression be made upon the disease in six or twelve hours, as much more ought to be drawn either by a repetition of the venesection, or by leeching the throat. Should the symptoms not yield at all in the course of twelve or thirty-six hours after the second detraction of blood, I would not hesitate, did the pulse continue full and strong, and the child not appear very much exhausted, to abstract three or four more ounces.

Depletion was employed in the three cases seen by myself. In one, the subject of which was a girl between five and six years of age, the dyspnœa and stridulous respiration, with hoarseness of the voice and cough, continued for thirty-six hours, and were not relieved until the child had been twice bled from the arm to the amount of four ounces each time, and once leeches over the larynx. This case presented in fact, most of the features of true croup. In another, in a girl of the same age, venesection to four ounces was employed after the symptoms had refused to yield to full vomiting by hive syrup. The third case was that of a boy between one and two years old, who was bled to three ounces.

Calomel ought to be resorted to as soon as the real nature of the attack is ascertained. Its powerful sedative action upon the circulatory and nervous systems, and its specific influence upon local inflammations attended with increased proportion of the fibrinous element of the blood, as well as experience, indicate the propriety of its employment in this disease. A large dose, about four or five grains, may be given at first, in order to procure its purgative action, after which smaller doses, from half a grain to two grains every two hours, should be administered with a view of obtaining the aplastic influence of the remedy upon the blood. The last-named doses ought to be continued for one, two, or three days, or until the violence of the attack is evidently abating. When found to operate too much upon the bowels, a small quantity of opium must be combined with it to prevent that effect.

Emetics are of great importance in the treatment, though less so perhaps than in true croup, in which it is essential to cause the rejection of the false membrane which obstructs the larynx. Yet

they are exceedingly useful, and sometimes indispensable, in assisting to expel the viscid mucus secreted within the larynx, and in relaxing, for a time at least, the spasmodic constriction of the glottis, which plays an important part in the production of the distressing dyspnœa and suffocation of the disease. They act probably also by lessening immediately, or through their influence on the circulatory and nervous systems, the inflammation of the larynx. They should be used once or twice, or oftener in the day, according to the degree of dyspnœa, and the effects they produce. For their choice and mode of administration, the reader is referred to the article on true croup.

Purgatives are required merely to keep the bowels soluble; they should be repeated as may be necessary throughout the disease. The most suitable are castor oil, rhubarb, magnesia, or small doses of the powder of jalap combined with calomel.

Expectorants are useful after the violence of the disease has been moderated by more energetic remedies. They may consist of small doses of ipecacuanha, of antimonial wine and sweet spirits of nitre, fractional doses of tartar emetic, decoction of seneka, snake-root, Coxe's Hive Syrup, or carbonate of potash.

Opiates are often necessary and serviceable in calming excessive restlessness, and allaying the violence of the suffocative attacks, which depend, in part at least, as has been stated, on spasm of the glottis. The most suitable are Dover's powder, or some other preparation of opium, or small doses of belladonna, or hyoscyamus.

A warm *bath* at 97° or 98°, employed once or twice a day, and continued for a period of ten or fifteen minutes, often assists greatly in lessening the sufferings of the child, in calming restlessness, and in moderating heat of skin and violence of the circulation, when the latter symptoms are strongly marked. The same effects may often be obtained by the use of *counter-irritants*, as sinapisms, mustard poultices, mustard foot-baths, etc. *Blisters* are of doubtful propriety in most cases. Nevertheless, I believe that I once saw good effects from the application of a small one over the larynx and trachea.

CHAPTER II.

DISEASES OF THE LUNGS AND PLEURA.

ARTICLE I.

PNEUMONIA.

Definition ; synonymes ; frequency ; forms.—The term pneumonia is now, by universal consent, applied only to inflammation of the parenchymatous structure of the lungs. It is often called, in this country, catarrh-fever, lung-fever, or inflammation of the lungs.

It is one of the most frequent, and therefore, one of the most important of the acute diseases of childhood. It is extremely probable that a great majority of the cases, which for years past have been called, in Philadelphia, catarrh-fever, are in fact lobular or lobar pneumonia. Dr. West, in a paper on the pneumonia of children (*Brit. and For. Med. Rev.* April, 1843), informs us that the English tables of mortality show pneumonia to be the cause of a larger number of deaths in childhood, than any other disease, with the exception of the exanthemata. From the third report of the registrar-general, he quotes the facts, that of all the deaths in the metropolitan districts under fifteen years of age, 13·6 per cent. were from pneumonia, 13·0 per cent. from convulsions, and 5·4 per cent. from hydrocephalus. He obtained nearly similar results from an examination of the returns from Manchester, Liverpool, and Birmingham. In the Philadelphia bills of mortality, the distinction between pneumonia and bronchitis is so imperfect, that it is impossible to obtain data, on which to found an exact standard of the relative frequency of pneumonia and other diseases. It appears, however, not to be so fatal here as in England, since of 26,510 deaths under fifteen years of age in this city, during the

ten years preceding 1845, only 2764, or 10·4 per cent., occurred from pneumonia and bronchitis combined. (*Condie's Dis. of Children*, 2d ed. note, page 88.)

I shall describe two forms of the disease, the *lobular* and *lobar*, the former of which is also designated broncho-pneumonia. Authors describe another form, to which the term *vesicular* is given, and Rilliet and Barthez refer to one which they call *carnification*.

Predisposing causes.—It is generally believed that pneumonia is most apt to occur in the course of other affections. This is certainly true in regard to the disease as it prevails in hospitals, and probably amongst the poorer classes of society also. Rilliet and Barthez state that of 245 cases observed by themselves, only 58, or very little more than a fourth, occurred in children previously in good health. The proportion of secondary cases is smaller in private practice, since of 51 that I have seen, 30, or more than half, occurred in children in good health. Age forms a strong predisposing influence. Of the 245 cases above quoted, 172 occurred under 5 years of age. Dr. West (*Loc. cit.*), says, that during the first five years of life, the cases of pneumonia were in the proportion of 10·3 per cent. to the total of diseases, while in the succeeding five years, they were in the proportion only of 1·3 per cent. It is most prevalent during the season of greatest activity of the first dentition, that is, from the 6th to the 18th month.

Sex.—A larger number of cases occur in boys than girls. The excess is little more, however, than may be accounted for by the preponderance of male over female children.

Constitution.—It is doubtful whether constitution has much or any influence upon the liability to the disease. Dr. West says that weak health is not a predisposing cause according to his experience. I am convinced that I have met with it as often in strong and vigorous children as in those of more delicate constitution.

Season.—The disease is most prevalent during the winter months. According to the third report of the registrar-general of England, the greatest mortality under fifteen years of age takes place in December.

Previous diseases.—It is apt to occur as a complication of all the diseases of children, and most frequently in measles, pertussis, typhoid fever, enteritis, and bilious remittent fever. I have met with three cases in the course of the latter disease.

Bronchitis.—Some writers of high authority have advanced the opinion that lobular pneumonia is always the consequence of a precedent bronchitis. This is denied by Rilliet and Barthez, who say “it is incontestable that lobular pneumonia may exist in children without bronchitis.” They agree, however, in the opinion that the form of broncho-pneumonia is much more frequent than simple lobular pneumonia. Other predisposing causes are general debility from previous diseases; prolonged dorsal decubitus; the breathing of a vitiated atmosphere, especially that of hospitals; neglect of cleanliness, and other bad hygienic conditions.

Exciting causes.—The continued action of some of the predisposing causes must be regarded as the exciting cause in the majority of the cases. External violence, as a severe fall, or blow upon the chest, will sometimes act as an exciting cause. The action of *cold* is almost always alleged to be the immediate cause of the attack. M. Grisolle states that it is impossible to determine the exciting cause in more than a fourth of the cases, and that in nearly all of those it is cold.

Anatomical lesions.—Lobular pneumonia.—By the term lobular pneumonia, is meant the form of inflammation which attacks one or more lobules of the lung, the others remaining healthy. Like lobar pneumonia it presents three stages, congestion, hepatization, and suppuration. In the first stage, the appearances are as follows: when the lung is cut into the surface is seen to be marbled with spots of a reddish or grayish rose colour, which are more or less distinctly limited, rather less resisting than the neighbouring portions, and which float when thrown on water. When squeezed they exude a frothy, bloody fluid, and crepitate under the finger.

In the second stage, the lung is usually soft and flaccid externally, and of a more or less deep rose-gray colour; it presents here and there circumscribed spots, which are prominent, solid under the finger, do not collapse when the thorax is opened like the surrounding tissue, and are of a purple-red colour. These spots,

which are usually circular, though sometimes elongated in shape, are most common on the posterior surface of the lung, but may sometimes be seen throughout the organ. In some cases they appear to be absent, and the lung presents externally a healthy appearance, but, on pressure with the fingers, they may be felt in the form of nodosities, at a greater or less depth from the surface. On cutting into the lung, it is found marbled with spots of a rose-gray and violet-red colour, of which the exterior ones correspond to the red points seen on the outer surface. These spots, both those on the surface, and those in the centre of the lung, form hardened masses, presenting the characters of ordinary pneumonic inflammation; they are smooth when cut into, granulated when torn, easily penetrated by the finger, and do not swim when thrown upon water. When squeezed, the hardened tissue crepitates but little, or not at all; its outer portions furnish a frothy, sanious fluid, while the centre of the mass contains a red and bloody fluid, which, like that of lobar pneumonia, is not frothy.

The third stage presents the following appearances: the inflamed portions are of a yellowish, grayish-yellow, or simply grayish colour, caused by the infiltration of pus into the parenchyma; the tissue is very friable, and pressure causes the exudation of a purulent fluid. When the pus is equally diffused through the diseased portions, so as to produce an uniform gray colour, they present nearly the same appearances as the surrounding healthy tissue, so that a careless examination might easily lead to a mistake as to the nature of the fatal lesion. The error may be avoided by an attentive examination, which would show that some of the lobules project above the cut surface of the lung; that the vesicles of those lobules are not collapsed as are those of the surrounding parts, and that they yield a purulent, and not a serous fluid, when squeezed between the fingers.

Lobular pneumonia has been divided by recent authors into two varieties, the *partial* and *generalized*. In the former, the number of inflamed lobules is small in proportion to those which retain their natural characters, and they are consequently thinly disseminated through the healthy portions of the lung; while in the latter, much

the greater portion of the affected lobe is diseased, leaving only a few healthy lobules scattered here and there. The morbid appearances are the same in both forms, except as regards their extent, which is so great in the generalized as to cause it to present many of the features of lobar pneumonia. Of the two forms the partial is much more common than the generalized. In the immense majority of cases, lobular pneumonia is double. Of 203 autopsies of this form made by Rilliet and Barthez, the inflammation was confined to one lung only in 5. The generalized form is infinitely more common in the lower than in the upper lobe, and is most frequent on the left side.

It is not uncommon to meet with *abscesses* as an accompaniment of lobular inflammation. The authors referred to found them in 26 out of 203, and Dr. West in 2 out of 11 autopsies. They are rare, however, according to M. Bouchut (*Malad. des Nouveaux-nés*, p. 318), under the age of two years. They occur as a result of the third stage of the disease, so that in the same lung may be observed hepatized lobules in the first, second, and third stages, and abscesses. The cavities of the abscesses are generally circular, sometimes oval, and measure from half a line to three-quarters of an inch in diameter. Sometimes the abscess is multilocular, each of the purulent cavities being partially separated from its neighbour, by a wall of hepatized tissue. They are found in various portions of the lung, but seem disposed generally to approach the surface of the organ. When the latter event happens, adhesive inflammation between the pleura pulmonalis and costalis usually takes place; but should this fail to occur, the abscess ruptures into the pleural sac, and produces pneumothorax. Rilliet and Barthez have met with this accident twice in their post-mortem examinations, and report another case in which the child recovered. I have met with one case of pneumothorax which occurred during an attack of secondary pneumonia, complicating bilious remittent fever. The boy, who was eleven years old, recovered perfectly, after a desperate illness.

The number of the abscesses is exceedingly variable. Sometimes there is but one, or they may be so numerous as to make it impossible to count them; but the latter condition is very rare. It

is much more common to meet with them in one lung only than in both, and in the left than in the right. They would seem to be most frequent between the ages of two and six years.

Lobar Pneumonia.—The anatomical characters of this form are the same in children over a year and a half old as in adults, and it is, therefore, unnecessary to occupy our time with descriptions which may be found in any standard work on practice of medicine. Under the age just mentioned, the anatomical lesions are not the same as in adults, but resemble very closely those of generalized lobular pneumonia, so that it is often difficult to distinguish one from the other. The affected lobe is never inflamed throughout, but presents outside of the indurated portions, lobules which retain their normal appearances, while even in the inflamed part of the lung, may be seen lobules in a less advanced state of change than those around.

Lobar pneumonia is generally confined to one lung, and occurs more frequently on the right than on the left side, and at the base than at the summit of the lung. Pneumonia of the upper lobe is more common on the left than on the right side. Of 84 autopsies of lobar pneumonia, made by Rilliet and Barthez, the disease was double in 9; confined to the right side in 48, and to the left in 27. Of the 75 cases in which the pneumonia was single, it was seated in the lower lobe in 48, and in the upper in 27. Of the 27 cases of pneumonia of the upper lobe, 23 were on the right, and 4 on the left side.

It is important to determine the relative *frequency* of the two forms of the disease. The authors just quoted, report 245 cases of pneumonia, of which 161 were lobular, and 84 lobar, showing a great excess of the former. Dr. West, on the contrary, is of opinion that the lobular form is not so much more frequent than the lobar at least in London, as some persons are disposed to think, for of 37 cases that he has observed, 22 were of the lobar, 11 only of the lobular, and 4 of the vesicular form. According to my own experience, the lobular form is much more frequent than the lobar, since of 51 cases of pneumonia that I have seen, 38 were of the former, and only 13 of the latter form.

Lobular pneumonia generally occurs in children under six years

of age, while the lobar form is more frequent after that period. Nevertheless, the lobular form is not uncommon after the age mentioned, as is proved by the fact that of 203 cases in which autopsies were made by Rilliet and Barthez, 43 occurred in children between 6 and 15 years of age. Nor is lobar pneumonia confined to children over 6 years of age, as was thought by Gerhard and Ruz, since of 29 cases reported by Dr. West, 19 occurred under 5, and 10 under 2 years of age. Gerhard, Rilliet and Barthez, and West, all agree that the lobular form is much more frequent as a secondary than as an idiopathic affection. Of 161 cases observed by Rilliet and Barthez, 158 were secondary; while of 11 cases reported by Dr. West, 5 followed whooping cough, 1 measles, and though the remaining 5 are said to have been idiopathic, the bronchi were found to be either greatly injected, or filled with secretions. Dr. Gerhard, in his second paper (*Am. Journ. Med. Sci.*, November, 1834, p. 106) says, "the lesion known by the name of pneumonia of young children, is, therefore, not similar to the idiopathic inflammation of the lungs, but is a mere secondary lesion occurring during the course of numerous affections of childhood, especially bronchitis, measles, and chronic diarrhœa, and should be described as the lobular induration of the lungs." If, however, bronchitis, which by some persons is held to be an integral portion of lobular pneumonia, were not taken into consideration, the latter would be entitled to rank as a primary affection in a much larger proportion of the cases. The great preponderance of secondary over primary cases of lobular pneumonia, does not seem to hold good in private practice, at least if we regard bronchitis as an essential part of the disease, and not as constituting a primary affection, in the course of which pneumonia occurs as a secondary one. Taking this view of the subject, I find that of 38 cases that have come under my observation, all attended with more or less bronchitis, 26 were primary, and only 12 secondary.

The lobar form of pneumonia, is much more frequently a primary affection than the lobular, since of 84 cases observed by Rilliet and Barthez, 55 were primary, and only 29 secondary. This does not agree exactly with my experience in private prac-

tice, as of 13 cases of this form that I have seen, only 5 were primary, and 8 secondary.

Complications.—*Bronchitis* exists to a greater or less extent in most of the cases. The inflammation varies from simple increased vascularity with augmented mucous secretion, to intense congestion with purulent or pseudo-membranous secretions. It is most marked and most constant in the lobular form. The excessive secretion, especially that of pus and pseudo-membrane, is generally found in the same form. The inflammation usually attacks the smaller bronchia, and in a considerable number of cases, is accompanied by dilatation of those tubes. Dr. West met with this alteration in 11 cases. When slight, it was limited to the smaller bronchi, but when more extensive, implicated the larger ones likewise. It always presented the tubular form, and was most marked in the cases supervening upon pertussis. It is very rare in lobar pneumonia.

Pleurisy is a frequent complication, occurring in about a fourth of the cases of the lobular, and in half those of the lobar form.

Emphysema is another common complication. It generally occupies the upper part of the lung, or its free edge, and is found most strongly developed in the lung which presents the greatest amount of inflammation, or in both, when both are diseased. Its degree depends upon the extent of the pulmonary inflammation and bronchitis, and the severity of the dyspnœa. The vesicular form is very much more frequent than the interlobular.

Symptoms; sketch of the disease; course; duration.—In order to present a faithful account of the disease, a general sketch of the symptoms will first be given, after which the most important ones will be considered separately under the head of particular symptoms, so that the reader may first obtain a notion of the course of the disease, and then become intimately acquainted with its details and peculiarities, by reference to the remarks on each particular symptom.

Pneumonia almost always begins in infants and children at the breast like simple catarrh. The child is restless, uneasy, peevish, easily made to cry, indisposed to take the breast as usual, and after a

short time, is attacked with fever, cough, and acceleration of the respiration. Auscultation reveals mucous and sub-crepitant rhonchus in both lungs. Percussion yields only negative results. If the disease progresses, the child becomes exceedingly restless, takes the breast with difficulty, and often starts back from it with a loud cry as though in pain. The skin becomes very hot, the pulse frequent, the respiration rapid and anxious, and the cough more frequent. Mucous, sub-crepitant, and sometimes crepitant rhonchus can be heard on both sides, and after a time bronchial respiration and resonance of the cry. At this period, the percussion is often dull or flat over the seat of disease. If the child recovers, the cough diminishes in frequency and force, and becomes loose; the restlessness subsides; appetite returns; the fever disappears, and the physical signs gradually cease to be heard. If, on the contrary, the case is to prove fatal, the respiration becomes more difficult, and often slower; the fever continues with exacerbations and remissions; the child is exceedingly restless; the surface becomes pale and cold; and death occurs from asphyxia.

In older children, it begins with violent fever, increased frequency of breathing in all the cases, pain in the side in some, and short, dry cough. Auscultation, practised very early in the disease, reveals crepitant or sub-crepitant rhonchus, and sometimes bronchial respiration, confined to one side, and usually to the base of the lung, in the lobar form; and general sub-crepitant rhonchus, and in rare cases, bronchial expiration, in the lobular form. Vomiting sometimes occurs on the first day. There is acute thirst, and the appetite is entirely lost; there is generally a good deal of restlessness in older children, often drowsiness in younger, and in some few cases, convulsions. As the case proceeds, the fever increases, and the extent over which the bronchial respiration is heard augments, whilst the râles diminish in abundance. The dyspnœa increases; the *alæ nasi* are widely dilated; the respiration sometimes becomes unequal and jerking; the cough is frequent, short, dry, and often painful, as shown by the child's crying at each cough; and the countenance becomes anxious. Expectoration commences, and consists of sanguinolent and rarely of rust-

coloured sputa. It is usually small in quantity, and in very young children is entirely absent. About the fourth or fifth day, the acceleration of the pulse and respiration, and the extent of the hepatisation reach their height. The bronchial murmur is loud, perceived both in the inspiration and expiration, and is accompanied by bronchophony and resonance of the cry, and by dulness over a large surface. After remaining stationary for one or two days, the disease begins to subside generally about the seventh or eighth. The heat of skin and frequency of pulse diminish; the respiration becomes slower; the *alæ nasi* no longer dilate; the flushing of the face disappears, while its expression is more natural; and the cough becomes loose. On auscultation, the bronchial respiration is found to be confined to the expiration, the voice is diffusely resonant, and an abundant sub-crepitant rhonchus is heard. The dulness on percussion is much less marked. A little later the fever ceases entirely; the respiration assumes its natural rhythm; the appetite returns; the thirst disappears; and the cough subsides very much. About the tenth or fifteenth day, convalescence is fairly established, though auscultation still reveals prolonged expiration, and diffuse resonance of the voice.

In unfavourable cases, death rarely occurs early in the disease; but usually at some distance of time from the invasion. When the fatal termination occurs within the first few days, the symptoms assume great severity from the beginning. In this class of cases there is great oppression of breathing; the pulse is rapid and very small; the face pale, with a purple tint of the cheeks; moist râles are heard extensively over the thorax, mingled with dry rhonchi, or bronchial expiration and diffuse resonance of the voice; the general symptoms become more and more aggravated, and death occurs in three, four, or five days. When, on the contrary, the fatal termination occurs at a later period, the case generally pursues the course we have described up to the period of resolution. Instead, however, of resolution and convalescence taking place, the fever continues, though in a diminished degree; the face becomes pale; emaciation occurs; the appetite does not return; the pulse remains frequent; diarrhœa persists or comes on; and the

cough, which had diminished, again becomes troublesome and painful. Auscultation and percussion reveal imperfect resolution, or an extension of the disease; and after some weeks of struggling, the child dies in a state of emaciation and debility.

Particular symptoms.—Physical signs.—The physical signs of pneumonia in children are much less certain than in adults. The degree of the uncertainty is very different in the two forms of the disease; for, while the lobar may almost always be detected by an attentive and competent observer, it is confessedly often impossible for the most practised physician to distinguish between bronchitis and the lobular form. Thus M. Grisolle (*Pathol. Int.* t. i. p. 348) says: "Yet it is almost impossible to diagnose lobular pneumonia." M. Chomel (*Dict. de Med.*, t. xxv. p. 185) says: "As to lobular or disseminated pneumonia, its phenomena are generally obscure, and in many cases it has been recognised only at the autopsy." Rilliet and Barthez, however, whose opinion on this point is deserving of the greatest confidence, believe that it is generally possible to distinguish between lobular pneumonia and bronchitis, by strict attention to the physical and rational signs combined.

In order to practise auscultation on a young child, it should be placed by the mother in a sitting posture on her knee and held there, while the physician, by kneeling on the floor, or sitting on a low chair, makes the examination he deems necessary. If the child be old enough to take notice, it should be attracted and amused by some toy or glittering object. Even, however, should it cry violently, much valuable information is to be obtained from auscultation, for we can ascertain the presence or absence of rhonchi, and their characters, during the deep inspirations between the cries; we can observe resonance of the cry and cough, and practise percussion.

The physical signs of *lobular pneumonia* depend upon the proportion which the pneumonic holds to the bronchial inflammation. When the inflamed lobules are few in number, and situated at a distance from each other, whilst the bronchitis is extensive, the physical signs of the latter affection obscure entirely those of the former; and it becomes impossible to ascertain by auscul-

tation or percussion, the existence of the pneumonic inflammation. We are compelled under these conditions, to depend exclusively on the rational symptoms. But, when the number of inflamed lobules is more considerable, and they are consequently situated nearer together, they occasion induration of the lung, which gives rise to certain stethoscopic phenomena, which will betray to the attentive observer the presence of the pneumonic inflammation. These phenomena are mucous or sub-crepitant rhonchus, prolonged expiration, rude respiration, and resonance of the cry and cough. The sub-crepitant rhonchus is an extremely important sign, especially in children under the age of five years. It is generally heard on both sides behind, and most distinctly over the inferior portions of the thorax. It is often the *only* stethoscopic sign of lobular pneumonia during the whole course of the disease. It frequently follows the mucous rhonchus, and when this is the case, and especially when associated with prolonged expiration, with rude or bronchial respiration, heard here and there, we may be certain of the existence of lobular pneumonia. If to the above signs are added dulness on percussion, diminution of the sub-crepitant rhonchus, crepitant rhonchus, and bronchial respiration during inspiration and expiration, it becomes certain that the disease is running into the lobar form. When lobular pneumonia pursues an acute course, the signs of hepatization rarely appear before the third day, and generally somewhere between the third and eighth. When, on the contrary, it goes on more slowly, the first signs of pulmonary inflammation do not occur until a much later period. The resolution of the inflammation is much more tardy in this than in the lobar form.

The physical signs of *lobar pneumonia* are crepitant or sub-crepitant rhonchus, feeble respiration, bronchial respiration, bronchophony, resonance of the cry and cough, and dulness on percussion. They are, in fact, the same in the great majority of cases as in adults. Under five years of age, this form begins, usually, with sub-crepitant rhonchus, while after that period, the earliest stethoscopic signs are crepitant rhonchus, or feeble respiration. The bronchial respiration makes its appearance soon after the sub-crepitant or crepitant rhonchus, is heard first in the

expiration, and then in both inspiration and expiration, and is accompanied by bronchophony, resonance of the cry and cough, and dulness on percussion.

These alterations of the auscultatory phenomena are confined to one side, in the great majority of cases, and are best observed over the posterior inferior portion of the lung. Rilliet and Barthez state that they have never known the bronchial respiration to disappear, in favourable cases, before the fifth day, and in the majority not before the seventh, eighth, or ninth; whilst in fatal cases, it continued to the moment of death. Its persistence is always a highly unfavourable symptom in very young children, whilst in those who are older, as in adults, it sometimes remains for several days or weeks, though the general symptoms have entirely disappeared. Dr. West regards bronchial respiration as a very grave sign, since out of 20 cases in which he noted it, 11 proved fatal.

It may now be stated in recapitulation, that in children under five or six years of age, hepatization of the lung is indicated by sub-crepitant rhonchus appearing subsequently to mucous rhonchus, or associated with it; by bronchial respiration heard first in expiration, and afterwards both in inspiration and expiration; by resonance of the cry, voice, or cough; by crepitant rhonchus in rare cases; and by more or less marked dulness on percussion. In general these signs exist on both sides, and are confined to the middle and inferior portions of the thorax behind.

In children over five or six years of age, on the contrary, the signs are the same as in adults, with the exception of the expectoration, which is very often, though not always, absent. They are feeble respiration; crepitant rhonchus; bronchial respiration; bronchophony; resonance of the cough; and dull or flat percussion, confined in by far the greater number of cases to one lung, and to the inferior portion of that lung behind.

Rational symptoms.—*Cough* is stated to be invariably present, except in children within the month, in whom it is sometimes, but very rarely absent. At all other ages, it is nearly a constant, and therefore most important symptom. It is dry at first, and not very frequent, but in one or two days becomes more frequent, often

very troublesome, and from dry and harsh, is more or less humid and loose. It continues until the disease moderates, lasting generally from nine to sixteen days. In fatal cases it usually persists to the last. In infants it is not very frequent, occurs in short paroxysms, and in fatal cases often ceases one or two days before death. Rilliet and Barthez remark that in pneumonia of the upper lobes, it has a peculiar character. It is little, short, smothered as it were, or piercing, teasing or slightly hoarse. I will merely add that cough is sometimes scarcely noticeable in cases which simulate hydrocephalus, during the early part of the attack. In the case of a child between three and four months old, there was absolutely no cough whatever during the first six days. On the sixth day, with a respiration of 100 in the minute, with somnolence and occasional vomiting, no cough could be detected either by the mother, nurse, or myself, though I saw the child frequently. On the seventh, the respiration being at 96, a little, short, dry cough was heard occasionally, and on the eighth, the respiration having fallen to 63, the cough was decided and perceptibly loose, and slight coryza had made its appearance. In three other cases the cough was so slight in the early stages of the disease, during the continuance of the cerebral symptoms, as not to have been noticed unless particularly inquired after. Later in the attack, after three, four, or five days, and as the cerebral symptoms moderated, the cough became frequent and loose, and the pneumonic symptoms pursued their regular course.

Expectoration is almost invariably absent under five years of age. Rilliet and Barthez, and Gerhard, have never observed rust-coloured sputa under the age mentioned. In older children there is sometimes, though not very often, voluntary expectoration. Even in them, however, the sputa seldom present the characteristic rust-colour and viscosity observed in adults, but consist simply of mucus tinged with blood, or of whitish, brownish, viscous or non-viscous phlegm. I once, however, saw a child three and a half years old, voluntarily expectorate viscid mucus, tinged copiously with blood; and I have a patient under my charge at the present moment, seven years old, with lobar pneumonia supervening upon pertussis, who expectorates freely a tenacious mucus,

sometimes streaked or dotted with blood, sometimes brownish, and at other times rust-coloured.

Valleix mentions a whitish or sanguinolent viscous froth, as sometimes escaping from the mouth of new-born children labouring under the disease. I have never met with this symptom, but know of one case of a child within the month, who, during an attack of pneumonia, vomited mucus tinged with blood. The child died, and presented the lesions of pneumonia. The nipples of the mother were perfectly healthy, so that the blood could not have been sucked by the child from them, but must have been the sputa which had been swallowed, after being coughed into the fauces.

It is scarcely necessary to say that the absence of expectoration is only seeming, for children undoubtedly reject the sputa into the fauces, and then swallow them.

Thoracic pain.—It is impossible to ascertain the presence of this symptom with certainty, prior to the age at which children talk, and very often not for some time after, as they refuse, or do not know how to describe their sensations. After the age of four or five years, it is often present, and frequently complained of. Indeed I am disposed to believe that it exists in most of the cases at all ages, from the fact that the act of coughing is so generally accompanied or followed by a cry like that produced by pain from other causes. I have so often remarked this disposition to cry after coughing, that I always ask the question, in the case of a young child, whether the cough is followed by crying, or by a momentary change in the expression of the features, like that occasioned by pain. In one case particularly, of a child twenty months old, labouring under lobular pneumonia, which had become lobar on one side, the movements during coughing were very peculiar. The patient always inclined the body strongly towards the side chiefly affected, forcibly stretched out the arm of that side, and cried violently. The pain generally comes on at the onset of the disease, is seated in the affected side, and is aggravated by coughing, and sometimes by the decubitus and percussion.

The *respiration* is always quickened, except where the constitution of the patient has been greatly deteriorated by long and

severe illness or other causes, under which circumstances it remains at the normal rate, or is very slightly accelerated. This symptom usually dates from the invasion, and soon the breathing rises as high as 40, 50, and 60 in the minute, in older children; and from 60 to 80 in the younger. It is more rapid commonly in the lobular, than in the lobar form; in the former, I have often counted it at 60, 70, and 80, while in the latter, it has seldom gone over 40 or 50. In some rare cases of the lobular form it rises as high as 100 in the minute. In favourable cases, the acceleration subsides usually about the seventh, eighth, or ninth days. In most of the cases the breathing is even and regular, while in others it is short, abdominal, uneven, and jerking. When the dyspnœa is very great in a young child, the nostrils dilate widely, the mouth remains open, and its angles are drawn downwards and outwards; the last of these symptoms is almost a fatal one. Sometimes the rhythm of the function is changed, so that it begins with a sudden, active, and moaning expiration, followed by the inspiration, after which comes the interval of rest. Rilliet and Barthez state that unequal, jerking respiration occurs almost exclusively in cases of inflammation of the upper lobes.

Physiognomy.—The face is almost invariably flushed. The colour, at first scarlet, becomes after a day or two deeper and darker, and in severe cases assumes a livid red tint. I have noticed in extensive lobular pneumonia, in addition to the deep red tint, a peculiar glazed appearance of the skin, which looks as though it had been varnished, while the edges of the flush are distinct and abrupt. The lips are generally deeply coloured, simultaneously with the face. The flush commonly subsides about the same time, or a little before the diminution of the rate of the respiration. In fatal cases, the face is apt to lose its colour and become pale and sallow, as the unfavourable symptoms become more and more marked. The pallor of the face is most striking in severe and fatal cases occurring in infants; the face is blanched, and the features pinched.

The expression of the face is one of anxiety and oppression in the early stage; in very severe cases, or those about to terminate unfavourably, the features become drawn and contracted.

Fever exists in all the idiopathic cases. The pulse, at all ages, is rarely under 120 from the first to the sixth or seventh day; in the youngest children it rises as high as 140, 160, and even 180; while in those who are older, it is seldom above 140. In favourable cases it diminishes about the fifth, sixth, or seventh day. In fatal cases, it is apt to diminish at the same period, but soon becomes more frequent and continues so to the end.

The *skin* is hot in the beginning, and continues so until the disease subsides. The heat is intense in severe, but not so great in milder cases.

The *nervous system* shows more or less marked symptoms of disorder. There is restlessness, peevishness, and irritability during the day, which increase towards evening. As the night advances the child becomes still more restless; infants will not sleep except in the arms, and wake crying or fretting every few minutes or hours; older children sleep uneasily, talk in their sleep, or start and cry out, and are often delirious. In some instances, the irritability is most distressing, both to the child and those around. The child is constantly fretting and whining; it wants its play-things, but will not touch them; food, but rejects it; and slaps and scolds at everything about it. Convulsions sometimes occur at the invasion. They last an uncertain length of time, and are usually followed by insensibility, from which the child wakes with fever, accelerated respiration and cough, indicating the true seat of disease to be the lungs, and not the brain, as might at first be supposed. Rilliet and Barthez state that they have observed convulsive symptoms almost exclusively in pneumonia of the upper lobe. I have met with convulsions in 5 out of 51 cases. In one they appeared at the beginning of lobular pneumonia in a child two months old; it recovered. In a second, they appeared on the third day of lobular pneumonia, which had supervened upon pertussis, in a child five months old. This also ended favourably. In the other three cases, they occurred at the termination, and were all fatal; two of these occurred in the course of pertussis, and one of measles.

Digestive organs.—Complete anorexia is generally present from the first; the thirst is intense, greater probably than in almost any

other affection of childhood. The tongue is moist, as a general rule, and covered with a whitish or yellowish fur. Vomiting and diarrhœa occur at the invasion of about half the cases in hospitals: in private practice, vomiting often occurs, but diarrhœa much less frequently.

Diagnosis.—The pneumonia of children is most liable to be confounded with bronchitis, pleurisy, and hydrocephalus. There is little probability that lobar pneumonia would be mistaken for bronchitis by any but a careless or incompetent observer; for the presence, in the former, of sub-crepitant, and very often of crepitant rhonchus, of bronchial respiration, bronchophony, resonance of the cry and cough, and dull or flat percussion, confined to one side, would easily distinguish it from bronchitis, which is marked by mucous and sibilant râles over both sides of the chest, and by a normal condition of the percussion. The difficulty in the differential diagnosis of the two diseases concerns, therefore, the lobular form of inflammation. The cause of the difficulty is the existence, in the vast majority of the cases of that form, of bronchial inflammation, coincidentally with that of the parenchyma of the lung. The degree of the difficulty will depend upon the proportion which the two inflammations hold to each other. If the amount of the pneumonic inflammation be great in proportion to the number of bronchia affected, as is the case in generalized lobular pneumonia, and where, in what we have called the partial form of the disease, the number of lobules inflamed is considerable, or they are placed close together, the difficulty is generally but slight. But when, on the contrary, the bronchitis is extensive in proportion to the pneumonia, or the physical signs of the former disease are present in a high degree, it becomes impossible to do more than suspect, from the age of the patient, and character of the rational signs, the presence of pneumonia. The symptoms which are most characteristic in such cases, are: resonance of the voice and cry, the phenomena furnished by very careful percussion; and lastly, the age and circumstances under which the disease has been developed. The two last-named conditions are very important; if the child be under six years of age, and the attack secondary, it is

almost certain to be broncho-pneumonia; whereas, if over that age, and the attack primary, it is probably simple bronchitis.

In newborn children and those at the breast, sub-crepitant rhonchus is the diagnostic mark of pneumonia, which, as has been already stated, is, at that age, almost invariably of the lobular form. In partial lobular pneumonia, we must depend chiefly on the sub-crepitant rhonchus, while in the generalized form, there is added to that, bronchial respiration, dulness on percussion, and in some very rare cases, crepitation. Add to these the violent character of the general symptoms, the intense dyspnœa with expiratory respiration, as has been described, the play of the nostrils, the violent contraction of the chest, the distension of the abdomen at each respiration, and there can be little difficulty in the detection of the true nature of the case.

It has been stated that pneumonia might be confounded with pleurisy. This could not happen except in regard to the lobar form, as the abundance of humid rhonchi, and the absence of dulness on percussion, would prevent such a mistake in regard to the lobular form. The lobar form may be distinguished by attention to the fact that pleurisy is rare under six years of age; by the greater severity of the pain, by the absence of rhonchi, by the effect of change of position on the sounds yielded by percussion, by the shorter duration and greater mildness of the general symptoms, by the entire absence or small amount of expectoration, and by the continued dryness of the cough in pleurisy; and, lastly, by the disposition on the part of pleurisy to become chronic, while pneumonia nearly always remains acute.

Dr. West (*Loc. cit.*,) states that pneumonia in the early stage is often mistaken for hydrocephalus. Since reading his paper, I have had several occasions to test the correctness of the assertion, and have no doubt that it is perfectly true. The vomiting, constipation, extreme irritability and restlessness, and complaints of headache occur in both, while the absence of symptoms to draw attention to the true seat of the disease in pneumonia, may readily mislead. The cough in the early stage of pneumonia is often very slight, and not being observed by the attendants, is not reported to the physician. The frequency of the respiration

is overlooked, or, if noticed, is ascribed to the fever, which is supposed to depend on the cerebral inflammation. In pneumonia, however, the vomiting is not usually very frequent, nor very obstinate, nor are the bowels so much constipated as in hydrocephalus. These variations from the ordinary symptoms of hydrocephalus, minute though they be, ought to attract the notice of the physician, and lead him to examine the case more carefully; when, in all probability, the physical signs would immediately reveal the pneumonia. I may mention, in illustration, that I attended a boy six years old, who, for three days, suffered from violent fever, and excruciating headache, which last was the only symptom complained of. There was neither cough, expectoration, nor any marked acceleration of the respiration. After three days the headache moderated, and he had slight pain in his side; on examination, I found him labouring under well-marked lobar pneumonia. Another child, four months old, was suddenly seized with convulsions, followed by fever, vomiting, excessive irritability and drowsiness, so that I supposed the case to be one of meningitis. After the third day, the cerebral symptoms having moderated, and cough, with dyspnœa, making their appearance, I detected the existence of extensive lobular pneumonia, of which the child died a few days after. In April, 1847, I was called to see a boy nineteen months old, who had been taken sick with slight fever, a little hoarse cough, and mild pharyngitis. After remaining in this condition for five days, he began to be drowsy and very irritable; the surface became pale, and the extremities rather cooler than natural. From the sixth to the tenth day, there was great somnolence, the child sleeping nearly all the time; when waked from sleep, he was always exceedingly irritable and cross, scarcely opening his eyes, and then shutting them again immediately, to avoid the light, which was evidently painful. During this time he took scarcely any food, but little drink, and vomited several times freely; the bowels were moved without medicine; the surface remained very pale, and the extremities often cool; the pulse was frequent and small; the respiration perfectly regular, and therefore attracted no attention; there was *no cough* whatever. Under these circumstances, I hesitated between regarding the case as me-

ningitis, or hydrocephaloid disease, as described by Dr. M. Hall. I took the latter view, however, and treated it with small quantities of brandy, cold to the head, and the frequent employment of mustard pediluvia. From the eleventh day the child began to improve; it would open its eyes from time to time, and look round for a few moments; the face began to show a slight degree of colour, and the palms of the hands, which had been white and transparent, exhibited a tinge of the natural pink hue which they have in children. Observing about this time that the respiration was accelerated, though perfectly free and regular, and without cough, I counted it, and was astonished to find it 80 in the minute. I now examined the chest carefully, and finding slight dulness on percussion with bronchial respiration, over the inferior half of the left side behind, immediately understood the nature of the case: it was one of latent pneumonia, simulating hydrocephalus. The child was now treated for pneumonia, and after an illness of twenty-seven days longer, recovered perfectly. As the case progressed, the rational signs of pneumonia were more and more apparent, the cough becoming frequent and painful, and after a time loose, while the cerebral symptoms gradually disappeared.

In addition to these cases I have met with three others, two in children within the year, and one in a child between one and two years old, which, during the early stages, resembled very closely the invasion of cerebral disease. Attention, however, to the rate of the respiration and the physical signs, and the presence of slight cough in two of them, revealed, after a little hesitation, the true character of the attacks. The third case, which occurred in the child within the year, was unattended by any cough during the first few days, and was, therefore, very obscure, until my attention was attracted by an acceleration of the respiration, when the physical signs, and at a later period, cough, explained the real nature of the attack. I may remark, in addition, that in all these cases, the absence of constipation, the infrequency and short duration of the vomiting, and some clearness of the intelligence when the child was fairly roused, though but for a few moments, from its state of somnolence, were other motives for doubting the attacks to be meningitis.

Dr. West also states that pneumonia is often overlooked in teething children, in whom the cough is called a tooth-cough, whilst the diarrhœa, which frequently occurs, and becomes the prominent symptom, is supposed to depend upon dentition, and is alone attended to. The diarrhœa is obstinate, and when, at last, the cough attracts attention, it is ascribed to phthisis, and the physician is astonished to find at the autopsy purulent infiltration of the lungs, but no tubercles, and no disease of the intestines. The diagnosis is to be correctly made, under such circumstances, only by careful physical examination.

Prognosis.—It may be stated in general terms, that pneumonia is dangerous in proportion to the earliness of the age at which it occurs and the form of the attack, whether primary or secondary. Lobular pneumonia, for the reason that it prevails almost entirely amongst children under five or six years of age, is much more dangerous than the lobar form, which occurs after that age. Of 12 cases of lobular pneumonia under one year, that I have seen, 5 were fatal. Of the 12 cases, 8 were primary, of which 3 died, and 4 secondary, of which 2 died. Of 17 cases of the same form, occurring between the ages of one and two years, only 3 were fatal. Of the 17, 11 were primary, all of which recovered, whilst of 6 secondary cases, 3 died. Again: of 9 cases of lobular pneumonia between 2 and 9 years of age, none died; of these, 7 were primary, and 2 secondary. Lastly, of 13 cases of the lobar form, only 2 of which occurred under three years of age, and the remainder between the ages of 4 and 10, all recovered. Of these, only 5 were primary.

In hospitals, and whenever the disease occurs under bad hygienic conditions, as amongst the poor, the prognosis is very unfavourable. Thus, of 128 cases in new-born children observed by MM. Valleix and Vernois, in the Foundling's Hospital at Paris, 127 died; while, according to M. Bouchut, of 55 cases between the ages of a few days and two years, observed at the Necker Hospital, 33 died; and lastly, of 61 cases between the ages of two and fifteen years, observed by M. Barrier, at the Children's Hospital, 48 died. It will be observed, that of 51 cases observed by myself in private practice, 8 were fatal.

We may conclude, therefore, that pneumonia under two years of age is always dangerous, and that when secondary during that age, very much more dangerous than when primary; that primary pneumonia, whether lobular or lobar, between the ages of 2 and 5 years, will terminate favourably in the great majority of cases in private practice; and that when the disease attacks children between 6 and 15 years of age, the termination is nearly always in health.

The following are some of the most unfavourable symptoms of the disease: convulsions; small, weak pulse; extreme rapidity of the respiration; persistence of the bronchial respiration in young children (of 20 cases in which it was noted by Dr. West, 11 died); incomplete resolution of the disease within the ordinary period; excessive and obstinate diarrhœa; cerebral symptoms; great emaciation; greatly altered physiognomy; excessive irritability; and a yellowish tint of the skin. M. Trousseau regards as an unfavourable symptom the occurrence of swelling of the veins of the hands, which he supposes to depend on an obstacle to the function of hæmatosis.

Treatment.—The treatment of pneumonia has been studied with the greatest care during the last several years. The researches of Louis, Grisolle, Rilliet and Barthez, and West, have given a completeness and certainty to this part of our subject, not possessed in regard to any other malady. I shall confine my remarks to the remedies which are now generally acknowledged to be most important, leaving those of doubtful value unnoticed.

Bloodletting.—It is very generally conceded at the present time, that the loss of blood, whether by venesection, leeching, or cupping, exerts a more powerful influence upon pneumonia than any other remedy. Its effects are to relieve, and in some cases, to remove, with very great rapidity, the general symptoms. It reduces the frequency and force of the circulation, moderates the heat of skin, calms the restlessness, and relieves the dyspnœa, thoracic pain, and headache. It is very doubtful, however, whether it shortens the duration of the disease, or exerts much influence on the extent of the hepatization,—at least such is the conclusion of several of the French observers. Dr. West awards to it the first place in

importance amongst the remedies for the disease ; and with him I entirely agree, though fully aware of the fact, that whilst the general symptoms are mitigated by bloodletting in the manner above described, the local disease is apt to run its usual course of several days. I once saw a boy, five years of age, with lobar pneumonia of the left side, from whom eight ounces of blood had been taken by venesection and leeches, walking about the room apparently well, after a week's sickness, in whose case there was still present over the inflamed lung, dulness of percussion, bronchial respiration, and crepitant rhonchus ; and I have now under my charge a girl four years of age, who, on the seventh day of the attack, after being leeches on the fifth, had a respiration of twenty, a pulse of ninety, and a cool natural skin—who was, in fact, entirely convalescent ; in whom, nevertheless, there was dulness of percussion over the lower half of the right lung, with bronchophony and bronchial respiration.

The amount and manner of the depletion must depend on the age of the patient and form of the pneumonia. It is usually recommended to make use of leeches and cups in children under two years of age, and of venesection after that age. The quantity of blood to be drawn must depend on the age and strength of the patient, and violence of the attack. At the age of two or three years, and in idiopathic cases, about four ounces may be taken from the arm at once. Should this fail to produce some relief to the symptoms in twelve hours, the bleeding may be repeated ; or better still, some scarified cups or leeches applied over the seat of the disease. I feel quite sure that I have seen more benefit derived from cups than leeches under these circumstances, and would therefore prefer to use them where there is nothing to prevent. It is a common idea that scarified cups are too painful to be applied to young children, but this is not the case when they are properly selected. The cups should be much smaller than what are used for adults, and the scarificator of a size to suit the cups. With these precautions, it will be found that the operation of cupping a child within the year, and still more from the age of a year upwards, is less annoying to the child and more expeditious than that of leeching. I would, on these accounts, strongly advise coun-

try practitioners, who often complain of the difficulty or impossibility of procuring leeches, to provide themselves with cups of a size suitable for children, to be used in the place of leeches.

Whether leeches or cups be preferred after general bleeding, about two or three ounces of blood should be taken from over the inflamed portion of the lung.

In children under two years of age, leeching, as has been stated, is generally preferred to venesection. I have not hesitated, however, to employ venesection in the course of the second year, when the symptoms have been very acute. The number of leeches should seldom exceed ten or twelve, which will commonly take about two ounces of blood.

In cases of secondary pneumonia, depletion must be used with great care, as they have been found not to bear the loss of blood well. This is the opinion both of Rilliet and Barthez, and of Dr. West. It is best, therefore, in most of these cases, to employ only local bleeding.

Antimony.—This remedy is well known to exert a powerful influence over pneumonia. Like bloodletting, it diminishes the force and frequency of the circulation and relieves the oppression; but like that, too, while moderating the constitutional symptoms and tending to keep them within safe limits, it fails to cut short or jugulate the inflammation. Dr. West recommends it particularly in cases preceded by catarrhal symptoms and those occurring during measles or hooping cough, and in cases of the lobar and idiopathic forms, where bleeding has failed to give efficient relief. In the first class of cases, he gives it “in doses of a quarter of a grain to a child of two years old, repeated every ten minutes till full vomiting is produced, and continued afterwards every two or three hours, for forty-eight or sixty hours.” In the second class he gives the same doses every two hours for twenty-four hours, and thinks it “paves the way for the advantageous employment of mercury.” When, however, the pneumonia had been neglected, so that the period for depletion had passed, and when distinct bronchial respiration was audible, he has “not found the large doses, recommended by the French practitioners, to produce beneficial results.” Rilliet and Barthez give to younger children

from two to four grains, and to those who are older, as much as six grains of the tartar-emetic, in solution, in the twenty-four hours. They administer the solution in spoonful doses every half hour. If the first doses cause vomiting they are repeated less frequently. The quantity given on the first day is continued for the two, three, or four following days. They recommend caution, however, in the administration of the remedy, especially in very young children; and should it produce excessive vomiting or severe diarrhœa, advise its instant suspension. Should the state of the inflammation still require its administration, they employ it in very minute doses, and abandon it immediately should the intestinal symptoms return.

For my own part, I have not found such large doses of antimony necessary in private practice, and I believe them to be often injurious.

The attention of the reader is requested to the following extracts from pages 467 and 468 of the first volume of Rilliet and Barthez. "One of the chief causes of gastritis and softening of the stomach in children has been, according to our experience, the employment of energetic treatment directed upon the gastro-intestinal mucous membrane. We refer particularly to the tartar emetic solution given for several days in succession. Though the doses were not carried to a great extent, and the quantity of the vehicle was ample, the disease has often occurred, thus proving the susceptibility of the mucous coat." They recommend great reserve in its use, "because two-thirds of the cases of gastritis that we have observed, and some of the cases of softening, followed the employment of that remedy." They remark afterwards, however, that the gastro-intestinal lesions generally followed the exhibition of the antimonial in secondary, while it seldom occurred in idiopathic cases of the disease.

It seems to me that the facts just quoted ought to cause us to hesitate in the administration of antimony in the large doses generally recommended. My own experience inclines me to believe that it is seldom necessary to give to children of two and four years old more than half a grain or a grain in the day, and to younger children still less. I have met with some children, and

in a few instances this is true of all the children of a particular family, who would bear only the smallest doses. I have known the hundredth part of a grain repeated every hour, to produce nausea and vomiting in children of two and four years of age. This very winter, I had under my charge a child two years old, who could take only half a drop of antimonial wine every two hours.

My own practice has been to give the remedy after depletion, in doses of the thirtieth, fortieth, and even sixtieth parts of a grain every hour, to children of the age of two or three years, and even in this quantity it often produces vomiting or painful nausea. If the fever, oppression, and heat of skin, persist in the same degree after several doses, the quantity should be increased; if, on the contrary, they subside, the doses ought to be diminished. In the cases of children over the age of three years, the dose must be increased according to circumstances. A very convenient and satisfactory mode of exhibiting antimony to children, is to give the *vinum antimonii*, combined with sweet spirits of nitre, in the doses of two, three, or four drops of the former, with eight or ten of the latter, repeated every two hours; the proportions of the former to be increased or diminished as the stomach is found to tolerate it. To infants within the year, antimony ought to be given, it seems to me, with the very greatest caution. Many at that age do not tolerate well more than from half a drop to two drops of the wine, every two hours. Beyond that dose, it is very apt to produce exhausting nausea or diarrhœa. The use of the antimony ought to be persevered in until the acute symptoms have moderated, when it should be left off gradually.

Before concluding my remarks upon antimony, it is proper to state that I am well aware of the fact that the doses recommended by the authors quoted above, and by many others of the highest authority, come at last to be tolerated by the stomach in a great many cases. I cannot but think, however, from personal experience, and from the evidence adduced by many observers in regard to the injurious effects of such doses upon the stomach and intestines, in at least some of the cases, that we are scarcely justified in resorting to them, particularly as it has been found (by myself

at least), that the disease is curable by smaller doses, in connexion with other means.

Calomel.—I am induced to believe from personal experience in private practice, that calomel is seldom necessary in the treatment of pneumonia. I have found a fair proportion of the cases that have come under my hands to recover without a resort to it, and, as I deem it a violent remedy that ought to be administered only when really called for, I have seldom prescribed it, and when I have done so, it has been in one or two full doses during the acute stage of the malady, for the purpose of procuring its sedative and cathartic action. MM. Rilliet and Barthez oppose its employment in secondary pneumonia as injurious, and in idiopathic cases as unnecessary, because in the latter form, the treatment by depletion and antimony has succeeded very well in their hands. Dr. West, on the contrary, awards high praise to it as a remedy after depletion; but as he gave it largely combined with tartar emetic, I am disposed to ascribe a great part of the favourable effects of the treatment to the antimony. Dr. West also recommends it very highly in cases of neglected pneumonia, after the time for depletion has gone by. In such cases its internal employment is often contra-indicated by the existence of diarrhœa; under these conditions he uses it externally. In children of four years of age, he directs one drachm (of mercurial ointment I suppose), to be rubbed into the thighs or axillæ every four hours. He says he has never known salivation to follow this plan, but has found the symptoms to diminish gradually in severity, and the solid lung to become once more permeable to air. Of the success of this plan of treatment I have had no personal experience, as such cases are very rare in private practice. I would, however, under these circumstances, prefer the employment of the iodide of potassium, which I have found of great service in the chronic pulmonary complaints of children. From half a grain to a grain of that remedy, dissolved in compound syrup of sarsaparilla, may be given three times a day, to a child three or four years old.

Expectorants; purgatives.—Ipecacuanha is preferable to the antimonial preparations in the treatment of pneumonia under the following circumstances: when the disease occurs in infants

within the year; in children of highly nervous temperament, or of feeble and delicate constitution; in many cases of the secondary form; in some of those in which bronchitis is the predominant element of the attack; in mild cases; and lastly in subjects who from idiosyncrasy do not bear antimony well, and of such there are many. The most convenient preparation is the syrup, of which from ten to twenty drops may be given every two hours, at four years of age; from five to ten drops, between one and three years; and from one to three drops to infants of two or three months. It is useful to combine sweet spirits of nitre with the syrup, in doses to suit the age. In lobular pneumonia, when the child is much oppressed by the presence of large quantities of mucus in the bronchia, the operation of an emetic is often highly beneficial. Ipecacuanha is the most suitable remedy under these circumstances, as it answers the indication perfectly well, and produces less exhaustion and depression than any other. Either after or without the emetic, I have found decided benefit in such cases from the administration of decoction of seneka and spiritus Mindereri. For a child two years old I direct two drachms each of seneka and liquorice root to be boiled in a pint of water down to twelve ounces, and strained. A teaspoonful of this decoction is to be given every two hours, with twenty drops of the spiritus Mindereri.

A *purgative* dose is useful at the beginning of the attack as a derivative and evacuant, but after that period, remedies of that class need to be used only to such an extent as to keep the bowels soluble. It is scarcely necessary to say that when antimony is employed, especially in any considerable quantity, it almost always supersedes the necessity of purgative medication. The patient ought, however, to have a stool once a day or every second day. At first, a dose of castor oil, a moderate quantity of magnesia or syrup of rhubarb, is all-sufficient. In the after-treatment of the attack, a repetition of the same remedies in smaller quantity, or, what is often better, an occasional enema, is all that is necessary. Violent or frequently repeated doses of purgatives are injurious by exhausting the patient, or by setting up gastric or intestinal irritation.

External applications.—Rilliet and Barthéz say that they have

never found either blisters, Burgundy pitch or tartar emetic plasters, exert the least influence upon any one of the symptoms of pneumonia, but that, on the contrary, they increase the fever. Dr. West has been led to abandon the use of blisters entirely, in consequence of the irritation and fever they occasion, and the disposition to sloughing he has observed amongst the poor. I think I have observed great benefit in a few instances from the application of a blister, when depletion and antimony or ipecacuanha have failed to produce some moderation of the symptoms after four or five days. I have always been careful, however, even in children two or three years old, never to allow the blister to remain longer than an hour and a half or two hours. I direct it to be removed commonly in an hour and a half, whether the integument be blistered, of a scarlet colour, or unchanged. A warm bread and milk poultice is then used as a dressing, and rarely fails to cause vesication in a few hours, if it has not already occurred. Many times I have been told by the mother that the skin was still white and unchanged beneath the blister when she removed it, and yet the poultice has produced full vesication. Treated in this way, blisters cause very little irritation, and I have never known but one to slough in my life, which happened in a child whose skin had been very much irritated by frictions with amber oil and ammonia.

Since the spring of 1845, however, when I was led to make frequent use of mustard poultices and pediluvia in the treatment of the bronchitis and broncho-pneumonia of measles, I have rarely employed blisters, but have preferred the employment several times a day of the remedies just indicated. Two parts of indian meal and one of mustard, for young children, and for those who are older equal proportions, are to be mixed with warm water, and spread thickly like a poultice on a piece of flannel or rag five or six inches square. This is to be covered with fine muslin, linen, or gauze, and applied over the back of the thorax. It may remain from fifteen to forty minutes, or until the child cries or complains or the skin is reddened. The mustard foot-baths may be employed at the same time with the poultices. These applications are useful whenever the oppression is very

great, and, when resorted to in the evening, often allay irritability and dispose the child to sleep. The number of applications to be made in a day must depend on the urgency of the symptoms. I have employed them from once a day to every two or three hours.

Tonics and stimulants are to be resorted to in cases which manifest undoubted signs of debility. When, therefore, the attack occurs in a feeble child; when the inflammation remains unresolved after depletion and other remedies, and when, as Dr. West says, extensive bronchial respiration persists, though the fever has moderated, attention must be paid to the state of the constitution, to the neglect of the local disease. The system must be sustained and strengthened in order to give it time and power to carry on the operations necessary for the removal of the local obstruction. With this view, all depleting means should be abandoned, and the child put upon a nutritious diet and the use of tonics and stimulants. The diet may consist of preparations of milk, of soups, eggs, and small quantities of meat carefully prepared. The best stimulants are weak brandy and water, milk punch, wine whey, or wine whey and arrow-root water. The most suitable tonics are quinine and the preparations of iron. A grain of quinine, suspended in a mixture of equal parts of syrup of gum and syrup of ginger, and given three or four times a day, has succeeded best in my hands.

Opiates are sometimes necessary in cases occurring in children of highly nervous and irritable temperament, in the secondary and cachectic forms of the disease, and whenever the cough is very frequent and harassing. After the acute symptoms have moderated a little, an evening dose of the Dover's powder, or a few drops of laudanum or paregoric, with sweet spirits of nitre, are often of great service.

General management.—The diet ought to be very strict in idiopathic cases. The child should have nothing for two or three days except demulcent drinks, or weak milk and water sweetened; no solid food ought to be permitted. After the severity of the symptoms has moderated, pure milk, milk toast, or chicken water may be allowed; and when all fever has disappeared, the usual food

may be given, at first, however, in small quantity. A child at the breast ought not to nurse as freely as usual. At all ages, care should be taken to give water from time to time: very young children often suffer severely for want of attention to this point. I have seen the most violent and obstinate screaming in a child a year old, quieted at once by a copious draught of cold water. The patient should be kept closely confined in a well-ventilated room, with the temperature as nearly as possible between 68° and 70° F. A direction given by some of the French writers, and by Dr. Gerhard, is not to allow very young children to lie for too long a time in one position in bed or in the nurse's arms, as it is apt to produce a stasis of blood in the dependent portion of the lungs, and thus maintain or increase the disease. Dr. West recommends, whenever the inflammation has reached an advanced stage, or involved a considerable extent of the lungs, that the patient be moved with great care and gentleness, lest, as he has often seen occur, convulsions be produced.

ARTICLE II.

BRONCHITIS.

Definition; synonymes; frequency; forms.—The term bronchitis is now universally employed to express inflammation of the mucous membrane of the bronchia.

It is usually called in this country catarrh, and catarrhal fever. It has been stated under the head of pneumonia, that many of the cases known amongst us by the popular term catarrh-fever, are, in fact, cases of lobular pneumonia. I shall, on account of this misapplication of names, endeavour to draw the distinction between bronchitis and lobular pneumonia with great care. Bronchitis is not treated of either by Dewees or Underwood. Dr. Eberle confounds it with pneumonia under the titles of catarrh, catarrhal fever, acute bronchitis, and pleuritis.

Bronchitis is one of the most frequent of the diseases of childhood. We have already seen that pneumonia causes a larger

proportion of deaths amongst children in London, than any other disease except the exanthemata. It appears from the tables of mortality published by Dr. Condie (*Dis. of Children*, note, page 88), that of 26,510 deaths under fifteen years of age in Philadelphia, during the ten years preceding 1845, 1592 were caused by pneumonia, and 1172 by bronchitis, and that of the different diseases of the respiratory organs, bronchitis was the most frequent after pneumonia. It is more common as a secondary than as an idiopathic disease. Of 115 cases observed by Rilliet and Barthez, only 21 were idiopathic. Of 23 cases that I have recorded, 11 were primary and the remaining 12 secondary. The diseases during the course of which it is most apt to occur, are pertussis and measles.

I shall describe three forms of the disease: 1, *acute bronchitis* of moderate severity; 2, *acute suffocative bronchitis*, or catarrhus suffocativus, the congestive catarrhal fever described by Eberle and by Dr. Joseph Parrish of this city; 3, *subacute* or *chronic bronchitis*.

Causes.—Amongst the *predisposing* causes of the disease, *age* is one of the most important. Rilliet and Barthez suppose it to be much more common in children over, than in those under five years of age. Of 115 cases observed by them, 37 occurred between the ages of one and five years, and 78 between six and fifteen years of age. It is scarcely fair, however, to compare a period of nine years with one of only four, as is done in the above statements. Of 23 cases that I have seen in private practice, 8 occurred between birth and two years of age; 10 between two and four years; 3 between four and six; and 2 between six and ten years of age. It would seem also that the simple acute, and the acute suffocative forms are most common under six years of age, while the secondary cases occur more frequently after that age. The fact of its being more frequently a secondary than a primary affection, has already been noticed. The diseases in which the largest number of cases occur are measles, pertussis, and typhoid fever. The secondary cases are most common, of course, during the prevalence of the diseases whose progress they complicate, whilst the primary cases are most common in the cold

months of the year, and especially in the autumn and spring. Bronchitis is sometimes epidemic amongst children as it is amongst adults.

The only *exciting causes* whose effects in the production of the disease seem clearly proved are, sudden transitions from a warm to a cold atmosphere, and sometimes the contrary change; prolonged exposure to cold, particularly when combined with moisture; and the inspiration of irritating gases.

Anatomical lesions.—Acute form.—The morbid alterations always exist in both lungs; and, according to M. Bouchut, are most intense in the right. The appearances observed in most of the cases are redness, caused by injection of the minute vessels of the mucous and subjacent tissues, softening of the mucous membrane, which can be ascertained only in the larger bronchia, and sometimes a thickened, unequal, and rough appearance of the same membrane. Ulcerations are extremely rare. In mild cases, the bronchia contain a viscid, transparent, frothy, or opaque yellowish mucus; in more violent cases, they are filled with a yellowish, yellowish-white, or whitish fluid, which is thick, not frothy, and mixed with pus and mucus, or with grayish, thin, not frothy, and liquid pus. The fluid escapes at the open extremities of the bronchia. Portions of pseudo-membrane are sometimes found mixed with the secretions just described, while in other cases, false membranes alone are present. In some instances, the false membrane exists in the form of patches, and in others it constitutes a lining to the whole extent of the bronchial ramifications. It is usually soft and but slightly adherent, and the mucous membrane beneath is either very pale and of its usual consistence, or red, softened, and rough. The different kinds of secretion are commonly most abundant in the bronchia of the inferior lobes.

In most of the severe cases, another lesion, dilatation of the bronchia, is also found upon examination. This change evidently occurs under the influence of the inflammation; it may affect either the length of the air-tubes, or only their extremities. In the former condition, the tube continues of the same size, or becomes gradually larger from one of its early subdivisions, until it reaches the surface of the lung; in the latter condition, a sec-

tion of the lung presents an areolar appearance, from the presence of a multitude of little rounded cavities, communicating with each other, and with the bronchia, of which they seem to be a continuation. These cavities are generally central, though they are sometimes found upon the surface of the lung, in which case they are formed of the pleura, lined by the thinned membranes of the dilated bronchus.

Chronic bronchitis.—The lesions just described as characteristic of acute bronchitis, are also met with in the chronic disease. The dilatation of the air vessels, however, presents different features. The calibre of the enlarged tube is often much greater, its walls are whitish and uneven and cry under the scalpel, and beneath the mucous lining may be seen hypertrophied transverse fibres. The mucous membrane itself remains smooth and polished, while the tissues beneath are thickened and hypertrophied.

Symptoms ; sketch of the disease ; course ; duration.—*Acute simple bronchitis* generally begins with a moderately frequent cough, which, dry at first, soon becomes loose, and is neither paroxysmal nor painful. The expression of the face remains natural, with the exception of an appearance of slight languor. The pulse and respiration are but slightly accelerated ; the external phenomena of the latter, an important means of diagnosis in infants, remain natural ; it occurs without jerking, the rhythm continues even and regular, and there is no violent action of the *alæ nasi*. The percussion is not modified. Auscultation reveals in very young children, a mixture of mucous and sibilant râles on both sides, which come and go, and are of short duration ; in older children, the moist râles predominate, and commonly last several days. These sounds are seated in the larger bronchia. The temper of the child is not much changed ; the appetite is not entirely lost ; there is neither vomiting nor diarrhœa ; and the fever is usually slight. The disease remains nearly stationary, or increases for a variable length of time, after which the cough becomes looser, and in children over five years of age, is sometimes attended with expectoration of frothy or yellowish mucous expectoration, whilst under that age there is no expectoration. The fever and other symptoms, with the exception of the cough, now

subside ; the cough remains some days longer. The duration of this form is generally short ; the idiopathic cases last usually from six to fifteen days, and more rarely from sixteen to twenty-five ; the duration of the secondary cases depends in great measure upon the nature of the diseases during which they occur.

The *acute suffocative bronchitis*, or congestive catarrhal fever of Parrish and Eberle, and suffocative catarrh, capillary bronchitis, or bronchial croup of other writers, may succeed to the form just described, or appear as an idiopathic affection. Under either condition, the general symptoms are more threatening than in the preceding form. The child is much more restless, irritable, and cross ; violent fever soon comes on, the pulse being full and frequent, running up to 130 and 180 ; the face is flushed ; the tongue moist and furred white ; the thirst acute ; and the appetite lost. The respiration soon quickens ; the cough, if it existed before, increases, and if not, soon makes its appearance, and is generally dry ; it occurs in short paroxysms, with or without stridulous sound, and after a few days, is accompanied by yellowish, or more rarely by pseudo-membranous expectoration. It is sometimes painful. The resonance on percussion is not modified. Auscultation reveals snoring or sibilant, mucous, and sometimes sub-crepitant rhonchi. In very young children, the vesicular murmur is rather more feeble than usual ; the dry rhonchi are less abundant than the moist, are observed only at times, and at other moments are absent : the mucous râle is very abundant, and varies in sound according to the size of the bubbles by the breaking of which it is produced ; it is present both in the inspiration and expiration, but especially in the inspiration, and is heard on both sides of the chest. It is fugitive and irregular, disappearing sometimes after an effort or after coughing, to be replaced by sub-crepitant râle or even natural respiration, and soon after returning with its usual characters. The sub-crepitant râle, which is always present in young children, is subject to the same changes and irregularities as the mucous râle.

If the disease increases, and in some instances from the beginning, the respiration is very frequent, irregular, and difficult. When the oppression is very great, it is accompanied by paleness or dark

congested colour of the face, particularly after coughing; by violent action of the alæ nasi, and by coolness or coldness of the whole surface. The pulse becomes still more frequent, and at the same time small and irregular. The decubitus is dorsal, with the shoulders more or less elevated. If the attack is prolonged, irregular remissions of the symptoms occur. Towards the close a great change in the expression of the face takes place; the cough becomes very difficult, the respiration extremely frequent, the pulse imperceptible; the child is soporose or very restless; and at length death closes the scene.

The duration of this form is variable. According to Dr. Eberle, it seldom lasts longer than two or three days, and in very young infants, death sometimes occurs on the first day. M. Bouchut gives as the duration in children at the breast, from two days to a week, and states that it generally runs into lobular pneumonia. In older children it usually lasts from three or four to six or eight days, but sometimes eighteen days or more.

Sub-acute and chronic bronchitis generally follows one of the acute forms of the disease. The phenomena yielded by auscultation are very irregular both in character and degree; the frequency of the respiration, and the attacks of dyspnœa persist; the cough is loose and paroxysmal; the pulse is frequent and small; evening exacerbations of fever take place; the face, and sometimes the rest of the surface, are often covered with perspiration. Auscultation reveals tubal blowing, with mucous or loud sonorous rhonchus, which seem to indicate the presence of dilatation of the bronchia. Emaciation makes rapid progress; the face is pale and blanched, the eyes sunken, the nostrils are covered with mucous or bloody crusts, and the lips ulcerated. Strength diminishes progressively; the appetite is lost, and the thirst acute; colliquative diarrhœa appears; and after twenty, forty, or more days, the child perishes in the last stage of marasmus. This form of bronchitis often simulates phthisis very closely, and may last for a long time, even several years. It rarely occurs under the age of five years. The expectoration consists of purulent or pseudo-membranous secretions in variable quantity.

Particular symptoms.—Physical signs.—The *dry râles* are

amongst the most frequent alterations of the respiratory sound in bronchitis. They may be sibilant or sonorous; they seldom exist alone, but are accompanied by mucous râle, and diminish as the latter becomes more abundant. As the dry râles cease to be heard, they are replaced by mucous or sub-crepitant rhonchus, or by feebleness of the respiratory murmur. The sibilant râle is often heard over the whole thorax, though sometimes confined to the posterior portions. It is not confined to cases of inflammation of the larger bronchia only, but is also present in capillary bronchitis.

Humid râles.—Mucous and sub-crepitant rhonchus do not exist in all cases without exception, as they may be absent in such as are very mild. They may generally be heard on both sides behind, more rarely over the whole of the chest, and almost always both in inspiration and expiration. They are generally persistent, but are sometimes suspended for a moment and replaced by sibilant rhonchus, or feeble respiratory sound. Their duration is in proportion to that of the disease. The value of the sub-crepitant râle as a symptom of bronchitis depends chiefly on the age of the patient. In children under five years of age, who, after presenting the signs of bronchitis for a few days, exhibit a fine and equal sub-crepitant rhonchus on one or both sides behind, there is strong ground for suspecting the formation of pneumonia. It is not certain that the child has pneumonia, but it is very probable, since acute bronchitis in very young children is almost always associated with pneumonia. After the age mentioned, sub-crepitant rhonchus is indicative only of bronchitis, unless it be heard during the course of some disease in which lobular pneumonia is a frequent complication, when it will be as likely to indicate broncho-pneumonia, as simple bronchitis.

Feeble respiratory murmur is sometimes observed. It is not permanent, occurs during the interruptions of the sub-crepitant or sonorous râle, and does not occupy the whole extent of the thorax, but is limited; it is intermittent, and is not accompanied by diminished sonoreity.

When dilatation of the bronchia exists to a considerable extent, it gives rise to bronchial or even cavernous respiration, and to

resonance of the voice, cry, and cough. The bronchial respiration differs from that of pneumonia by its tone, and by its intermitting. The percussion is generally sonorous.

The physical signs above described, are not invariably present in bronchitis. Cases do occur, though they are very rare, in which auscultation fails to reveal the presence of the disease.

Rational symptoms.—The rational symptoms are of the utmost importance in informing us of the severity of the attack.

Cough generally exists from the beginning, being in mild cases more or less frequent, and either dry or loose; while in severe cases it is frequent or very frequent, at first dry and then moist, and very rarely hoarse. In acute or sub-acute capillary bronchitis, the cough has a particular character. From the first day, it occurs in short paroxysms, lasting from a quarter to half a minute. The paroxysms vary greatly in violence, occur at irregular intervals, and generally continue without interruption to the fatal termination, though they are sometimes replaced by simple loose cough a few days before that event. The cough is rarely painful, so long as the inflammation remains simple. Expectoration is never present in very young children. When it occurs in those over five years of age, it consists, in the mild form, of a sero-mucous or yellowish mucous frothy liquid. In general bronchitis, it is sero-mucous at first, becoming after a few days yellowish and more or less viscous; it is sometimes nummular, and sometimes amorphous.

The *respiration* varies in its characters according to the extent and violence of the disease. In mild cases, it is not much increased in frequency, being generally between 28 and 40 in the minute. In more violent cases, and particularly when the disease implicates the smaller bronchia, it becomes very frequent. The acceleration is slight in the beginning, but increases regularly as the case progresses; thus it may be 30 at first, and rise afterwards to 50, 60, 80, and even 90. When not very much quickened, it remains even and regular; when more so, it becomes somewhat laborious, and the movements of the chest are full and ample; in severe cases, attended with much dyspnœa, it is often irregular, or assumes the characters to which M. Bouchut has applied

the term *expiratory*; that is, the order of the movements is inverted, each respiration beginning with the expiration, leaving the pause between the inspiration and expiration, instead of between the expiration and inspiration. In chronic bronchitis with copious purulent or pseudo-membranous expectoration, the dyspnœa is generally habitual.

Fever.—The fever is slight in mild cases, the pulse rising very little above its natural standard. The heat is not great, and the febrile movement usually subsides before the termination of the disease. In the grave or capillary form, on the contrary, the pulse is always frequent, and continues to increase in rapidity as the disease advances. It varies between 104, 120, 160, and in very violent cases, rises as high as 200. Early in the attack, it is vibrating, rather full and regular, whilst in fatal cases, it always becomes small, irregular, trembling, and unequal. The skin is generally hot in proportion to the activity of the pulse, except towards the termination, when the extremities often become cool. It is almost always dry. In very young children it is often pale and cold, and covered with perspiration from the beginning.

The *expression* of the face is unchanged in mild cases, but when the disease is violent and extensive, becomes deeply altered after a few days. The eyes are then surrounded by bluish rings; the expression is uneasy, anxious, and sometimes, but less frequently, exhibits an appearance of profound exhaustion. The anxiety of the countenance increases with the oppression; the *alæ nasi* are dilated; the nostrils dry or incrustated; and the lips and face, which are extremely pale or momentarily congested, assume a purple tint, particularly after the paroxysms of cough.

The *decubitus* is indifferent at first, but as the disease progresses the child lies with its thorax more or less elevated, or is restless and constantly changing its position.

In dangerous cases there is great *distress* and *restlessness* after the first few days, or even from the beginning. In some instances the irritability and peevishness are excessive and uncontrollable, while in others, there is heaviness and somnolence, especially towards the termination of fatal cases. Some of the disorders

of the nervous system just mentioned are present in all the grave cases.

Digestive organs.—There is moderate *thirst* and incomplete *anorexia* when the disease is mild, but, when severe, the thirst is generally acute, and the appetite entirely lost. The state of the bowels varies. The *tongue* and abdomen present no special characters in idiopathic cases.

Diagnosis.—The mild form of bronchitis, in which the inflammation is confined to the larger bronchia, is not likely to be mistaken for anything but the early stage of whooping cough. The diagnosis can be made only by attention to the different characters of the cough, which is more spasmodic and paroxysmal in pertussis, by the absence of fever in that disease, and by the development of the peculiar symptoms of each, as the case progresses. The severer forms of bronchitis, and particularly the suffocative, may be confounded with lobular pneumonia. In very young children, it is often impossible to distinguish between extensive bronchitis and lobular pneumonia, the physical signs being the same in both. M. Bouchut states, however, that the diagnosis can be made in very young children, by careful attention to the external phenomena of respiration. He says that in generalized bronchitis, the respiration is frequent, abdominal, without constriction of the base of the thorax, and without agitation of the nostrils; while in confirmed pneumonia, on the contrary, the respiration is inverted as to its rhythm, and is jerking or moaning, like that of an adult in whom a sudden sigh is followed immediately by a quick inspiration; it is in fact *expiratory*.

Chronic bronchitis may be mistaken for tuberculosis of the lungs or of the bronchial glands. The distinction can be made only by careful study of the history of the case, and of the phenomena afforded by auscultation and percussion.

Prognosis.—Bronchitis is a much more serious disease in children at the breast and those under five years of age, than after that period, because of the strong disposition it has to pass into pneumonia. For that reason it ought always, even in its mildest form, to be carefully watched in its symptoms and progress, when it occurs under the age mentioned.

The acute simple form is in itself a mild affection of but little consequence, but requires to be watched for the reason just given. When, on the contrary, the disease is more extensive, affecting all the bronchial ramifications, and constituting the suffocative form, it is at all ages a most dangerous malady. Rilliet and Barthez state that all their own patients, and those of M. Fauvel also, died. I have seen but two well-marked primary cases of this kind. One occurred in a child nineteen months old in the month of December 1846. The child had been sick for three days with an attack of the mildest form of acute simple bronchitis, when it suddenly became alarmingly ill. The dyspnœa was extreme; the respiration between 80 and 90; the face pallid, anxious, and suffering; the surface cool and covered with cold perspiration; the cough paroxysmal, moderately frequent, short and painful; and the pulse very rapid and small. The child was satisfied only when resting erect in the arms of its mother, with the front of its chest lying upon her breast, and its head over her shoulder. There were abundant sibilant, mucous, and sub-crepitant râles over all the posterior portion of the thorax. It continued very ill with these symptoms for thirty-six hours, then began to mend, and in two days more, was convalescent. The other case occurred in a boy between one and two years old, and presented the same symptoms, except that they were less severe.

The symptoms indicating great danger are: increase of the dyspnœa, extreme anxiety, small and irregular pulse, coolness or coldness of the skin, with clammy sweats, much jactitation, and delirium, drowsiness, or coma. With such symptoms, the danger is greater and the fatal termination more imminent in proportion as the child is younger, less robust, and its constitution exhausted by preceding or coincident disease.

Treatment.—The acute simple disease requires, when mild, little other treatment than careful attention to the hygienic condition of the patient and the administration of some mild expectorant. The child ought to be confined to an apartment with a well-regulated temperature, and kept quiet, either in bed or on the lap. The clothing ought to be warm, and yet not sufficient to produce free perspiration, which would expose to chilliness. The diet

must be simple, and may consist of some of the preparations of milk with bread. As an expectorant, an occasional dose of syrup of ipecacuanha through the day, either alone, or if the cough be frequent and troublesome, combined with a little paregoric, laudanum, or solution of morphia, is proper and useful. The bowels ought to be moved once in the twenty-four hours, either naturally or by an enema. A warm pediluvium, with the addition of salt or mustard, in the evening, will generally assist to procure a quiet night.

When, in the same form, the symptoms assume greater severity, when the signs of reaction are prominent, the dyspnœa considerable, and the cough frequent and harassing, it is sometimes, though not always, advisable to take a little blood. In children under three years of age, it is best, as a general rule, to make use of leeches, by which from one to two ounces of blood may be taken from the interscapular space; in those over that age, from two to four ounces may be drawn in the same way, or by venesection. It seems to me, however, that the great majority of cases of this form of bronchitis will do perfectly well without bloodletting of any kind. A gentle purge ought to be given, unless the bowels have already been freely moved. This may consist of castor oil, rhubarb, magnesia, or what is a very convenient dose for children, half a teaspoonful of fluid extract of senna mixed with a teaspoonful of spiced syrup of rhubarb. At the same time some febrifuge and diaphoretic may be exhibited with much advantage. I am in the habit of using the antimonial wine or syrup of ipecacuanha, combined with sweet spirits of nitre, as in cases of pneumonia. When the fever is considerable and the patient over a year old, the antimonial preparation is the best; from one to four drops, with five drops of sweet nitre, may be given every two hours. In some few children and in young infants, half a drop only of the wine will be borne without nausea and exhaustion. If the ipecacuanha be preferred, and it is generally most proper for children at the breast, the dose must be proportioned to the age, constitution, and present condition of the patient.

If, as the case progresses, the bronchial secretions become very abundant and the dyspnœa severe, the proper remedy is an emetic.

This may be ipecacuanha, either in powder or syrup, the syrupus scillæ compositus, or a teaspoonful of powdered alum, to be repeated, if necessary, in ten or fifteen minutes. The latter substance is, as I have stated under the head of croup, a very certain, efficient, and safe emetic.

Great benefit may be obtained in all forms of bronchitis, from the more or less frequent application of mustard poultices to the front or back of the thorax, and from mustard pediluvia. If the symptoms are obstinate, a small blister over the sternum, or still better, the interscapular space, allowed to remain not more than one and a half or two hours, and then dressed with a poultice, is often very useful, though they should be avoided in young children as long as possible.

The mercurial preparations, so much recommended by many of the English and by some of our own writers, appear to me to be very seldom really necessary in this, or indeed, in any of the forms of bronchitis in children.

Rilliet and Barthez recommend, when the cough and sibilant râle persist after the disappearance of the febrile symptoms, the use of small doses of the flowers of sulphur. I have myself known this remedy to prove useful in such cases. About four grains may be given every three hours to a child four years old.

The *grave acute or capillary* form of the disease must be treated more actively than the preceding. While the pulse remains full and strong, the face flushed, and the skin hot, depletion is the most efficient remedy. The amount of blood to be taken must depend on the age, constitution and present condition of the child; if over two years old, if of strong and robust appearance, and not reduced by preceding disease, from three to six ounces might be drawn from the arm. In younger children it is better, in general, though not in all cases, to employ leeches, taking within two ounces at a time as a common rule. I am in the habit of applying leeches, in the cases of children, to the interscapular space, as most convenient and most effectual, because of its proximity to the roots of the lungs. After the child has recovered from the immediate effects of the bleeding, an emetic of ipecacuanha or alum may be administered with great benefit; two hours after the emetic, small

doses of antimonial wine and nitre, or fractional doses of tartar emetic should be prescribed, and repeated every hour or two hours. At the same time a mustard poultice to the thorax and a mustard pediluvium may be directed, and advantageously resorted to again in four or six hours, or, if the oppression be very great, in a shorter time.

In still more severe cases, in which the dyspnœa is excessive; the pulse very rapid and small; the skin cool and pale; the jactitation very great; and when there is present extensive mucous and sub-crepitant rhonchus, the treatment recommended by Rilliet and Barthez, and by M. Fauvel, is the frequent employment of emetics. Depletion is, it seems to me, entirely contra-indicated under such circumstances. In one very severe instance of the kind already referred to, the dangerous symptoms subsided under the use of cupping, mustard poultices and pediluvia frequently renewed, and the internal use of decoction of seneka and spiritus Mindereri every hour. Six small cups, of which only two were scarified, were applied over the back of the thorax. In another case, which occurred in a child eighteen months old, during an attack of measles, the symptoms yielded, and the eruption made its appearance, under the use of mustard pediluvia and poultices applied every two hours, and the internal use of spiritus Mindereri and sweet spirits of nitre. In both cases, the symptoms of exhaustion were so strongly marked, that I feared to employ emetics, lest they might fatally increase the already dangerous prostration, though the dyspnœa and abundant mucous and sub-crepitant râles seemed to call for them. If the exhaustion were to become excessive, it would be proper to resort to stimuli, amongst which wine whey, or weak brandy and water, would be the most suitable.

Chronic bronchitis.—The most important points in the treatment of chronic cases consist in a rigorous and persevering regulation of the hygienic conditions of the patient, and in the use of tonic, balsamic, and expectorant remedies. The child should be carefully and warmly clothed; it ought to be taken as often as possible into the air in fine weather, and only in fine weather; and the diet should be selected with a strict view to the improvement of the strength and vigour of the constitution. The food may

consist, if the child be of proper age, of light meats, of potatoes and rice, as the only vegetables, and unless there is some contra-indicating circumstance, of a small quantity of wine, with the mid-day meal. The best wine is port, of which one or two tablespoonfuls may be given, in a considerable quantity of water.

Tonics must be administered throughout the course of the disease, or until the appetite and strength shall have improved to such an extent as to make them no longer necessary. The best is probably quinine, in the dose of a grain morning and evening, to be continued for several weeks; or, the citrate of iron and quinine in the dose of half a grain or a grain three times a day, or from one to three drops of the solution of iodide of iron, used in the same way, may be substituted.

In one case of chronic bronchitis, which came under my care, the child recovered under careful regulation of the hygiene, and the use of a decoction of seneka prepared by boiling a drachm each of seneka and liquorice roots, in a pint of water, to half a pint. The decoction was strained, and a large teaspoonful given three times a day. The remedy was used during a period of two months; under its use the child grew fat and strong, and recovered entirely from the disease.

Other remedies, proposed by different authors, are the various resinous preparations; the balsams of tolu and copaiba, benzoin, and the sulphurous mineral waters. While these means are employed, it is recommended also to make use of counter-irritants. If any are used they ought to be such as will not produce too much inflammation of the skin, as for instance weak Burgundy pitch plasters, daily frictions with hartshorn and sweet oil, a simple diachylon plaster, or very mild pustulation with croton oil.

ARTICLE III.

PLEURISY.

Definition; frequency; forms.—Pleurisy consists in inflammation of the pleural serous membrane.

Idiopathic pleurisy is a very rare disease under five years, and especially during the first and second years of life. After the age of five years it becomes more frequent. Secondary pleurisy, on the contrary, or that which occurs in the course of other diseases, is common at all ages. M. Bouchut met with it in 23 out of 68 autopsies of new-born and suckling children. Of the 23, 9 accompanied acute pneumonia, 6 tubercular pneumonia, 5 enterocolitis, and 3 different other diseases. This form of the affection is rarely detected during life, being masked by the concomitant malady. I have met with only three idiopathic cases, two of which occurred between the ages of four and five, and one at seven years of age.

I shall describe two forms of the disease, the *acute* and *chronic*.

Predisposing causes.—As to the influence of *age*, it has already been stated that idiopathic pleurisy is very rare between birth and five years of age. Secondary cases, on the contrary, are most common between the ages of one and five years. The disease is more frequent in boys than girls. The idiopathic form is most apt to occur in vigorous and hearty subjects, while the chronic and cachectic forms attack those who are feeble and delicate. It is often, as already stated, a secondary affection, occurring particularly during pneumonia, and after that disease, during rheumatism, scarlet fever, and Bright's disease. *Season* is another predisposing cause. It is most common during winter and spring, especially the latter.

The *exciting causes* are very obscure in most cases. The only ones which seem to have been ascertained with any certainty, are long exposure to cold and to sudden changes of weather. It has been said to follow external violence. In one of the cases that came under my observation, the child had struck the affected side severely against a pointed stick on the day of the attack.

Anatomical lesions.—The serous membrane may retain its natural characters, which happens in the majority of cases, or it may present the different appearances indicative of inflammation. These are more or less minute and abundant injection and punctation, spots or patches of an ecchymotic appearance, observable particularly at the points where deposits of false membrane have

taken place. Another change produced in the pleura by inflammation is the loss of its natural polish, which is replaced by a more or less granular and rough appearance. In chronic cases it becomes whitish or opaline in colour, and thickened. It is very rarely softened.

In addition to the lesions of the pleura itself there are various diseased products of secretion which require notice. These may be either solid or liquid. The solid products are the false membranes which exist so generally in all serous inflammations. These are found both upon the costal and pulmonic pleura. In their recent state they are of variable size and thickness, being in some cases very soft and deposited in small points; in others, more extensive, but thin like paper; and in others again thicker (one or two lines in thickness), firmer, and decomposable into several layers. The outer layers are yellow, elastic, and soft, while the inner ones are red, more resisting, and marked with vascular arborizations. When observed some time after their formation, the false membranes are found to have been converted into cellular adhesions, which may either be very loose, or fasten the lung tightly to the costal pleura. The adhesions are generally, however, thin, transparent, and in the form of loose bridles. After a length of time, the false membranes come to present the appearances of true serous tissue, and like that, are susceptible of inflammation.

The fluid found in the pleural cavity usually consists of transparent or turbid serum, holding albuminous flocculi in suspension. Sometimes, but more rarely, it consists of purulent serum, and still more rarely of pure pus. The liquid generally occupies the lowest portion of the thoracic cavity, but is sometimes circumscribed at various heights, or between the lobes of the lung, by abnormal adhesions, or by some part of the lung which has been rendered incompressible by inflammation.

The lung presents various alterations from its healthy condition. It is pressed backwards towards its root to a greater or less extent. The tissue of the organ is generally found in one of two conditions: either hard, not crepitating, impenetrable to the finger, and presenting a smooth surface when cut into, a state of things which has been expressed by the term *carnification*, and

which is a mechanical effect of pressure ; or else the lower lobe, which is in contact with the fluid, is large, heavy, fleshy, rather hard, not so easily penetrable by the finger as in simple hepatization, yielding under pressure only a small quantity of blood, and but slightly retracted towards the spinal column. The latter condition, depends in all probability on an effusion which has occurred after, or coincidentally with, hepatization.

In some cases, in which the effusion is but small, or where it has been absorbed, the lung is found to be elastic and crepitating. Whatever the amount of effusion may be, it is said that the lung can always expand to its normal size if the fluid be absorbed.

Pleurisy, whether complicated with pulmonic disease or not, is much the most frequently confined to one side. In idiopathic cases, it is more common on the right than left side ; when it accompanies pneumonia, it is, on the contrary, more common on the left than right.

Symptoms.—In describing the symptoms, I shall treat first of the physical, and afterwards of the rational signs and course of the disease.

The *physical signs* are exceedingly important, as they often constitute, especially in young children, the only means of recognising the disease. The *pleural friction sound* is less important than some other physical signs, as it is scarcely ever heard in children under five years of age, and only during the absorption of the fluid, as a general rule, in those above that age. *Bronchial respiration* may commonly be detected from an early period in the attack. At first it is heard during inspiration, but afterwards exists both during inspiration and expiration, or in the former alone. In the majority of the cases it is heard over the posterior portion of the thorax, and upon one side only. At first it is audible over nearly the whole height of the affected side, while later in the disease, it can be perceived only at the inferior angle of the scapula or in the interscapular space. Its duration is variable ; it may disappear in a few days, or last for a much longer time. In favourable cases it is usually replaced by feeble vesicular respiration, more rarely by friction sound, and sometimes by pure respiration. This sign is almost always present at all ages

in acute cases, but is often absent in those which are slow and tedious. In suckling children it is not constant, but intermits occasionally, so that it may be heard at one and not at the next examination. *Ægophony* can rarely be detected in children less than two years old. Under that age, there is heard instead of it resonance of the cry, especially in the region beneath and on a line with the spine of the scapula. It is intermitting like the bronchial respiration. In children over two years old, *ægophony* can often be distinguished by careful examination, but never, of course, unless the quantity of effusion is considerable. It is heard at an early period of the attack, and chiefly in acute cases, and must be sought for in the lower portion of the interscapular space, and the inferior dorsal region. It coexists almost invariably with bronchial respiration; lasts but a short time, disappearing after one, two, three, or four days; and is intermitting. In older children, it is sometimes replaced by diffuse resonance of the voice, as it is by resonance of the cry in infants.

Feebleness or absence of the respiratory murmur seldom exist at the beginning of acute cases, but in the sub-acute or chronic form are generally present from the invasion. In the latter class of cases feeble respiration is noticed first over the inferior portion of the dorsal region, but, as the effusion increases, it is heard also in the upper and anterior regions, and becomes more and more feeble, until at length no sound whatever is audible: the respiratory murmur is suppressed. In acute cases, on the contrary, the absence of the respiratory sound is observed at variable periods of the attack; when soon after the invasion, it is generally coincident with bronchial respiration, which, heard at first over the whole or inferior three-fourths of the dorsal region, becomes afterwards perceptible only in the interscapular space, or at the inferior angle of the scapula, while the respiration is feeble or absent over the lower portions of the lung. In very acute cases the feeble respiration remains limited to the dorsal region, and disappears after a few days, while in chronic cases it extends over a larger surface, and continues for several weeks, or even months.

Percussion.—This means of diagnosis is very important in all cases of the disease accompanied by effusion of liquid, unless the

quantity is exceedingly small. When, on the contrary, the inflammation results merely in the production of thin false membranes, percussion furnishes no useful information.

Percussion is of no assistance, however, at the moment of invasion, as it is not until the period at which effusion takes place that the resonance of the thorax begins to be altered. In acute cases, the resonance is generally duller than natural, though seldom entirely dull, on the second, third, or fourth day. As the effusion augments, the dulness increases over the region occupied by the fluid, until at length all resonance ceases, and the sound is perfectly flat. The degree of dulness can be properly appreciated only by comparing the two sides together. The degree, extent, and duration of this sign will depend of course upon that of the effusion. In children as in adults, the sounds afforded by percussion vary with the position of the patient, which influences of course the situation of the fluid in the pleural cavity.

In regard to the physical signs of pleuro-pneumonia, it may be stated that when a pleuritic effusion takes place in a child labouring under pneumonia, it happens as a general rule, that the bronchial respiration occasioned by the inflammation of the lung increases in intensity, though in some few cases it is diminished or suppressed. Rilliet and Barthez lay down the following principle: "*that when a pleuritic effusion occurs in a child affected with hepatization of the inferior portion of the lung, all the abnormal sounds which were perceptible over the diseased point are considerably exaggerated, and the sonoreity disappears.*"

Inspection of the thorax affords no assistance at the invasion of the disease, nor generally in acute cases which last but a short time, and in which the amount of effusion is small. When, however, the effusion is large, it may be observed upon close examination, that the movements of the affected side during respiration are more limited than those of the opposite one, and that the intercostal spaces are more projecting than natural, in consequence of distension by the fluid within. At the same time *mensuration* will show that the side on which the effusion exists is larger than the other. The difference may amount to a third or two-thirds of an inch. In acute cases, in which the quantity of liquid is small, mensuration

will of course show no difference. When the effusion is large, *palpation* is a very important sign. The hand applied over the diseased side feels no vibration of its walls either during respiration, crying, or speaking. This sign exists in the cases of infants as well as of older children.

Rational symptoms; course; duration.—Acute pleurisy is very rarely met with, as already stated, in children under six years of age, except as a secondary affection. In idiopathic cases it begins with severe pain in the side, cough, some difficulty of respiration, increased frequency of the pulse, loss of appetite, thirst, bilious vomiting, sometimes headache, and in rare instances delirium. The *pain* in the side or *stitch*, is almost always present in acute cases occurring in healthy children, while in those which are slight, or occur in weak and debilitated subjects, or very young children, it very often cannot be detected. Sometimes, however, its existence may be ascertained in very young children by tenderness of the side shown during the act of percussion. It is aggravated by coughing, by full inspirations, by change of position, and by percussion. The seat of pain is almost always in front; but it may extend irregularly over the whole of one side, or be confined to the false ribs, or less frequently, to the neighbourhood of the nipple. The pain generally lasts from three to six days, though it sometimes continues longer. This symptom was complained of in the three cases that came under my notice. In one it lasted a week, and in the second only two days, though in both the effusion was extensive, and required several weeks for its absorption. In the third case, it continued for five days. In the last, the effusion was very slight. It was aggravated in all by coughing, by the act of respiration, especially when this was deep, and by motion.

Cough exists in nearly all idiopathic cases, and generally from the onset, though sometimes not before the second or third day. Usually frequent and dry, it commonly retains these characters in acute cases, for four or six days, and then diminishes rapidly. In more tedious cases it continues for a longer time, but moderates in violence after some days. In secondary cases it has no special characters. Cough existed in only two of the three cases seen by

myself. In one it was frequent, rather dry, and very painful for the first few days, after which it became looser, and though the inferior two-thirds of the right side were filled with effusion for a period of two weeks afterwards, it ceased entirely. In the other it was frequent, dry, very painful, so as to elicit loud complaints, and lasted a week, after which the child recovered with only slight effusion. In the third case, in which the whole of the left side was occupied by the effusion, there was no cough whatever; neither the mother nor myself ever perceived any.

The *expectoration* is very slight, or there is none. It was absent in the three cases referred to.

The *respiration* is usually accelerated in acute cases; but remains natural in other respects; the dyspnœa, however, is slight compared with that of pneumonia. In the chronic form it is generally regular and but little increased in frequency. The difficulty of breathing is commonly great in proportion to the earliness of the age, and to the extent and rapidity with which the effusion takes place. In one of the cases observed by myself, it was between 40 and 50 during the first two days, after which it fell, as the effusion took place, to 30. In the second it was 45 at first; at the end of a week 38; at the end of the third week, as the effusion was being absorbed, it was 28, and then gradually fell to 20, the natural rate. In the third it was at 60 for the first few days, but at the end of a week had nearly regained its natural condition. In the last case the effusion was very small, and the convalescence rapid.

The *fever* is not usually very great, and seldom lasts more than a few days, or a week. During the first three or four days, the pulse rises to 110, 120, or 130, and seldom higher, after which it commonly falls again, so that by the end of a week it is seldom over 70, 80, or 90. The heat of skin is not very great in most instances, and generally subsides rapidly and disappears after a few days. In acute secondary attacks, the febrile symptoms are more marked as a general rule, than as has just been described, because of the existence of the concurrent disease. In chronic cases the fever sometimes assumes, after a while, the hectic type.

The *countenance* presents no particular characters, except that

an expression of pain passes across it occasionally when the child coughs, or takes a deep breath. It is seldom deeply flushed as in pneumonia. The *alæ nasi* are dilated only during the continuance of the difficulty of respiration.

The *decubitus* is generally dorsal or indifferent. In the two cases observed by myself in which the effusion was large, the number of inspirations was always from three to five greater when the child laid on the *sound*, than when on the affected side.

Headache is often present during the first few days, in children over six years of age.

Convulsions are said to occur sometimes at the onset in very young children. The *strength* is not usually much diminished, except during the acute period. The *appetite* is generally diminished and the *thirst* acute, but neither of these symptoms is so marked as in pneumonia. The *tongue* is usually moist, and sometimes covered with a coat of whitish fur; the *abdomen* is natural.

Bilious vomiting is said to occur in more than half the cases. The *stools* are generally regular, or there is some constipation.

Auscultation practised soon after the invasion generally reveals bronchial respiration without any rhonchus. The percussion is dull; the cough, pain, fever, and difficulty of breathing continue for several days; after which all but the cough generally disappear, while that commonly persists. In acute cases, the appetite now begins to return, the thirst moderates, and auscultation reveals only feebleness of the respiratory murmur and slight dulness on percussion. The general symptoms cease soon after this, and the patient is entirely convalescent in from one to three weeks, though feeble respiration and diminished sonoreity sometimes persist for a longer period.

Chronic pleurisy may follow the acute form, or occur as an idiopathic disease. In the former case, the acute symptoms diminish after a variable length of time, but the fever does not cease entirely and often recurs towards evening. In the latter case there is very slight fever or none at all, and the pain is vague, uncertain, and attracts but little notice. The effusion takes place gradually, and is generally large. The percussion is now

entirely dull over a greater or less extent of the side, and the respiratory sound is suppressed. The side is evidently enlarged, the increase of size being visible to the eye and ascertainable by measurement. If the case continues and terminates unfavourably, the child emaciates, grows pale, has night-sweats and hectic fever, and dies at last in a state of profound exhaustion. In favourable cases, on the contrary, the effusion is gradually absorbed, and the patient recovers with a contraction of the side. In some rare instances the fluid has been evacuated by an opening through the parietes of the thorax, caused by ulceration or made by a surgical operation; and in others again by an opening into the lung, through which the fluid has been expectorated. The recovery by absorption has been known to take place two and five months after the invasion. In one case that I saw, the duration from the time when the effusion took place to its complete absorption was five weeks, and in the other between six and seven.

Diagnosis.—Pleurisy may be confounded with pneumonia or hydrothorax. From the latter affection it is to be distinguished by the absence of pain in that disease, by the existence of the effusion on both sides of the thorax in most cases, and by the fact that hydrothorax generally follows as a consequence of some previous disease, particularly the eruptive fevers or nephritis.

The distinction between acute or chronic pleurisy and lobular pneumonia is, as a general rule, very easy. Lobular pneumonia occurs almost always in children under six years of age; it is accompanied by a great variety and abundance of humid rhonchi on both sides, and by very slight dulness on percussion; the vibration of the parietes of the thorax continues: pleurisy, on the contrary, occurs very rarely under six years of age, except as a secondary affection; it is unaccompanied by rhonchus of any kind; the auscultatory signs are feeble respiration, bronchial respiration, and when the effusion is large, absence of all sound; the vibration of the walls of the chest ceases to be perceptible; and lastly, the percussion is much more dull than in lobular pneumonia, or it is flat.

The distinction between acute pleurisy and lobar pneumonia is more difficult than either of the points which have just been con-

sidered, and in some instances is subject to considerable doubt. It may generally be arrived at, however, by attention to the differences laid down in the following table, which is taken from the *Bibliothèque du Médecin Praticien*.

ACUTE IDIOPATHIC PLEURISY.

Frequent after six years of age; rare under that age.

Begins with dry cough, sharp thoracic pain, bronchial and metallic respiration during inspiration, either on the first day or later, and more rarely with obscurity of the respiratory sound.

Modification of the physical signs by change of position.

Fever and acceleration of the respiration usually moderate. Rapid diminution of these symptoms from the fourth to the seventh day.

Expectoration absent or very slight.

No rhonchi.

Absence of vibration of the thoracic parietes during speaking or crying.

Course of the disease irregular; rapid disappearance in some cases, prolonged duration in others. The bronchial respiration is substituted or masked by feeble respiration.

ACUTE IDIOPATHIC PNEUMONIA.

Frequent after six years of age; more rare under that age, but much less so than pleurisy.

Begins with cough, slight thoracic pain, and crepitant or sub-crepitant rhonchus; at a later period there is bronchial respiration during the expiration and bronchophony.

No modification under like circumstances.

Fever violent; considerable acceleration of the respiration. Diminution of these symptoms less marked, less rapid, and not before the sixth or ninth day.

Expectoration mucous, sometimes sanguineous, very rarely rust-coloured.

Rhonchi preceding, following, and often accompanying the bronchial respiration.

Augmentation of vocal resonance very sensible in older children, and in a less degree in all.

Course of the disease regular; steadily increasing, in most cases, and then diminishing from the sixth or ninth day. Bronchial respiration more disseminated.

The chronic form of pleurisy with extensive effusion, may be easily distinguished by the history of the case, by inspection, palpation and mensuration of the chest, by the nearly total absence of sonoreity and of the respiratory murmur except at the inner edge of the scapula, and by attention to the character of the general symptoms.

Prognosis.—Acute pleurisy is rarely a fatal disease in healthy subjects. When it occurs as a complication of some other malady, on the contrary, it is much more apt to terminate unfavourably. The degree of fatality in secondary cases will depend, in great measure, on that of the primary disease. Pleuro-pneumonia is a more dangerous disorder than either alone. Of 5 cases of primary pleuro-pneumonia, observed by Rilliet and Barthez, 2 died; while of 10 secondary cases, 8 died.

Chronic pleurisy is generally a serious, and not unfrequently, a fatal disease. Of 5 cases, observed by the authors just quoted, 2 proved fatal.

The three cases of pleurisy observed by myself, all of which were acute in the beginning, though two became chronic afterwards, recovered.

Treatment.—The *hygienic treatment* in this, as indeed in all the diseases of children, is of the utmost importance, and ought to be regulated by the practitioner himself. In all forms of the disease, the child should be carefully protected from cold, and in the acute form, kept at rest, and if possible, in bed. The diet must be very strict, and should consist for a few days of nothing but the weakest preparations of milk. After the fever has disappeared, bread and milk, vegetable soup with a few oysters boiled in it to make it agreeable, and gradually rice, potatoes, and at last small quantities of meat may be allowed. In the chronic form the diet ought to be less strict, but regulated with equal care, as to quantity and material. In that form the patient should be taken into the air if the weather be mild and dry, and in winter the chamber ought to be well aired from time to time.

Bloodletting.—Depletion ought to be employed in acute pleurisy, as a general rule. Blood may be drawn either by venesection, cups, or leeches, the quantity to be regulated by the age and constitution of the patient. Venesection is preferable to local depletion, unless there be some contra-indicating circumstance. From four to six ounces may be taken generally from a child between four and six years of age. It is seldom necessary to repeat the operation; when, however, the acute symptoms are not at all relieved by the first detracting, it would be proper and useful to resort

again to a small venesection, to leeching, or to take two or three ounces of blood by cups, as recommended in the article on pneumonia.

Depletion ought to be avoided in most of the secondary cases unless the symptoms are very acute and the child strong and vigorous; also in all chronic cases, after the febrile symptoms have been dissipated, and in feeble, delicate children, or, if resorted to, it should be used with very great circumspection.

Antimonials.—A moderate use of the antimonials is of great service in the acute stage of the disease. Small doses of antimonial wine and sweet spirits of nitre, or fractional doses of tartar emetic, as recommended in the article on pneumonia, will generally cause the fever, dyspnœa, and cough to subside rapidly. Large doses seem to be unnecessary in any case, and are liable to be injurious in many.

Alteratives.—Many writers recommend the habitual employment of the mercurial preparations in connexion with bloodletting. It seems to me, however, that they are, to say the least, seldom necessary in acute cases, since the majority of these are nearly certain to recover without a resort to them; and it is better, as has already been said, to avoid the use of mercury in children when there are other and less powerful remedies which may be resorted to instead. When, however, acute pleurisy tends to assume the chronic form, and in confirmed chronic cases also, they would seem to be more clearly indicated, though under such circumstances, I have succeeded in curing two cases, as I shall presently show, without a resort to them. Nevertheless, calomel combined with digitalis, has been recommended by very high authority under these circumstances. From a quarter to half a grain of that preparation, with a quarter of a grain of powdered digitalis, may be given every two or three hours.

The remedy employed by myself, after the disappearance of the acute symptoms and when the effusion had taken place, was iodide of potassium in syrup of sarsaparilla, according to the following formula: *R.* Potass. iodidi grs. xvi.; Aquæ, Syrup. Sarsap. comp. āā ℥i.—*M.* Give a teaspoonful three times a day to children three or four years old. Under this treatment the effusion

disappeared rapidly, though diuretics had failed to make any impression on the cases.

Diuretics are highly recommended in the treatment of cases in which effusion has taken place. Those chiefly employed are squills, digitalis, and nitre. The squill is given alone, or in combination with calomel or digitalis, or both. The dose of the powder of squill or digitalis is about a quarter of a grain every two or three hours. The squill may be used also in the form of syrup or oxymel, and the digitalis in tincture. These two substances were employed by myself in the following formula: *R.* Acet. Scillæ ʒii.; Aquæ fontis ʒiv.—*M.* Give a teaspoonful with a drop of Tinct. Digit., three or four times a day to children two years old. This formula was made use of for several days in the two cases already referred to, without any perceptible diminution of the amount of the effusion, whereupon it was suspended, and the iodide of potassium as above recommended substituted, and with much better effect.

Purgatives ought to be used during the acute stage of pleurisy to an extent sufficient to keep the bowels soluble, and to act as mild evacuants. In chronic cases, on the contrary, they are particularly recommended as evacuants, in order to deplete the blood-vessels, and thus hasten the absorption of the effusion. So far as my experience goes, this treatment is unnecessary, as diuretics and alteratives are generally sufficient, without a resort to violent remedies which must irritate the intestinal mucous membrane, always extremely susceptible in children, to a dangerous degree.

External remedies.—Blisters are very generally employed in the acute form to relieve pain and dyspnœa, and in the chronic form to hasten the absorption of the effused liquid. I did not apply them in the cases under my charge, having succeeded very well without; but would not hesitate to make use of a small one applied for a not longer period than two hours, if the pain and oppression continued after sufficient depletion and the use of antimonials. In chronic pleurisy, the application of a large Burgundy pitch plaster, made rather weaker than what is used for adults, and large enough to cover nearly the whole side, would, it seems to me, be preferable to blisters.

Tonics are often necessary in chronic, and sometimes after the febrile symptoms have subsided in acute cases occurring in feeble and delicate children. The most suitable are quinine in the dose of a grain morning and evening, small quantities of very fine port wine, and the preparations of iron.

Paracentesis.—When, in chronic pleurisy, the effusion is very large; when there is no disposition to absorption, notwithstanding the use of proper remedies; when the child is becoming very debilitated, and is attacked with hectic fever and night-sweats; the operation of paracentesis has been recommended by very high authority, and has been performed with entire success on several occasions. M. Heyfelder (*Arch. de Med.*, 3 serie, t. v., p. 59,) performed it in one case eight weeks, and in another four months and a half after the beginning of the attack. Both cases recovered; the lung expanded again, the opening closed, and the respiration was nearly alike over both sides.

Case of chronic pleurisy of the left side, beginning with acute symptoms; extensive effusion with displacement of the heart to the right of the sternum; recovery.—February 12th, 1846.—The subject of the case is a boy four years old, of delicate stature and appearance, but enjoying good health. I saw him first at 1 P. M. He was perfectly well yesterday, slept soundly last night, and rose apparently in good health this morning. He ate his usual breakfast, but complained afterwards of feeling unwell. Soon after this he complained of headache, of soreness and weakness of the knees in going up stairs, and then of violent pain in the left side beneath the armpit.

At the time of my visit he was in bed, in the following condition: Pulse 130, full and strong; skin warm and moist; headache; sharp, severe pain at the præcordia, extending backwards under the armpit, and aggravated by motion, crying, and by deep inspirations; respiration quick, and jerking. No cough at all, absolutely none. Abdomen natural; neither vomiting nor diarrhœa. Tongue slightly furred, moist. Action of heart violent; impulse strong, and felt over a large space; sounds loud and strong, to the left and beneath the nipple, a soft murmur in second sound. Percussion dull over a larger space than natural.

Behind, percussion dull over whole of left side ; natural on right side. Respiration natural on the right side ; feeble and indistinct, without bronchial sound on the left.

Ordered a teaspoonful each of extract of senna and syrup of rhubarb, to be given immediately. To have a warm bath in the evening, and to take one of the following powders every two or three hours, beginning in the evening. R.—Pulv. Opii. et Ipecac. grs. iij. ; Potass. Nitrat. grs. vi. In pulv. No. vi.

February 13.—Passed a restless night. Better to-day. Pulse 130, softer ; skin moist. Impulse of heart less violent. Pain not so severe. Respiration still quick, and when the child is excited or irritated, it becomes jerking, while at other times it is quiet. Physical signs as before, except that the murmur in the second sound of the heart is no longer heard. Ordered three ounces of blood to be drawn by leeches from the left side ; powders to be continued so as to allay restlessness and pain.

February 14.—Has had a better night. Pulse less frequent. Respiration 30, and without jerking ; no cough at all ; makes no complaints of pain. The appetite is returning.

February 15.—Better in all respects ; no fever nor pain ; no cough. Physical signs as before.

The case went on until the 27th of March, when I paid my last visit, making the duration of the whole case over six weeks. During the last two weeks of February, there were no acute symptoms. The fever had disappeared entirely. The respiration continued, however, from 28 to 30 during all that time. The effusion occupied nearly the whole of the left side, which was manifestly larger than the right, and the intercostal spaces were enlarged. Behind, there was total flatness on percussion from the spine of the scapula downwards, and in front from a short distance below the clavicle. The respiratory murmur was absent in the lower three-fourths of the dorsal region, and feeble above. In front, respiration was heard only above and just beneath the clavicle. In the course of this period, the heart was gradually forced over to the right side of the sternum, so that at last its impulse was felt, not to the left, but to the right of the sternum. The cardiac sounds were loudest and most distinct in the same region.

The displacement was so remarkable that the mother discovered it herself, I having avoided telling her, to save her from anxiety. The new position of the heart did not seem to produce any inconvenience, in addition to that occasioned by the pleuritic effusion. During the last two weeks of March, the child was kept in bed; his diet was milk and bread; a large Burgundy pitch plaster was kept on the side, and he took internally vinegar of squill, and tincture of digitalis.

Finding that the effusion remained stationary under this treatment, I prescribed a grain of iodide of potassium to be given three times a day, in a teaspoonful of compound syrup of sarsaparilla. The diet was changed at the same time. He was allowed small quantities of meat every day, and was taken from bed and placed in a chair by the window. Under this treatment, he gradually improved, so that by the 27th of March, when I paid my last visit, the effusion had in great measure disappeared, and he was able to play about the room all day. The side was slightly contracted; the respiration was pure and vesicular, but rather more feeble than on the left side; the heart had returned to its natural position.

I have examined this child in the course of the present year (1847), and find him to be in as good health as before his sickness. Excepting a slight contraction of the left side, there is no perceptible difference between that and the right.

ARTICLE IV.

HOOPING-COUGH, OR PERTUSSIS.

Definition; synonymes; frequency.—Hooping-cough is characterized by a hard, convulsive cough, occurring during expiration, and accompanied by long, shrill, and laborious inspirations, which are called hoops. The cough occurs in paroxysms, which are terminated by the expectoration of tough phlegm and often by vomiting.

The disease is known by various other names, of which the

most common are tussis ferina, chincough, and kincough. The *frequency* of the disease is exceedingly variable, as it occurs both in the sporadic form and as a widely prevailing epidemic. Some idea of its frequency may be gained from the facts that during the ten years preceding 1845, there were 781 deaths from it in Philadelphia, under fifteen years of age. During the same time there were 1592 deaths from pneumonia; 1149 from croup; and 1172 from bronchitis. (*Condie, Dis. of Child.*, 2d edit. note, p. 88.)

Causes.—*Age.*—It occurs generally in young children. Of 130 cases in children, collected by M. Blache, 106 were between 1 and 7 years of age, and only 24 between 8 and 14. Of 29 cases observed by Rilliet and Barthez, there were 26 between 1 and 7 years, and 3 between 8 and 12. Of 49 observed by myself, there were 9 under 1, 37 between 1 and 7, and 3 between 8 and 10 years. It is stated by MM. Blache, Rilliet and Barthez, and Valleix, to be most common in girls. Of the 49 cases observed by myself, 27 occurred in boys, and 22 in girls. Some writers have asserted that certain *constitutions* and *hereditary influence* predispose to the disease. So far as my own experience goes, it has seemed to attack indifferently those who were simultaneously exposed to it. The fact of its being propagated by direct *contagion* is proved beyond doubt by numerous observations. I have rarely known one child in a family to be attacked without its extending to all the others not protected by having had the disease previously. That it often appears also in the form of an *epidemic*, is established by the testimony of many writers, so that at present no doubt is entertained upon this point.

Symptoms.—It is customary to describe three stages of whooping-cough. The first is called the stage of invasion, or the catarrhal stage; the second the stage of increase, or the spasmodic stage; and the third the stage of decline, which is characterized by an amendment of all the symptoms.

First stage.—The great majority of the cases begin with the ordinary symptoms of simple catarrh. These are coryza, sneezing, slight injection of the conjunctivæ, and dry cough. The cough rarely has any peculiarity in the beginning which will enable us

to distinguish it from that of an ordinary cold, though some persons have asserted that they could recognise it. I have often listened with great care to the sound of coughs which parents supposed might be whooping-cough, but was always obliged to confess my inability to determine, until time gave them more decided characters. In addition to the symptoms enumerated, there is generally more languor, lassitude, drowsiness, and irritability, than are commonly present in simple catarrh. In a small proportion of cases the first stage is wanting, and the disease assumes its peculiar features from the first. The duration of this stage is very uncertain, and is ascertained with difficulty. My own experience would fix it at about two weeks as the average, though it may last undoubtedly a much shorter, or longer period.

Second stage.—At the beginning of this stage the disease has assumed its peculiar convulsive and paroxysmal characters. It consists of violent fits or paroxysms, or as they are often called, kinks of cough, recurring after longer or shorter intervals. Just before the paroxysm the child seems restless, anxious, and irritable, or else keeps perfectly quiet and evidently tries to retard its approach. When it begins, the child, if lying down, rises up suddenly, or if playing about runs to take hold of some fixed object, by which to support itself during the accession. The cough is dry, spasmodic, and sonorous, and occurs in a succession of short, rapid expirations, by which the thorax seems to be emptied of all its air, with violent efforts. It is followed by one or two long and deep inspirations, which are accompanied by the peculiar hoop to which the disease owes its name, in consequence of the drawing of the air through the narrowed glottis, which is spasmodically closed. During the fit the face becomes deeply suffused or even purple, and swollen; the eyes are watery, and the countenance expressive of great anxiety, and after the fit is over, of fatigue and exhaustion. The latter symptoms are, as M. Valleix remarks, the signs of partial asphyxia, and are the result doubtless of the complete expulsion of air from the thorax, and consequent momentary suspension of the function of hæmatisation. There is almost always an expectoration of colourless ropy fluid, often accompanied by vomiting, at the close of the fit of coughing, and

the patients usually appear weak and languid for a short time, after which they return to their play.

In very severe cases there are other symptoms in addition to those just mentioned. *Hemorrhages* from the mouth, ears, nose, lungs, and beneath the conjunctiva, are not unusual. I have seen several instances of epistaxis, and one of extensive sub-conjunctival ecchymosis myself, and I am well acquainted with the history of another, in which there was bleeding both from the nose and ears. In another, in a girl two years of age, which came under my own observation, a species of syncope, a state of insensibility without convulsive movements, accompanied by great paleness, occurred after many of the paroxysms. I have met with general *convulsions* in four cases, two of which were fatal. In two other cases, both occurring in infants under six months, the paroxysms of cough were accompanied by the most violent struggling and oppression, and by deep blueness of the hands and feet, like that of severe cyanosis.

In some instances, after the paroxysm is apparently over, the child will begin within a few instants to cough again, and may in this way have several fits in such rapid succession as to make an almost continuous paroxysm. It is quite common for this to happen twice, and in one case which I saw, it occurred three times on several occasions. The ordinary *duration* of a paroxysm or kink, is from a quarter to three quarters of a minute, though it may last as long as two minutes, or according to some even longer. The number of accessions in twenty-four hours is very irregular. It depends chiefly on the stage and violence of the attack. During the height of the disease, I have generally found them to number about 40. In some rare cases, however, they are much more numerous, and amount to 70 or 80. They are generally most frequent in the course of the third or fourth week, after which they remain stationary for two or three weeks, and decline gradually. The paroxysms may occur spontaneously, the child being often disturbed from sleep by their sudden occurrence, or they may be excited by various circumstances, such for instance as contrarieties, a fit of crying, change of position, eating, violent exercise, and imitation. I have frequently seen an attack brought on

by the sight of another child in a paroxysm of the disease. The duration of the second stage is stated by Rilliet and Barthez to be about 30 or 40 days in most cases.

Third stage.—It is impossible to fix a precise limit from which to date the beginning of this stage. It is generally, however, said to commence from the time when the disease is evidently on the decline. The paroxysms now grow less frequent and less violent, the cough reassumes some of the catarrhal features which it had at first, and gradually loses its peculiar spasmodic character. The child's general health improves; the appetite becomes vigorous, the strength is invigorated, the sleep again becomes sound and tranquil, and the disease disappears. The *duration* of this stage is uncertain like that of the two others. Rilliet and Barthez state it to be short in uncomplicated cases (ten to fifteen days), and are of opinion that when it has been supposed to have lasted several weeks or months, it has been the result of some complication, as chronic dilatation of the bronchia, tubercular disease, etc. It happens not unfrequently, however, that after the disease has apparently ceased, all the distinctive characters of the cough recur, if the child chances to take cold within a few weeks or even longer after its disappearance.

In cases of pertussis unaccompanied by complications of any kind, there are no marked *general symptoms*. There is seldom any fever, the appetite continues good, and with the exception of occasional languor and fatigue, and irritability of temper, the child appears to be well.

The *total duration* of the disease, in simple cases, may be stated at from one to three months, according to Rilliet and Barthez. I have never known a case to last so short a time as a month, and have rarely found the whole duration much within three months.

Complications.—Though it has happened to me on several occasions, to meet with children who have been very ill from the violence of the disease under consideration, in its uncomplicated condition, I have never known a case to prove fatal, except in consequence of some kind of complication. It seems to me very important, therefore, that the various complications liable

to occur in the course of the disease, should be carefully considered.

Convulsions.—This complication is not a rare one, since it occurred in 5 of 29 cases observed by Rilliet and Barthez, and in 3 of 49 observed by myself. It is one of the most dangerous accidents liable to occur in the course of the disease. Of the 7 cases reported by the authors quoted, (5 of their own, and 2 belonging to M. Papavoine,) 6 died. Of my 3 cases, 2 died. In all that I have seen, the convulsions were general, extremely violent, and accompanied by insensibility in the fatal cases to the last, and in the favourable one, for several hours. In the two fatal cases the pertussis had lasted nearly two months, and was accompanied by extensive lobular pneumonia. The fatal event took place within twenty-four hours from the supervention of the spasms. The subjects were eight and nine months of age respectively.

The favourable case occurred in a child five months old, who had been attacked with lobular pneumonia three days before the occurrence of the convulsions, which came on during the height of a severe paroxysm of coughing. The convulsive movements were general and continued for about half an hour, after which the child was drowsy or irritable for some hours longer. The hooping-cough continued to be severe for two weeks after this, as many as 42, 46, and 48 paroxysms occurring every day. At last, however, perfect recovery took place. It is proper to call the attention of the reader to the fact, that the 3 cases observed by myself occurred under one year of age.

Bronchitis is a very frequent complication. The authors above quoted found it to exist either alone, or combined with pneumonia, in half of the fatal cases. Of the 49 cases observed by myself, it existed to a greater or less extent, in its simple form, in 16. All of these recovered, so that it cannot be regarded as a very dangerous accident. In fatal cases it has often been found accompanied by continuous dilatation of the smaller bronchia.

Pneumonia, according to the authors above quoted, is about as frequent as bronchitis. When, however, the fatal termination took place soon after the beginning of the disease (18th, 26th, or 27th

days), it was not generally present. After these periods, on the contrary, it was almost always observed. I have met with well-marked pneumonia only in 5 of the 49 cases referred to, and in 1 other, making 6 in all. Of these, 4 were lobular and 2 lobar. Of the 4 children affected with lobular pneumonia, 3 were under one year, and the fourth between one and two years of age. Two of these died in convulsions, and one in a state of marasmus. The cases of the lobar form of the disease occurred in girls of seven and nine years of age respectively, and both recovered. This complication is much more dangerous therefore than simple bronchitis; the degree of danger is in proportion to the earliness of the age at which the disease occurs, and to the extent of the inflammation.

Emphysema has been supposed by some to be a common result or accompaniment of the disease. This is denied, however, by others. I have never observed it myself, and as nearly all the children whom I have attended with pertussis continue to be under my observation, I should certainly have noticed it, were it of common occurrence.

Vomiting is a very frequent incident in pertussis, but ought not to be regarded as a complication unless dependent on some disease of the digestive organs, or symptomatic of cerebral disease. Where it occurs in simple cases, or in those complicated with bronchitis or pneumonia, it has always seemed to me to be advantageous.

Tuberculization is not infrequent, according to the French authorities, as a sequence of the disease. In the majority of the cases the tubercular deposit is concentrated in the lungs and bronchial ganglions. I am disposed to believe that it is of rare occurrence in this city, at least amongst the better classes, as I very seldom meet with it, or indeed with any form of tubercular disease in children.

Diagnosis; prognosis.—The diagnosis of pertussis is difficult only during the first stage of the complaint. It seems to me, indeed, impossible to distinguish, during that stage, between it and simple mild laryngitis, or the mild catarrhal attacks which are so common in our climate. After it has once fairly entered upon the

second stage, it is scarcely possible to confound it with any other malady. Rilliet and Barthez state, however, that acute bronchitis with paroxysmal cough is not unfrequently mistaken for pertussis. The mistake will scarcely be made, if it be recollected that in acute bronchitis with paroxysmal cough, the invasion is sudden; that there is violent fever, great dyspnœa, and the physical signs of bronchitis; that the hoop is generally wanting, or feebly marked, and that the disease is violent and rapid in its course; all of which circumstances are widely different from what occurs in pertussis.

The same authors assert that tuberculosis of the bronchial ganglions gives rise to a cough which may be mistaken for pertussis. The following table extracted from their work will show the differences between the two disorders.

PERTUSSIS.	TUBERCULOSIS OF THE BRONCHIAL GANGLIONS.
Often epidemic, attacking several children at once; transmissible by contagion.	Always sporadic; non-contagious.
Three distinct stages, of which only the second accompanied by kinks.	No distinct stages.
Kinks attended with hooping, ropy expectoration, and vomiting.	Kinks generally very short, without hooping, ropy expectoration, or vomiting.
Pure respiration in the intervals between the kinks.	Physical signs of tuberculosis of the ganglions; but in certain cases, absence of these signs.
In the intervals between the kinks respiration and pulse natural, so long as the disease is simple.	Accessions of asthma in some cases, with the kinks; continuous febrile movement, with evening exacerbations; sweats; progressive emaciation, &c.
Voice natural.	Voice sometimes hoarse.
Course generally acute.	Chronic course.

Prognosis.—Pertussis is rarely a dangerous or fatal disease so long as it remains simple. Of the 49 cases observed by myself, 27 were simple, all of which recovered. Nevertheless, even the

simple disease does sometimes terminate fatally, from the excessive violence of the paroxysms of coughing.

The danger in hooping-cough, which is considerable, depends, therefore, almost entirely on the complications which are so apt to occur, for which reason the physician should watch with the closest attention, in order to prevent their occurrence, and that he may recognise and treat them in their earliest stages. The most dangerous complication is convulsions, and after that bronchitis and pneumonia. So long as the child seems well and lively, and without fever or dyspnœa in the intervals between the fits, there is nothing to be feared. But if, on the contrary, it becomes languid and irritable, with indisposition to take food, feverishness, and some increase of the rate of respiration, the practitioner should be upon his guard. A very early age and natural delicacy of constitution are unfavourable circumstances in the disease. I have already stated that complications occurred in 22 of the 49 cases observed by myself. Of these, 3 died, one at the age of eight, one at that of nine months, and the other at that of a year and a half.

Nature of the disease.—There is no essential anatomical lesion in pertussis, except, perhaps, slight inflammation of the bronchial mucous membrane. In most of the cases, the membrane lining the larger and smaller air-tubes, and very rarely that of the trachea, is reddened and perceptibly thicker than natural, and the tubes contain a considerable quantity of frothy mucus, or a thick, viscid, and tenacious phlegm.

As to the nature of the disease, it seems to me very clear that it ought to be regarded as containing two elements of morbid action, one of which consists in slight inflammation of the respiratory mucous membrane, and the other of disordered action of the respiratory system of excito-motory nerves. It is neither a pure neurosis nor a pure inflammation, but partakes of the characters of both, and much more of the former than of the latter. The authors of the *Compendium de Médecine Pratique* (t. ii., p. 526) regard it as a neurosis on the following grounds: 1. "In the greater number of cases, the respiratory apparatus presents no kind of alteration, or else the lesions are so multiplied or variable that they are surely not the real origin of the disease; 2. The

clearly remittent course of the symptoms and the total absence of fever, unless some complication is present, are not observed in ordinary or even specific inflammations; 3. The cessation or sudden return of the paroxysms under the influence of moral emotions or change of place, belong to a disorder of innervation and not an inflammation, which commonly passes through certain stages before it is resolved; 4. The complete return to health, the integrity of all the functions in slight cases, the resistance which it opposes to treatment, the uselessness of antiphlogistics, and the success obtained from narcotics and antispasmodics, are all so many circumstances peculiar to whooping-cough and to many of the neuroses."

Treatment of simple pertussis.—Bloodletting.—Depletion is very rarely necessary in simple pertussis. The only cases in which it can be called for are those occurring in sanguine children, where the paroxysms are so violent as to endanger the brain by over-distension of the vessels. In these cases a small bleeding, or the application of a few leeches to the temples or behind the ears, may be proper; but even these may often be safely treated by reduced diet and by a few doses of saline cathartics, without a resort to the more powerful and more permanently exhausting means of depletion. As for the treatment of simple pertussis by repeated venesections, in the hope of curtailing its duration, or under the idea of their being rendered necessary by the violence of the malady, it seems to me forbidden by the present state of medical knowledge, which informs us that pertussis, like the exanthemata, has a certain course through which it must pass, and that the greater number of the cases do not endanger life so long as they remain simple, however violent they appear to be. Of the 27 simple cases treated by myself, depletion was not used in any, and all recovered.

Antispasmodics.—Of the different remedies of this class which have been used in the disease, I shall only mention assafoetida, which is recommended upon very high authority, and is doubtless useful in moderating the severity of the paroxysm. It is much employed in this city as a domestic remedy. I have used it myself on several occasions with some benefit; but, as I have ob-

tained better and more constant success from other means, I now seldom resort to it. Dewees speaks of it as "occasionally useful, but never decidedly efficacious" in his hands. Kopp recommends it very strongly, in the dose of six grains three times a day in pills, for a child four years old. This seems to me a large dose. I have generally given two or three grains three or four times a day to a child of that age.

Narcotics.—Of the various narcotics which have been more or less extensively employed, the most important are belladonna, opium, and hydrocyanic acid. *Belladonna* is highly recommended by several German authors, by Rilliet and Barthez, who state that it is beyond contradiction the one most deserving of confidence, by Trousseau and Pidoux, and by Dr. Eberle. It ought to be given with great care, and not continued for too long a time. Eberle says that it ought not to be exhibited where there is fever and bronchial inflammation. Trousseau and Pidoux employ the following formula: *R.*—Pulv. Belladonnæ gr. iv; Extract. Opii aquos. gr. iv; Extract. Valerianæ 3ss. Ft. in pilul. no. xvi. Give from one to four in the course of the day. If the child dislike the pilular form, they give it in syrup, according to the following formula: *R.*—Extract. Belladonnæ gr. iv; Syrup. Opii, Syrup. Flor. Aurantii, āā 3j. Misce. Of this, from one to eight teaspoonfuls are to be given in twenty-four hours. I have seldom made use of belladonna, and can, therefore, give no personal opinion as to its efficacy.

Opium is confessedly a very valuable remedy in the disease, not as a curative, but as a sedative and palliative. When the cough is frequent and fatiguing, especially if the patient have an irritable and nervous constitution, some opiate preparation is of the utmost service in moderating the frequency and violence of the paroxysms, and in allaying irritability and restlessness. It is best given in the evening, and in combination with ipecacuanha, or very minute doses of antimony.

Hydrocyanic acid has been employed by various observers, and is highly spoken of by some. Its poisonous properties, however, have deterred many, and amongst them, myself, from resorting to it. Inasmuch as there are other and safer means for

conducting the disease to a favourable termination, it seems to me useless to venture upon so potent a preparation as this. Dr. Atlee, of Lancaster, gave it in the following formula: *R.*—Acidi Hydrocyanici ℥j; Syrup. Simpl. 3j.—*M.* A teaspoonful given morning and evening; and if no uneasiness, dizziness, or sickness be produced within forty-eight hours, the dose to be repeated, three times a day. This prescription is for a child six years old; one drop of the acid being added for each year of the child's age beyond one year. He has never repeated the dose more than four times a day. (*Condie's Dis. of Child.* 2d ed. p. 337.)

Emetics and Nauseants are amongst the most important remedies in the treatment of hooping-cough, since they exert a powerful influence upon the disease, and unless carried to excess, are not in themselves likely to be injurious. Some authors recommend the administration of an emetic every day or every other day, while others give them according to the necessity of the case. Believing that frequently repeated emetic doses are unnecessarily severe, and productive of too much fatigue and exhaustion, I have preferred in the simple disease, to give only small doses of ipecacuanha from time to time, so as to moderate the violence of the cough. Tartar emetic is seldom necessary, and ought to be avoided if possible, on account of its disposition to irritate and inflame the gastro-intestinal mucous membrane. The syrup of ipecacuanha is the preparation I have almost always used. From ten to twenty drops, given three times a day to a child three years old, will very generally moderate the severity of the paroxysms.

Purgatives are necessary in the simple disease only when constipation is present. The mildest ought to be preferred, in order to avoid irritation and exhaustion. Castor oil, magnesia, or syrup of rhubarb are the best.

Particular remedies.—Of the different specific remedies that have been employed, none have attained and maintained so high a reputation in this city as the *carbonate of potassa*, which, in the form of the cochineal mixture, is constantly used both by physicians and as a domestic remedy. The following formula is the one generally administered: *R.*—Potass. Carbonat. ʒj; Cocci ʒss; Sacch. alb. 3j; Aquæ fontis, 3iv.—*M.* Give a dessert spoon-

ful three times a day to a child a year old. Believing the carbonate of potash to be the active agent in the mixture, I have generally left out the cochineal and used the potash alone, dissolving it in equal parts of syrup of gum and water. I have frequently employed this remedy and believe that, with the exception of alum, to which I shall presently refer, it is the most useful agent in keeping down the violence of the disease with which I am acquainted. I have given it in the dose of a grain three and four times in the twenty-four hours, to children one and two years old, for several weeks at a time, without witnessing any injurious effects from it.

Alum is highly recommended as a remedy in pertussis by Dr. Golding Bird (*Guy's Hospital Reports*, April 1845). He states that in the second or nervous period of the disease, when "all inflammatory symptoms have subsided, and when, with a cool skin and clean tongue, the little patient is harassed by a copious secretion from the bronchi, the attempt to get rid of which produces the exhausting and characteristic cough, alum will be found to be of much value." He adds that he "has not yet met with any other remedy which has acted so satisfactorily, or afforded such marked and rapid relief." From reading Dr. Bird's remarks on alum, and prompted by my knowledge of its admirable qualities in the treatment of croup, I was led to make trial of it in the disease under consideration, and I believe I may say that it has exerted a more decided influence in moderating the violence of the disorder, than any that I have ever made use of. I have administered it in 15 cases, beginning in the course of the second stage. In all it was beneficial, and in some the effects were strikingly useful, the improvement being more rapid than I had ever seen to result from other remedies, or to occur when the disease has been allowed to pursue its natural course. In a boy between five and six years of age, who had been coughing violently for two weeks, the paroxysms diminished so much in intensity and frequency after he had taken the remedy two days, that he was not once disturbed at night, though before he had always been waked several times, and the spells which occurred during the day were much less severe. After continuing the remedy for

ten days, the disease had subsided so much that its employment was suspended. Soon after, however, the paroxysms again became severe and troublesome. The alum was resumed, and with the same results as at first. In another family in which there were three children, all of whom had been taking syrup of ipecacuanha, and carbonate of potash for some days, without any good effects, the alum was given, and acted as in the case first referred to. The nights were comparatively quiet, and the spells occurring through the day, very much moderated. I may repeat that, so far as my experience in the above 15 cases goes, the effects of alum have been more decided and satisfactory than those of any other remedy. I have never known it to produce bad consequences either at the time of its administration or subsequently, though I have given it to children from two months to seven years of age, and have continued its use from one to five weeks at a time. If administered in large doses it produces vomiting. It does not constipate, but on the contrary, is apt to induce diarrhœa, when continued for some time. Dr. Bird gives from two to six grains every four hours. His formula is as follows: *R.* Aluminis, gr. xxv; *Ext. Conii*, gr. xii; *Syrup. Rhœados*, ℥ii; *Aquæ Anethi*, ℥iii.—*M.* Give a medium-sized spoonful every six hours. I have not generally used it in such large doses. To children under one year I give from half a grain to a grain, three or four times a day; and to those over that age, two grains every six hours. The formula I have employed is the following: *R.* Aluminis, ℥iiss; *Syrup. Zingib.*, *Syrup. Acaciæ*, *Aquæ fontis*, āā ℥i.—*M.* When this is prepared with good syrups, it tastes very much like lemonade, and is not at all unpleasant, so that children take it without difficulty. The dose is a teaspoonful three times a day, or every six hours.

Sulphur.—Some of the German authorities make frequent use of, and greatly commend the effects of flowers of sulphur, both at the beginning and throughout the course of the disease. Rilliet and Barthez state that they saw it succeed several times in the hands of M. Jadelot. I have never employed it. It is given in doses of three grains two or three times a day, to children from two to four years of age; and to those who are older, in doses of

fifteen grains or more in twenty-four hours. It may be administered in powder diffused in milk or syrup, or made into an emulsion. It is said not to be purgative in the doses mentioned.

Various other remedies have been recommended by different authors, the most important of which are the *subcarbonate of iron* used by Dr. Steyman, and by Lombard of Geneva; the *mistletoe*, (*Viscum Album*), employed by Baglivi and J. Frank, and recently by Guersent and Blache, who give it in powder, in the dose of twelve or fourteen grains four times a day; and the *cicuta*, which is highly spoken of by several German authors.

Revulsives.—The milder revulsives are useful in certain complications of pertussis, and as palliatives. To make them the chief basis of the treatment, however, which has been done by some, appears to me to be wrong. In order to produce a decided impression upon the disease, it would be necessary to resort to the more powerful remedies of the class, such as moxas, issues, tartar emetic ointment, blisters, etc., the use of which is not, I believe, warranted by the nature of the disorder.

Treatment of the complications.—If any of the diseases which have been mentioned as apt to occur during pertussis should arise, the treatment which is proper for them in their idiopathic form, must be adopted without regard to the whooping-cough, with the following reservations: that care must be taken not to use means of too powerful and exhausting a nature, or such as have a tendency to irritate the organs with which they come in contact. For, it must be recollected, that after the complication is cured, the patient still has the original disease to go through with, and therefore requires all his strength; and, moreover, the various organs of the body are predisposed by the very fact of the existence of the original malady, to assume diseased action, should any irritation in the shape of a violent remedy be applied to them.

The cases of *bronchitis* which came under my observation were treated in the simplest manner. The children were put to bed, their diet carefully regulated, the bowels gently opened with castor oil or syrup of rhubarb, and small doses of syrup of ipecacuanha or antimonial wine, with sweet spirits of nitre, administered every two hours. Mustard poultices were applied once or twice a day

to the inter-scapular space, and mustard pediluvia used every night, or more frequently if the dyspnœa were considerable. If the bronchial secretions were very profuse, and the cough troublesome, the decoction or syrup of seneka was given in connexion with occasional doses of laudanum or paregoric.

The complication of *pneumonia* was treated somewhat differently. In the two cases of the lobar form, in children seven and nine years old respectively, one, the eldest, was bled from the arm, and the other leeches. The rest of the treatment consisted in the administration of small doses of antimonial wine and nitre, in the manner pointed out in the article on pneumonia, in the use of small doses of Dover's powder, and of the foot-bath. Both recovered.

The four remaining cases of pneumonia were of the lobular form, of which three proved fatal. The subjects of the fatal cases were eight months, nine months, and eighteen months of age respectively. They were treated principally with ipecacuanha, occasional laxatives, small doses of anodynes, and with mustard poultices and pediluvia. In one a blister was applied between the shoulders, but with most unfortunate results; since the vesicated surface sloughed, and added very much to the sufferings of the child. The fourth case occurred in a boy five months of age. In this a violent attack of convulsions occurred on the third day of the pneumonia. The child was immediately placed in a warm bath, and large sinapisms applied over the front of the chest and upon the extremities, after which he was treated with half grain doses of alum, repeated every three or four hours, mustard pediluvia and poultices, and small doses of wine of opium. On the sixth day the pneumonia was resolved with copious sweats and cold hands and feet, for which small quantities of brandy and water and wine whey were used. The recovery was perfect.

When *convulsions* occur they must be treated according to the cause which produces them, and the constitution and present state of the child. If the patient be strong and sanguine, and not exhausted by previous sickness, the treatment should consist of depletion by venesection, or by leeches to the temples, or behind the ears; of cold applications to the head; the warm bath; cathartics

or purgative enemata ; and revulsives in the form of sinapisms, or of a small blister to the nucha. If, on the contrary, the patient is of delicate constitution, or exhausted by long illness, we must be content to resort to warm baths, revulsives, antispasmodics and anodynes, and stimulating enemata.

Of the 4 cases of convulsions which came under my notice, the 3 already referred to, and one other, two proved fatal. Both of these occurred in children who had long been labouring under lobular pneumonia, that had baffled all treatment. Death took place within twenty-four hours from the appearance of the convulsions, which were in fact the result of the diseased condition of the lungs. No treatment further than the warm bath and sinapisms, was resorted to. Of the two favourable cases, one has just been described under the head of pneumonia. The other occurred in a hearty boy nine months old, and seemed to depend on congestion of the brain, brought on by a severe fit of coughing. In this instance a venesection to a small amount was performed, the child was placed in a warm bath and cold applied to the head. No return of the spasms took place and the child recovered without difficulty.

Hygienic Treatment.—This part of the management of the disease is of the highest importance, for it is by careful attention to its details, that the complications which constitute the chief danger of the malady, are to be prevented. In a considerable number of cases of pertussis, nothing more need be done than to insist upon strict attention to hygienic rules. The chief indications are to preserve the child from taking cold, and to prevent indiscretions in diet. The clothing ought to be warm, and during the autumn, winter, and spring, flannel should always be placed next to the skin. The child ought to be kept in the house during damp weather at all seasons, and in the winter season, whenever it is intensely cold. The diet should be nutritious, but of easy digestion. All heavy, rich food ought to be absolutely forbidden during the continuance of the malady.

Treatment of the Paroxysm.—It often happens that the paroxysms are so violent, that the child seems to be in imminent danger of suffocation or convulsions. This is especially true of infants. In three cases which I have seen, in infants of two, three, and five

months old, the kinks lasted so long, and the spasm of the larynx was so unyielding, that the children struggled as though labouring under tetanus; the countenance was disturbed and anxious; the face and hands, at first flushed, became purple from deep congestion; and on some occasions the breathing was suspended for several seconds, so that life *seemed* for the time in the greatest danger. The difficulty in these cases depends on the spasmodic closure of the glottis, which is, sometimes, no doubt, completely shut. I have never known these alarming symptoms of asphyxia to occur when the hoop has been clear and distinct, for when that is present, the larynx is much less tightly closed.

When the symptoms above described occur in older children, they should be raised and supported in the sitting posture; when in infants, they ought to be held lightly in the arms, so that they may take any position which instinct prompts them to. At the same time cold water ought to be sprinkled from the fingers upon the face; the child should be gently fanned, or, if the weather be warm, taken to the open window; if there be time, it is well to put the feet into mustard water. It has been recommended on such occasions to apply compresses dipped into cold water to the sternum. I would propose the trial of a means which my father found very successful in arresting tonic spasm of the respiratory muscles, in a case of laryngismus stridulus. This is the sudden application of a piece of ice wrapped in linen to the epigastrium. When the laryngeal spasm is very intense and obstinate, a small blister to the front of the neck, is useful in controlling it.

CLASS II.

DISEASES OF THE DIGESTIVE ORGANS.

CHAPTER I.

DISEASES OF THE MOUTH.

I FIND myself much embarrassed in regard to the classification of the diseases of the mouth most proper to adopt. So much confusion reigns amongst authors as to their nature, and consequently as to their nomenclature, that it is very difficult to reconcile the various discrepancies which exist. After much consideration, however, I believe that the following arrangement is the one best suited to the existing state of knowledge upon these affections :

1. Simple or erythematous stomatitis.
2. Follicular stomatitis, or aphthæ.
3. Ulcerative, or ulcero-membranous stomatitis.
4. Gangrene of the mouth.
5. Thrush, or stomatitis with curd-like exudation.

ARTICLE I.

SIMPLE OR ERYTHEMATOUS STOMATITIS.

This form of stomatitis consists of simple diffuse inflammation of the mucous membrane of the mouth, unattended by vesicular or pustular productions, by ulceration, or by membranous exudation. It is a disease of infrequent occurrence, except in the forming stage of other kinds of stomatitis, and of little importance, seldom requiring the attention of the physician.

The *causes* of the disease are the introduction of irritating substances, such as hot drinks, and acrid or caustic preparations, into the mouth ; difficult dentition ; and probably sympathy with disordered states of the stomach. It occurs not unfrequently as a secondary affection, particularly in the course of measles, scarlet-fever, and small-pox.

The *symptoms* of erythematous stomatitis are more or less vivid redness of the mucous membrane, which is sometimes diffused, and sometimes punctuated or disposed in patches ; slight swelling of the same tissue ; heat, and tenderness to the touch, and in the act of sucking or eating. The child is generally fretful and restless, and either loses its appetite, or refuses to nurse or take food freely, on account of the tenderness of the mouth. There are seldom any general symptoms except in secondary cases, in which they are those of the primary affection.

The *treatment* is very simple. It consists in the use of some demulcent wash, as gum water, sassafras pith mucilage, a little honey put on the tongue occasionally, and if the inflammation be at all considerable, in the application of some astringent preparation. This may consist of honey and borax, two or three parts of the former to one of the latter, or of the following wash, recommended by M. Bouchut. *R.*—Mel. Rosæ ʒi ; Aluminis ʒss ; Aquæ distillat. ʒss.—*M.* The application of any of the washes recommended is best made by means of a thick and soft camel's-hair pencil : or it may be done with a soft rag, which should be dipped in the wash, and then conveyed into the mouth on the point of the finger. The remedy ought to be used several times a day.

If signs of gastric or intestinal disorder are present, they should be attended to.

ARTICLE II.

APHTHÆ.

Definition ; synonymes ; frequency ; forms.—The term aphthæ ought to be restricted to the vesicular and ulcerous form of disease

of the buccal mucous membrane, in which that tissue is covered with an eruption of vesicles which break, and are followed by small rounded ulcerations. Under this title writers formerly confounded the affection we are now considering with ulcerative stomatitis and thrush. It is called by Billard follicular stomatitis, and by several other writers vesicular stomatitis.

The *frequency* of the disease is very considerable. I shall describe two *forms*, the *discrete* and *confluent*.

Causes.—The only causes which seem to have been ascertained with any degree of certainty are early age, and the process of dentition; the contact of irritating substances, particularly stimulating and acrid articles of food, with the mucous membrane of the mouth; and the existence of some morbid irritation of the digestive tube, especially of the stomach. The confluent form is often connected with severe general disease of the constitution.

Symptoms; duration.—Aphthæ begin in the form of small red elevations, having little white points upon their centres, which consist of the epithelium of the mucous membrane raised into vesicles. The vesicles are small in size, oval or roundish in shape, and of a white or pearl colour. They soon break and allow the fluid which they contained to escape, after which there remains a little rounded ulcer, with excavated and more or less thickened edges, and surrounded almost always by a red circle of inflammation. The bottom of the ulcers is usually of a grayish colour. There is seldom any diffuse inflammation of the mucous membrane in this disease. The *number* of aphthæ varies in the two forms. In the discrete variety there are but few, whilst in the confluent form they are of course much more numerous. They generally appear first on the internal surfaces of the lips and gums, and then on the inside of the cheeks, edges of the tongue, and soft palate.

The discrete form is generally accompanied by symptoms of slight disorder of the digestive organs, consisting of thirst, acid eructations or vomiting, imperfect digestion, and a little constipation or diarrhœa. The confluent form, which is much more rare, especially in very young infants, usually coincides, as has already been stated, with severe general or local disease.

The *duration* of aphthæ is different in the two varieties of the

affection. The discrete form generally pursues a rapid progress, lasting usually from the beginning to the time of cicatrization, between four and seven days. Sometimes, however, when the vesicles are formed successively, one after the other, the disease lasts much longer. The confluent variety pursues a much slower progress, and is much more difficult of cure.

Diagnosis and Prognosis.—The diagnosis of discrete aphthæ is not at all difficult, in consequence of their being isolated and succeeded by small and limited ulcerations. The confluent form, on the contrary, may be confounded with ulcerative or ulcero-membranous stomatitis, and with thrush. From the first mentioned disease it may be distinguished, however, by attention to the circumstances that that affection begins by small white patches, and not by pustules, as do aphthæ; that the ulcerations which follow the patches are covered with true pseudo-membrane; and that the white patches just spoken of appear first upon the gums, whilst aphthæ generally begin upon the posterior surface of the inferior lip, and upon the tongue. From thrush it is to be distinguished by the facts that that disease commences by white points which are not pustular, which, running together, form a creamy exudation, and by the absence or very small number of the ulcerations.

Discrete aphthæ constitute a very mild disorder. They always recover without much difficulty. The confluent disease is more serious, because its progress is much slower, its cure more difficult, and because it is often connected, as has been stated, with some other severe disease.

Treatment.—Aphthæ, particularly the discrete variety, require in general very simple treatment. The means to be employed are *general* and *topical*.

The *discrete variety* usually requires only topical remedies, regulation of the diet, and when there are marked symptoms of gastric derangement, the exhibition of some mild emetic, or of a laxative dose. The *local treatment* should consist of applications of demulcent preparations, as the mucilages of slippery elm, sassafras pith, flaxseed, marsh-mallow root, quince seeds, etc., which are to be used pure when there is no pain, or with the addition of a few drops of laudanum or wine of opium, when the mouth is

sore and tender; the aphthæ ought to be touched occasionally with the mixture of borax and honey, or the aluminous preparation recommended for simple stomatitis. The applications must be made several times a day with a camel's hair pencil, a pencil made of charpie or cotton, or with a soft rag covering the finger. When the ulcers which follow the vesicles fail to cicatrise rapidly under the above applications, or when they are numerous and painful, their cure may be very much hastened and the pain quickly relieved, by touching them lightly with a stick of nitrate of silver, or a piece of alum sharpened to a point; or we may employ a pencil dipped into a strong solution of nitrate of silver, or into a mixture of one part of muriatic acid to two of honey.

The *general treatment* of discrete aphthæ need consist of nothing more than the prescription of a simple, unirritating diet in most of the cases. If, however, the digestive apparatus is deranged, the case must be treated according to the symptoms; by antacids or a gentle emetic, when the tongue is foul and the secretions acid, and by the use of a mild laxative, as castor oil, magnesia, or rhubarb, when there is constipation. When diarrhœa is present, we should resort first to a small dose of castor oil or syrup of rhubarb, with the addition of half a drop to two drops of laudanum, according to the age of the child, and afterwards to astringents and opiates, as will be recommended in the article on simple diarrhœa.

The treatment of *confluent aphthæ* must depend on their cause. The local treatment is the same as that for the discrete variety, except that cauterization should be resorted to at an earlier period. When they seem to depend upon a general morbid condition of the constitution, as congenital debility, a scorbutic diathesis, or upon chronic affections of the digestive organs, they must be treated in the first case by properly regulated, nutritious diet, and by the exhibition of tonics and gentle stimulants, particularly iron, quinine, and small quantities of very fine old brandy; and in the second case, in the manner which will be recommended for chronic derangements of the stomach and bowels, when I come to treat of the diseases of those organs.

ARTICLE III.

ULCERATIVE OR ULCERO-MEMBRANOUS STOMATITIS.

Definition ; synonymes ; frequency.—This form of sore mouth is characterized by the secretion upon the mucous membrane of a plastic exudation in thick, yellowish, adherent patches, and by inflammation, erosion, or ulceration of the subjacent tissues. It is the same disease as the aphtha gangrenosa, and I believe the cancrum oris also of Underwood ; the ulceration of the mouth of Dewees and Eberle ; the stomatite couenneuse, and the ulcerative and pseudo-membranous forms of the stomatite gangreneuse of M. Valleix ; the stomatite pseudo-membraneuse or diphtheritique of some writers ; and the stomatite ulcero-membraneuse of Rilliet and Barthez. It is the disease described under the title of gangrenous sore mouth by Dr. B. H. Coates (*North American Surgical and Medical Journal*, vol. ii, 1826), with the exception of a few cases which were what I shall treat of as gangrene of the mouth. It is treated of by Dr. Condie (*Dis. of Child.* 2d edit. p. 142), under the title of gangrene of the mouth, and partly confounded, as it seems to me, with a much less frequent and vastly more dangerous disease, which I shall describe hereafter as a separate affection under that name.

Of the different titles given above, I prefer that of ulcero-membranous stomatitis, as most expressive of the distinctive features of the disease. This form of stomatitis is not very *frequent* in private practice, but sometimes prevails extensively in hospitals, and other public institutions for children, where it often assumes an epidemic character.

Causes.—The *predisposing causes* are epidemic influence, of the existence of which I believe there is no doubt ; according to some observers, contagion, which, however, has not as yet been positively shown ; and bad hygienic conditions as to cleanliness, ventilation, food, clothing, and habitation. It is most frequent between the ages of five and ten years, though it may attack all ages,

and is more common in boys than girls. It occurs during the convalescence from severe diseases, as pneumonia, the eruptive fevers, typhoid fever, enterocolitis, and other affections of children.

The *exciting causes* of sporadic cases are unknown, with the exception, perhaps, of the presence of a carious tooth in the mouth, and fracture or necrosis of the maxillary bones.

Symptoms ; course ; duration.—The disease begins with slight pain and uneasy sensations in the gums, which then become swelled, red, bleeding when touched, and are soon after covered with a grayish, pultaceous exudation of varying thickness. The exudation extends from the gums to the internal surface of the lips and cheeks, and sometimes, but more rarely, to the soft palate, and even to the pharynx and nasal passages. The plastic deposit occurs in the form of small, and slightly projecting, yellowish patches, which approach each other, unite, and form bands of pseudo-membrane, somewhat uneven upon the surface, and adhering with considerable force to the tissue beneath. When the exudation is detached, the mucous membrane is found to be of a red or purple colour, bleeding, and excoriated or ulcerated. The ulcerations which exist under the false membrane are of various depths, of a grayish, livid, or blackish colour, with swelled, softened, and livid red, or bleeding edges. Those which are formed upon the inside of the lips are rounded in shape, whilst those seated in the angle between the lips and gums, are usually elongated.

When the disease is mild, and when it is properly treated, the false membranes are detached, leaving the mucous tissue merely excoriated, in which case it soon regains its natural condition ; or else the ulcers which exist beneath, rapidly become healthy and cicatrise. In violent cases and in those badly treated, the inflammation, on the contrary, persists ; the pseudo-membranes increase in thickness, or if detached, are formed anew ; the ulcerations become deeper ; the disease extends ; and the case lasts an indefinite period of time.

Other symptoms, beside those we have mentioned, characterize the disease.

The *breath* is always more or less fetid, and in bad cases, al-

most gangrenous. The *salivary* and *sub-maxillary* glands are generally more or less swelled, hard, and painful, and according to some authors, the surrounding cellular tissue is in the same condition, though this is denied by others. The *movements* of the lower jaw are stiff and painful in severe cases. *Deglutition* is not affected unless the disease extends to the pharynx. In violent cases there is usually a copious *discharge* of bloody serum, which flows from the mouth during sleep. When the ulcerations are deep and large, the tissues beneath are more or less swelled; the swelling, however, rarely assumes the hard, resisting, circumscribed characters, with the tense, smooth, hot, and shining appearance of the skin which exists in true gangrene of the mouth. In most of the cases there is but little *febrile reaction*, especially at the invasion, though it sometimes increases afterwards if the disease becomes extensive.

The disease begins, as already stated, on the gums, and unless limited to these parts, as sometimes happens, extends to the lips and cheeks. In many of the cases it attacks only one side of the mouth, and this is more frequently the left than the right.

The *course* of the disease is usually rapid in epidemic cases, and in those which are properly treated. Where badly treated, on the contrary, it may last from one to several months, or terminate in gangrene of the mouth.

Diagnosis ; prognosis.—The *diagnosis* is, as a general rule, very easy, if proper attention be paid to the characteristic features of the disease. It has, as already stated, been very often confounded with gangrene of the mouth. The method of distinguishing between the two will be given in full in the article on that disease. From thrush it is to be distinguished in the manner which will be pointed out under that subject.

The *prognosis* is favourable in the great majority of the cases. Sporadic cases probably always terminate favourably. The epidemic disease, though rarely fatal, is sometimes so from its extension to the pharynx and larynx, or from its termination in gangrene of the mouth. Of upwards of 120 cases of this kind, observed by Dr. Coates at the Philadelphia Children's Asylum, in a period of three months, all but one recovered (*Loc. cit.* p. 21).

The cases which occur in the course of other diseases are not dangerous in themselves, but are so as the sign of great severity of the primary affection.

Treatment.—The treatment may be divided into *general* and *local* or *topical*. The *general treatment* should consist in most of the cases of attention to the diet, which ought, in healthy and vigorous children, to be simple and unirritating, and in those who are weak and debilitated, nutritious and digestible. No internal remedies are required in the majority of the cases. If, however, the bowels are costive, or the child feverish and uncomfortable, a laxative dose may be given with advantage; or some simple diaphoretic, as nitre and water, or the neutral mixture, may be used through the day, and a warm pediluvium or an immersion bath given in the evening. When the constitution is feeble, and the child weak or anemic, tonic remedies are indicated. The best is probably quinine, or one of the ferruginous preparations; or the compound infusion of gentian, with addition of Huxham's tincture of bark, may be resorted to. If the inflammation be severe, and accompanied with tumefaction and tenderness of the glands and some febrile reaction, it would be proper to apply a few leeches to the neck.

The *local treatment* is all that is necessary in a large number of cases. When the attack is slight, we need only to keep the mouth clean by means of demulcent washes, used in the manner recommended in the article upon aphthæ, and to employ from time to time some mild astringent application. This may consist of honey and borax, of weak solutions of acetate or sulphate of zinc, or of sage or rose-leaf tea, with alum and honey. When the disease is more severe and extensive, and especially when it is attended with many and deep ulcerations, it should be treated with more energetic local applications. In such cases cauterization with a strong solution of nitrate of silver (℞i to ℥ss of water), or with muriatic acid, either pure or mixed with honey, should be resorted to. M. Bretonneau employs the pure acid, applying it twice in forty-eight hours in recent cases, which almost always cures the disease; or, when the case is chronic, using the acid in the same way, with the precaution, however, of suspending its

employment from time to time. He applies it between the teeth by means of a small roll of paper, and to the other surfaces with a mop made of rag or sponge. I would merely remark, in reference to cauterization with these powerful preparations, that I have never found it necessary in private practice, having always succeeded with less severe and less painful remedies.

Dr. Dewees recommends the following combination in cases of ulceration of the mouth, and says of it that it "has so far never failed us:" *R.*—Sulph. Cupri gr. x; Pulv. Cinch. Opt. ʒij; Pulv. G. Arab. ʒi; Mel. commun., ʒij; Aquæ font. ʒiij.—*M.* et ft. sol. The ulcerations to be touched with the solution twice a day, with the point of a camel's-hair pencil. Dr. Coates (*Loc. cit.*), says that he "settled down, after various trials, in the employment of the following: *R.*—Sulph. Cupri ʒij; Pulv. Cinchonæ ʒss; Aquæ ʒiv.—*M. S.*—To be applied twice a day, very carefully, to the full extent of the ulcerations and excoriations."

Rilliet and Barthez recommend very highly the plan pursued by M. Bouneau at the Children's Hospital. This is to cleanse the mouth first, and then to apply dry chloride of lime (*calx chlorinata* of the pharmacopœia), to the diseased surfaces. The application is made by means of a piece of rolled paper, or a stiff pencil, which should be moistened and then dipped into the powder so that some may adhere, or with the finger. The surfaces are to be gently rubbed with the powder, and after a few moments' contact, washed clean with pure water. This is to be done twice a day, until the ulcerations assume a clean, healthy appearance, after which the following mouth-wash is to be employed: *R.*—Mucil. G. Acac. ʒi; Syrup Cort. Aurant. ʒss; Calc. chlorinat. ʒi.—*M.*

The chief danger of the disease depends on the circumstance that it sometimes terminates in gangrene of the mouth, to be presently described. Any disposition to such a termination should be carefully watched, and the proper preventive means, consisting of local stimulating or caustic applications, with the internal use of stimulants and tonics, ought to be at once resorted to.

ARTICLE IV.

GANGRENE OF THE MOUTH.

Definition ; synonymes ; frequency.—Gangrene of the mouth is an affection which occurs chiefly in children of debilitated constitution. It begins generally by ulceration of the mucous membrane of the cheek, which after a longer or shorter time, runs into gangrene, and extends rapidly to the gums ; after a few days, if the disease be not arrested, the central tissues of the cheek become thickened, and indurated, an eschar forms upon the integument, which spreads in depth and width, until at last the cheek may be perforated, the whole side of the face and jaws destroyed, the teeth loosened, and the maxillary bones exposed and necrosed. It is known by a great variety of names : gangrænopsis, cancrum oris, gangræna oris, kanker of the mouth, gangrenous erosion of the cheeks of Underwood ; necrosis infantilis, gangrenous stomatitis, etc. It is a *frequent* disease in the hospitals for children in Europe, and a not uncommon one in institutions of the same kind in this country. It sometimes prevails endemically in hospitals. It is a rare disease in private practice. I have never yet met with a case, excepting in public institutions.

Predisposing causes.—The disease is nearly, but not exclusively confined to the period of childhood. It is most common between the ages of three and six years ; is very rare but does sometimes occur in infants ; and is of nearly equal frequency probably in the two sexes. Unfavourable *hygienic conditions* constitute a strong predisposing cause. Children living in hospitals or any crowded institution ; those whose parents are poor and in want, and whose constitutions have been greatly deteriorated by long illness, by the tubercular diathesis, or by acute diseases, are particularly apt to be attacked. It almost always follows upon some previous acute or chronic disease, particularly measles, or some other acute exantheme ; pneumonia ; entero-colitis ; hooping-cough ; long-continued malarious fevers, &c. Guersent and Blache say

(*Dict. de Med.* t. 28, p. 601), "The existence of some anterior disease is a necessary condition of gangrene of the mouth: we have never known it, nor has M. Baron, to occur as an idiopathic affection." It has been affirmed by some persons to be *contagious*, but this is exceedingly doubtful. The fact of its occurring sometimes in an endemic form has already been referred to. It has been known also to prevail as an epidemic.

The *exciting causes* can rarely be ascertained with any certainty. The only one which seems to have been proved to exist in some instances, is the exhibition of large doses of the mercurial preparations, and even this is questioned by some very good authorities.

Anatomical lesions.—Upon examination after death, it is found that the *integument* surrounding the mortified spot, soon runs into putrefaction. The lip or cheek in which the disease is seated, is swelled, hardened, tense, and shining, of a purple or greenish colour, and presents a deep, circumscribed engorgement. On the most prominent part of the swelling there often exists a rounded or oval, and distinctly limited eschar, of variable size, from that of a small bean, to that of a dime, or a quarter or even half dollar. In other instances the cutaneous slough is much larger, and extends irregularly to different parts of the face, to the chin, neck, eyelids, and even to the neighbourhood of the ear, so as to occupy the whole of one side. Under these circumstances, the tumefaction is neither so considerable, nor so regular, as when the slough is smaller. The eschar is always black, and generally dry and parchment-like, and extends a third or two-thirds of a line in depth, or quite through the integument. The tissues beneath the *skin* are not generally implicated, though in some cases the eschar is detached, and there is a perforation of the cheek through which may be seen the alveolar processes.

The *mucous membrane* of the mouth is always affected with mortification. The disease may be limited, so as to exist in the form of an elongated ulceration, of a dark grayish colour, situated in the fold where the mucous membrane is reflected from the cheek to the lower jaw; or, in a larger proportion of cases, it is seated on the internal surface of the cheek, opposite the interval between the

alveolar processes. Sometimes the disease is much more extensive, and occupies all or a part of the internal surface of the cheek. In such instances the whole thickness of the mucous tissue is destroyed, and it presents upon its surface a blackish or brownish pultaceous slough, almost liquid in consistence, which may be scraped off with a scalpel, leaving beneath loose shreds of mucous membrane, without any trace of organization. The gums frequently participate in the disease, and are converted into shreds, or completely destroyed.

The *maxillary bones* are sometimes, in severe cases, when the disease has extended to the gums, exposed, blackened, and even necrosed. The *teeth* are very often uncovered and loosened, and not unfrequently some are lost. The *tissues* between the skin and mucous membrane are found either hardened and infiltrated, or sphacelated to a greater or less extent. In the least severe cases, the fatty cellular tissue and the muscular structure of the cheek are infiltrated with serum, but preserve their organization. When the disease is more aggravated, the gangrene extends to these tissues also, and always to those adjoining the mucous membrane first; so that the cellular structure beneath that membrane, and then the muscles, are infiltrated with a sanious fluid, and either in a state of sphacelus or tending thereto, whilst some of the adipose tissue beneath the skin is still merely infiltrated. In yet worse cases, the sloughs formed on the two surfaces of the cheek come into contact, and if their separation from the sound parts has taken place, a perforation is the consequence.

The condition of the *blood-vessels* in the midst of the diseased parts has been carefully examined by Rilliet and Barthez. These authors state that when the tissues of the cheek are merely infiltrated, the vessels remain healthy, permeable, and their parietes are scarcely or very slightly thickened. When the vessels run along the edge of the slough, they are still permeable, but their walls are thickened, and begin to assume the appearances of the mortified tissues. Lastly, when they traverse the centre of the eschar, they can still be traced out, but their canals are found obliterated by coagula, in the whole extent of the mortified parts; or else the coagula occupy the vessels at their points of en-

trance into and exit from the slough, while between these points their walls are thickened, tend to assume the colour and softness of the putrefied tissues, and their canals are filled with pultaceous gangrenous matter. The writers quoted do not suppose that the obliteration of the vessels is the cause of the sphacelus, since that change occurs only after the death of the surrounding tissues has already taken place.

The disease very rarely occurs on both sides of the mouth at once, though this does occasionally happen.

The *sub-maxillary glands* are nearly always in their natural condition, but in rare instances are softened and engorged.

Gangrene of the mouth never, or very rarely indeed, exists without lesions of other organs. Of these the most frequent are acute pulmonary affections, and after them, acute or chronic diseases of the gastro-intestinal tube, and then malarious fevers, pleurisy, pneumo-thorax, peritonitis, pharyngitis, and nephritis.

Symptoms ; course ; duration.—The following account of the symptoms of the disease is taken chiefly from the work of Rilliet and Barthez. Gangrene of the mouth generally begins during the course or convalescence of some acute or chronic disease, by ulceration, aphthæ, or phlyctenæ, of the mucous membrane, and in rare instances, by œdema of the substance of the cheek. At the same time the face is pale, and usually continues so throughout the disease ; the nostrils and eyelids are often incrustated, and the latter infiltrated or sunken, and surrounded by bluish circles ; the lips are swelled and covered with scabs, or dry. The breath of the child is fetid from the beginning, and as the disease progresses becomes gangrenous. There is but little fever at first, unless the case be accompanied by some acute disease : the pulse is commonly frequent and small in the beginning, rising gradually from 80 or 90 to 100 or 120, and becoming insensible towards the end ; in cases occurring in the course of other diseases, the pulse rises sometimes to 120 or 140, and is larger and fuller. The child is generally languid and quiet at first, or more rarely, cross and peevish. The strength may be either lost entirely, merely diminished, or the patient may retain a sufficient amount of force to sit up and observe what is going on

around, and even to leave the bed the day before death. Half of the children observed by Rilliet and Barthez, in whom this symptom was noted, sat up in bed until within a few days of the fatal termination. In most cases but little complaint is made of pain in the mouth, though in some it is said to be severe.

The ulceration already spoken of as forming the first symptom of the disease, is generally of a grayish colour, and resembles very closely those which exist in the ulcero-membranous form of stomatitis. It may be seated either on the gums, in the fold formed by the junction of the cheek or lip with the gum, or on the inside of the cheek, opposite the space between the alveolar processes. It may present a gangrenous appearance from the first day, or not until after two or three days; or lastly, it may pass through the stages characteristic of ulcerative stomatitis, and terminate in the affection under consideration. Dr. B. H. Coates (*Loc. cit.*) describes under the title of gangrenous sore mouth of children, the ulcero-membranous form of stomatitis, and a few cases of gangrene, and states that three or four children out of 120 affected with ulcerated gums, "suffered small spots of mortification, and one, by the delay arising from the tardy report of a nurse, suffered necrosis in a portion of an alveolus."

The ulcerations just described assume the following appearances as the gangrenous nature of the malady develops itself. They become grayish, and then dark in colour, bleed easily when touched, and are covered with pultaceous sloughs, exhaling a characteristic fetid odour. The gangrene extends to the neighbouring parts, from the gum to the cheek, or from the cheek to the gum, and implicates at last the whole side of the mouth, or of the lower lip. At the same time the affected cheek or lip undergoes a circumscribed infiltration, which is at first rather soft, but becomes afterwards firmer, and forms at last a hard and rounded knot or tumour in the centre of the cheek, which is now tense, shining, and pale, or marbled with purple spots, while the slough on the inside is of a brownish colour, more extended in size, and sometimes surrounded by a dark ring. The hard tumour of the cheek just described, usually appears between the first and third day after the sphacelation of the mucous membrane, though in some

instances, not until a later period. It is formed, as stated in the account of the anatomical lesions, by engorgement of the cellular and adipose tissues. The child, at this stage, is still able to sit up in bed and take notice, or shows evident signs of weakness and depression; the face is swelled, and destitute of expression in the affected side; a bloody or dark-coloured saliva runs from the mouth, which is partially open; the appetite is not entirely lost in all cases, the patient still demanding and taking food; vomiting is rare, but diarrhœa is almost always present; the thirst is generally intense; the skin is warm and feverish, natural, or too cool, and almost always dry, the differences depending probably more upon the concomitant disease than upon the mouth-affection. The respiration is natural or altered according to the nature of the primary disease, which is, as already stated, in the majority of the cases, a pulmonary affection. The intelligence is generally undisturbed, though in some rare cases there is insomnia, delirium, or piercing cries.

If the disease continues to progress, as it almost always does when it has reached the stage I am describing, there appears in many, but not all the cases, (8 of the 21 observed by Rilliet and Barthez,) a slough or eschar upon the most prominent and discoloured part of the swelling of the integument of the cheek or lower lip. This generally makes its appearance between the third and sixth days of the disease, but in other cases, as early as the second, or not before the twelfth, or even later. The skin, at the point where the eschar is about to form, becomes purple, and then black; sometimes a phlyctæna makes its appearance, which is very soon converted into a small, dry, black slough. This, if not limited by a process of separation from the living tissues, becomes larger and larger by the extension of the sphacelation, until it may, as already stated, embrace the whole side of the face. In grave and fatal cases, the gangrene sometimes extends to all the tissues of the cheek, and meeting, at last, the disease which had commenced on the inside of the mouth, occasions a perforation through which may be seen the teeth, alveolar processes, and the whole interior of the buccal cavity. In such instances as these, one of which I saw in the Pennsylvania

Hospital, the appearance presented by the child is, as may well be imagined, sad and sickening to behold. Even under these circumstances, however, with the cheek perforated, the edges of the opening irregular and covered with shreds of dead tissue, the gums destroyed, the teeth loosened, and the maxillary bones exposed, blackened, and perhaps necrosed; with a dark and fetid sanies flowing from the mouth or perforation, and a putrefactive smell infecting the air around, the child is said to retain, in some instances, its strength, so as to sit up in bed, ask for food, and drink with avidity. In other cases, on the contrary, the patient, at this stage, is exhausted to the last degree, and refuses both food and drink. During the closing stage of the disease, there is generally profuse diarrhœa, rapid emaciation, dry skin, small, rapid pulse, and at last death in a state of utter prostration.

In favourable cases the recovery may take place in the early stage, before the integument becomes involved, and while the gangrene is limited to the mucous membrane, or at a later period, after the slough has separated. In the first instance the child generally recovers without deformity, though I saw one case in which necrosis of about an inch of the front of the inferior maxilla took place, without any loss of the soft parts. When the child recovers after the formation of the cutaneous slough, a very rare event, the gangrene ceases to extend, the eschar separates and is cast off, the edges of the opening assume the appearances of a healthy ulcer, and after a length of time, approach each other and cicatrise, leaving generally a large uneven, discoloured scar, like that of a burn, which remains through life a horrid deformity.

The *duration* of the disease varies according to its termination. When this is unfavourable, which happens in much the larger proportion of cases, death usually occurs about the end of the first, or in the course of the second week, though it has been known to occur at a later period. In favourable cases, the duration is commonly longer, particularly if a cutaneous eschar has been produced, as the separation of the slough, and cicatrization of the ulcer which remains, requires a tedious and slow process on the part of nature.

Complications are very apt to arise in the course of the disease.

The most frequent is pneumonia. Guersent and Blache state that it exists in nine-tenths of the cases; Rilliet and Barthez found it in 19 out of 21; of the 19 it began in 8 during the progress of the gangrene, and apparently under the influence of the latter, whilst in the remaining cases it existed before, and acted perhaps as predisposing cause to the affection of the mouth. Another and more dangerous complication is the occurrence of gangrene in other parts of the body, particularly the soft palate, pharynx, œsophagus, anus, and more frequently the vulva and lungs.

Diagnosis.—Some authors have described as identical affections, under the title of gangrenous stomatitis, the disease under consideration, and the one already treated of as ulcero-membranous stomatitis. This has been done particularly by M. Taupin, who is followed in his description by M. Valleix (*Guide du Med. Prat.* t. iv). It seems clear to me, moreover, that Dr. B. H. Coates, in his very valuable paper on the “gangrenous sore mouth of children” (*Loc. cit.*), and Dr. Condie, in his article on “gangrene of the mouth,” mingle in their descriptions the two diseases referred to. I cannot but think, however, that the differences between them as to frequency, symptoms, course, amenability to treatment, and termination, which are fully pointed out in the diagnostic table below, and lastly the example of MM. Baron, Billard, Guersent, and Rilliet and Barthez, and Dr. G. B. Wood, fully warrant me in regarding them as different and distinct diseases.

The diagnosis of gangrene of the mouth is, in most cases, very easy. The ulceration of the mucous membrane, followed by gangrene; the deep-seated induration of the cheek, at first pale on the outside, then dark-coloured, and terminating after a time in a characteristic slough; the course of the malady, and the nature of the general symptoms, will generally prevent any difficulty in the recognition of the disease.

From stomatitis it may be distinguished by attention to the points laid down in the following table, taken from Rilliet and Barthez:—

STOMATITIS.

Begins by ulceration or by pseudo-membranous plastic deposit.

Odour very fetid and sometimes gangrenous.

But little extension of the local lesion, which always retains the same appearances.

But little swelling of the cheek or lips, or simply œdema of those parts, without deep-seated induration, tension, or unctuous appearance.

Salivation rarely so considerable as to flow from the mouth; when present sometimes sanguinolent; never mixed with shreds of gangrenous tissue.

Never an eschar on the exterior.

Never complete perforation of the soft parts; denudation of the bones never occurs; loss of the teeth very rare.

Course of the disease slow when left to itself; recovery rapid under the influence of treatment.

GANGRENE.

Begins by ulceration, which is sometimes gangrenous from the first, or by œdema of the cheek.

Odour always gangrenous.

Considerable and rapid extension: the tissues assume a peculiar dark-grayish tint.

Extensive swelling and œdema of the cheek, with deep-seated induration, tension, unctuous appearance, purple spots.

Salivation abundant; constant escape of fluid, at first sanguinolent, afterwards putrefactive.

Often an eschar upon the cheek or lips.

Perforation of the soft parts frequent; denudation of the bones constant; loosening of the teeth constant, and their loss frequent.

Course rapid, and fatal termination, as a rule, when the disease is left to itself, and in spite of all treatment.

Gangrene of the mouth may be confounded with malignant pustule. The method of diagnosis has been drawn by M. Baron in the following words: "Malignant pustule always begins on the exterior; affects the epidermis first, and extends successively to the corpus mucosum, chorion, and subjacent parts; whilst, on the contrary, the gangrene under consideration attacks the mucous membrane first, then the muscles, and lastly the skin."

Prognosis.—The prognosis of true gangrene of the mouth is exceedingly unfavourable. The great majority of the subjects perish in spite of all that can be done. Dr. Coates (*Loc. cit.* p. 14) says that a black spot on the outer surface of the swelling "has always been in my own experience, the immediate harbinger of death. It is proper to state, however, that I have heard it said,

that cases had recovered in this city, in which the gangrene had produced a hole through the cheek." Rilliet and Barthez state that "death is the ordinary termination of gangrene of the mouth; though there are instances of recovery on record." Of 29 cases analyzed by them, only 3 recovered. Guersent and Blache (*Loc. cit.* p. 596) state that unless arrested in the formative stage, it ends fatally almost constantly in from five to ten days, and frequently before perforation has taken place. Of 36 cases observed by M. Taupin in the Children's Hospital, at Paris, not one escaped. (Guersent and Blache, *Loc. cit.* p. 597.) The authors of the *Compendium de Médecine Pratique*, say of this disease (t. i, p. 632), "Death is the almost inevitable termination." Dr. Marshall Hall (*Edin. Med. and Surg. Journ.* xiv, p. 547), reports six cases of the disease, two of which followed measles, one repeated attacks of pneumonia, one fever (type not mentioned), one worm-fever, and one typhus fever. All but one, the case occurring in the course of typhus fever, in a girl twelve years old, died. This girl recovered, with, however, falling-in of the right cheek, "a frightful chasm" on the left side of the mouth, and caries of a portion of the alveolar process, palate bone, and second molar tooth. Recoveries sometimes occur, however, as in the case mentioned by Dr. Hall, after perforation, but nearly always with terrible deformities, with adhesions of the walls of the mouth to the jaws, with incurable fistulæ, &c.

The prognosis is more favourable in private practice than in hospitals. The favourable circumstances in any case are: good hygienic conditions; vigorous constitution of the child; the absence of dangerous concomitant disease; the continuance of appetite and strength; and a disposition to limitation and separation of the slough. Unfavourable symptoms are: weak and debilitated constitution of the patient; severe co-existent disease; prostration of the strength; and extension of the sloughing process.

Treatment.—The reader needs only to refer to the remarks on prognosis to be assured that no treatment as yet discovered promises much success. I would call attention also to the following statement,—that the remarks about to be made apply only to true gangrene of the mouth, and not to all the cases described by some

writers under the title of gangrenous sore mouth or even under that of gangrene of the mouth; since, as already stated, they confound together true gangrene and ulcero-membranous stomatitis.

The treatment is divided into *local* and *general*. The *local treatment* recommended by the French writers, consists in the cauterization of the sloughing parts with one of the mineral acids, with nitrate of silver, or with the actual cautery. This is the plan proposed by MM. Billard, Baron, Guersent and Blache, Barrier, Rilliet and Barthez, Bouchut, and Valleix. The authors of the *Bibliothèque du Médecin Praticien* remark, however, that nearly all the patients subjected to cauterization die, and that of the small number saved, there are as many who had not been subjected to that treatment, as there are of those to whom it had been fully applied. They wonder, therefore, that recent authors continue to repose the same confidence in it, as did their predecessors. "For us," they say, "we are of opinion that cauterization exerts but slight influence, if it have any at all, and it is greatly to be desired that the zeal of practitioners might discover some more efficacious remedy." (*Loc. cit.* t. v, p. 551.)

It is very important to make use of the caustic application as early after the beginning of the sphacelus as possible, for if it be allowed to spread to any considerable depth or extent, there is scarcely a hope of arresting it by any means. Guersent and Blache recommend pure nitric, sulphuric, or muriatic acid; Rilliet and Barthez propose the acid nitrate of mercury, muriatic, sulphuric, or acetic acid; M. Valleix proposes the treatment employed by M. Taupin, which is to remove the pseudo-membrane and a part or the whole of the gangrenous eschar with scissors, to make some scarifications upon the healthy parts, to apply pure muriatic acid, and after the fall of the slough, to make use of dry chloride of lime (*calx chlorinata*). The acid most generally employed is the muriatic. The local treatment proposed by Rilliet and Barthez is the following: as soon as the ulcerations assume a gangrenous appearance, to touch them with a brush or sponge dipped into acid nitrate of mercury, or pure muriatic acid, the brush to remain in contact with the sloughs for a few instants, and then to be applied rapidly around and on the parts beyond

them. After this cauterization, an application is to be made of dry chloride of lime (in the manner recommended in the article on ulcero-membranous stomatitis), which is to be left in contact with the sloughs for a few minutes, when the mouth must be thoroughly washed with a strong jet of water from a syringe. The cauterization and use of the chloride of lime are to be resorted to twice a day, and the mouth washed three or four times in the interval with large injections of simple water, barley water mixed with honey of roses, or better still, with a strong decoction of cinchona. If the case goes on favourably, and the sloughs separate, the cauterizations are to be suspended, and the chloride of lime alone employed. If, on the contrary, a slough forms on the outside of the cheek, a crucial incision must be made into it, and a brush charged with the same caustics introduced between the cuts; powdered cinchona is then placed in the openings, and retained there by a piece of diachylon plaster, or by pledgets of charpie, dipped in a solution of soda. This treatment is to be continued until the slough separates, when the edges of the wound, and all the diseased parts that can be reached, are to be cauterized.

In applying escharotics to the mouth, certain general precautions are required, of which it is necessary to give some account. When they are used upon the inside of the cheek, a spoon must be introduced into the mouth, with the concavity directed towards the alveolar processes, in order to preserve the teeth and tongue from being touched. When the application is made upon the gums, the cheek should be drawn to one side by an assistant, and the tongue pushed out of the way with the finger, or a spoon. If the acid happens to touch the teeth or tongue, it must be instantly washed off. The mouth ought always to be thoroughly cleansed with water immediately after the cauterization, to remove any superabundance of acid.

The kind of brush most suitable for the application of the mineral acids is one made of charpie, strongly tied to a solid handle. The sponge mop, which is sometimes used, is made by fastening a small piece of fine sponge to the end of a stick.

Guersent and Blache recommend that the acid be applied to the slough every hour, until the sphacelus ceases to extend. They

state that this plan is sometimes advantageous when the gangrene is confined to the gums only, but that it is generally powerless when the disease has extended to the cheek, or has implicated the deep-seated tissues. Under the latter circumstances, and when the inefficacy of caustics has been shown by trial, they propose the use of the actual cautery, as recommended by M. Baron and other distinguished practitioners, and which, they add, has afforded them some brilliant results in very bad cases.

M. Barrier advises that we should accurately expose the diseased parts by crucial incisions, and apply the escharotic to all the parts forming the limits of the gangrene, in such a way that the tissues already disposed to slough shall be thoroughly cauterized, while those a little beyond are so in a less degree.

The English writers, and those of our own country, seem rather less disposed than the French, to make use of powerful escharotics, and lay more stress upon the general treatment. Underwood, following Mr. Dease of Dublin, advises that "the parts should be washed and likewise injected with muriatic acid, in chamomile or sage tea, and afterwards dressed with the acid, mixed with honey of roses, and over all a carrot poultice." Dr. Symonds (*Libr. of Pract. Med.* vol. iii, p. 23,) directs the cheek to be frequently rubbed with a stimulating embrocation of camphorated oil and ammonia, on the first appearance of the swelling, and in the intervals to be kept moist with a tepid lotion containing muriate of ammonia and alcohol. On the slightest appearance of an eschar upon the interior of the mouth, it is to be touched with solid nitrate of silver, or strong muriatic acid. If sloughing has already commenced, the nitrate of silver lotion is said to be the best application. The mouth is to be frequently washed or syringed with a solution of chloride of soda, and when mortification has taken place, we are to endeavour to prevent it from spreading, by carrot, or fermenting poultices. Maunsel and Evan-son say that the early application of muriatic acid, undiluted, or mixed with one or two parts of honey, is the only efficient application in these forms of gangrene. Dr. Gerhard (*Libr. of Pract. Med.* vol. iii, Am. Ed., p. 24), says, "the best local applications are the nitrate of silver, if the slough be small in extent; if much

larger, the best escharotic is the muriated tincture of iron, applied in the undiluted state; after the progress of the disease is arrested, the ulcer will improve rapidly under an astringent stimulant, such as the tincture of myrrh, or the aromatic wine of the French Pharmacopœia." Dr. Dunglison (*Pract. of Med.* vol. i, p. 36) recommends the application with a brush, of a mixture of equal parts of creasote and alcohol, after incisions have been made through the gangrenous parts. Dr. Condie (*Loc. cit.* p. 150) states that he has found a strong solution of sulphate of copper, (thirty grains to the ounce of water,) applied very carefully twice a day, to the full extent of the gangrenous ulceration, by far the most successful lotion.

It seems to me very clear, after the study of the treatment recommended by the different writers quoted above, that the most important part of the local management of the disease, is the early application of some escharotic substance to the ulcerations, or to the mortifying parts; the best escharotic is probably pure muriatic acid. This should be made use of twice or three times a day, observing the precaution to wash the mouth immediately afterwards, with water by means of a syringe. Later in the disease, when the gangrene has extended to the skin, the use of escharotics, or of the actual cautery, is still recommended by many writers, but opposed by others. I confess I should be inclined to prefer at this stage, the use of muriated tincture of iron, as recommended by Dr. Gerhard, of strong lotions of sulphate of copper, of solutions of nitrate of silver of moderate strength, or of the dressings of muriatic acid and honey of roses, as proposed by Underwood, in connexion with carrot and fermenting poultices, as recommended by Underwood and Symonds. Throughout the course of the disease the mouth ought to be frequently cleansed by washing or injecting with solution of chlorinated soda, mixed with eight parts of water, which corrects at the same time the terrible fetor of the disease.

General Treatment.—All writers recommend the use of tonics, stimulants, and nutritious diet, unless the presence of high fever, or the state of the digestive organs, seem to contra-indicate their employment. Without personal experience on which to found

such an opinion, but from a consideration of what I have seen most successful in other forms of gangrene, as that following accidents and surgical operations in deteriorated constitutions; from what proved effectual in a case of idiopathic gangrene of the vulva, in a child ten years of age, which came under my charge; and from what is necessary in analogous conditions of the constitution when labouring under typhoid and cachectic diseases, I am induced to believe that the general treatment must be of as great or nearly as great importance as the local, and that the steady and persevering use of tonics, stimulants, and of the most strengthening diet, should always be insisted on from the earliest period, whether fever be present or not. The quantity of stimulants and the amount of food, ought, it seems to me, to be measured only by the capacity of the digestive organs to receive and assimilate them. Of the tonics, the best is quinine, which may be given suspended in syrup, in doses of a grain four or five times a day, to a child three or four years old. The most suitable stimulants are very fine old brandy, Madeira wine given in considerable quantities, and, if the stomach is sure to receive it well, carbonate of ammonia, or better still, the aromatic spirits of hartshorn. The diet must consist of milk, made into punch with brandy, wine whey, the yolks of eggs beaten up with wine, rich soups, animal jellies, and, if the child wishes it, of tender meat finely minced.

The room in which the child is placed ought to be large, if possible, and at all events, thoroughly ventilated.

ARTICLE V.

THRUSH.

Definition ; synonymes ; frequency ; forms.—Thrush is a deposit upon the mucous membrane of the mouth, of a whitish or grayish-yellow exudation, of a soft, cheesy consistence, at first adherent, and afterwards spontaneously detached, and generally unaccompanied by ulceration of the tissue beneath. This constitutes the whole disease in some cases, no other lesion being discoverable; whilst in other instances, and probably in the great

majority, it is connected with some more or less serious general or local affection. It is the disease described under the title of aphthæ or thrush, by Underwood and Eberle; of aphthæ, by Dewees; of erythematic stomatitis with curd-like exudation, by Dr. Condie, and of aphtha lactantium, aphtha lactamen, and aphtha infantilis of older writers. It is the muguet of the French.

The *frequency* of the disease is very great in hospitals for children. It is common also amongst the children of the poor, and comparatively rare in the middle and upper classes of society. It occurs under two forms, the *idiopathic* or *primary*, and *symptomatic* or *secondary*. By the first is meant the form in which the affection of the mouth is the only perceptible lesion; by the second, that in which disease of other organs, or of the constitution generally, precedes the buccal exudation.

Causes.—Predisposing causes.—The disease occurs at all ages, but is by far most common during the two first months of life. *Altered health* from any cause, *deficient ventilation*, and *want of cleanliness*, strongly predispose to the production of thrush. Much difference of opinion exists as to the nature of the connexion between *enteritis* and thrush, especially since the publication of the researches of M. Valleix, who thinks that the latter disease is almost always the consequence of the former, and who doubts the existence of purely local cases of thrush. MM. Trousseau and Delpach, on the contrary, (*Journ. de Med., de MM. Beau et Trousseau*, January, Feb., April, May, 1845,) report 14 cases out of 58, in which there were neither gastric nor intestinal complication, and others in which enteritis did not occur except as a consequence of thrush. They state, however, that though enteritis does not exist in all cases, and is a simple complication in others, it is sometimes the true cause, the sole origin of the disease. Again, Dr. Berg, in a very accurate and careful history of the disease, (*Brit. and For. Med. Rev.* October, 1847, p. 429,) in which he asserts and endeavours to show its *cryptogamic nature*, states “that both the local and general symptoms which accompany thrush in the child are, in most cases, immediate or secondary consequences of the presence of the parasite, and not to be regarded as the causes of that fungoid vegetation.” It is believed by

many observers to be *contagious*. This opinion is rendered doubtful, however, by the assertions of MM. Baron, Billard, Guersent, and Valleix (*Loc. cit.* t. iv, p. 63), that they have known children in health to be fed with the same spoon which has been used for others affected with the disease, without their contracting it. M. Bouchut, on the contrary, and Dr. Berg (*Loc. cit.*), both of whom believe in the cryptogamic nature of thrush, assert it to be contagious. Dr. Berg is of opinion that it is "conveyed from one patient to another by sporules or fragments of sporules, in the dried state, floating in the atmosphere, but that it still more frequently is propagated by the bottles from which children with thrush have been fed, or by the nipple, especially where, as in many hospitals, two children are suckled by one nurse." This gentleman made many experiments in order to decide this question, all of which proved favourable to the idea of contagion.

Of various predisposing causes which have been cited as productive of the disease, the ones most generally admitted are the use of *artificial diet*, particularly one consisting of farinaceous substances, and in children who are suckled, an *unhealthy state* of the nurse's milk. To show the truth of these assertions, I make the following quotations. Underwood says: "A principal remote cause of this disease seems to be indigestion, whether produced by bad milk, or other unwholesome food, or by the weakness of the stomach." Dewees remarks that "children fed much upon farinaceous substances, are especially exposed to the attacks of this disease, particularly when their food is sweetened with brown sugar or molasses." Dr. Eberle says: "Unwholesome and indigestible nourishment, and over-distension of the stomach, during the early stages of infancy, almost inevitably lead to the occurrence of aphthæ (thrush). Bad and old milk, and thick farinaceous preparations sweetened with brown sugar or molasses, are especially apt to give rise to the disease." Much influence is ascribed by Dr. Berg to the operation of artificial food in favouring the growth of aphthæ. M. Valleix (*Loc. cit.* p. 60) who has studied the subject with the greatest care and attention, says that amongst the hygienic conditions which may act as predisposing causes "one alone has seemed to me to exert a positive

influence, and this is *improper alimentation*." He adds that since the publication of his "Clinique" he has several times met with cases of thrush, "and I have always found that the children had been put upon feculent diet. On the other hand, I have never known a child to have the disease, who had been suckled exclusively during the early months of life." MM. Trousseau and Delpech, in the very valuable paper on muguet (thrush) already quoted, say: "we would be justified, therefore, in asserting, that we have never known an infant to die of thrush, who had been suckled at a healthy breast, or whose health had not been dangerously compromised by other causes." To show in another mode the influence of this cause, I will state that of 29 cases of the disease observed by these gentlemen in children who were suckled, only 7, or one-fourth, died; whilst of 22 in those who were not suckled, 17, or more than three-fourths, died.

Season exerts a considerable influence upon the production of thrush, as M. Valleix found that more than half the cases occurred during the three warmest months of the year.

Exciting causes.—The deprivation of the breast, and a consequent resort to artificial diet, particularly one consisting of farinaceous substances, is probably much the most frequent exciting cause of thrush. An unhealthy state of the milk of the nurse will also act as an exciting cause. I have met with two cases of the disease, one of them fatal, which appeared to depend upon the latter circumstance. Dr. Berg believes that prolonged sleep from any cause disposes to the disease, by favouring the growth of the parasite, or by so changing the secretion of the mucous membranes of the mouth, as to render them important agents in augmenting the disorder. An acid state of the buccal secretion is cited as a cause by many authors, and is clearly proved to exist in a great many instances.

Anatomical lesions.—The characteristic exudation is formed upon the mucous membrane of the mouth, pharynx, œsophagus, and in very rare cases, of the stomach and intestines. It is a curious fact, and a very important one, insisted upon by MM. Trousseau and Delpech and other observers, that the false membrane never extends to the nasal or air-passages; and they call attention

to the singular difference in this respect between the affection under consideration and diphtheritic inflammation, which attacks almost exclusively the nostrils, pharynx, larynx and bronchia.

Lesions of the digestive mucous membrane are met with in nearly all the cases. M. Valleix states that softening of the gastric mucous membrane is almost constant, and that it is often accompanied by redness and thickening. The authors cited above are of opinion that the gastric lesions have been greatly exaggerated, and assert them to be much the same as what exist in other diseases foreign to the digestive apparatus. Various morbid alterations of the mucous membrane of the intestines exist in nearly all fatal cases. This fact is acknowledged as well by MM. Trousseau and Delpech, who deny the invariable connexion of these alterations with thrush, as by M. Valleix, who asserts the connexion almost without reserve. In nearly all cases the mucous membrane of the large intestine presents some of the following lesions, which are mentioned in the order of their frequency; thickening, injection, softening, or ulceration. In the ileum are found, in a great many cases, injection, softening, or thickening of the mucous membrane, unusual development of the mucous follicles, and tumefaction and ulceration of the glands of Peyer.

In severe symptomatic cases a certain amount of erythematous inflammation is commonly found upon the skin of the buttocks and thighs, and ulcerations sometimes exist upon the inner ankles. Traces of inflammation sometimes, but very rarely, exist in the membranes of the brain, and the lungs not unfrequently present the lesions of secondary pneumonia. Before leaving this part of the subject, I may remark that in the few cases I have met with in private practice, no ulcerations occurred upon the malleoli, and the erythema was observed only in the neighbourhood of the anus.

Dr. Dewees describes the autopsy of a child who died about the end of the first month of life, of what he designates as aphthæ. The lesions coincide so closely with those which are characteristic of thrush, that I will quote the description, in order that the two may be compared together by the reader. "We found the whole tract of the œsophagus literally blocked up with an aphthous incrustation, to the cardia, and there it suddenly stopped. The

inner coat of the stomach bore some marks of inflammation, as did several portions of the intestines; but not a trace of aphthæ could be discovered below the place just mentioned." In the previous description of the case, he says that coat after coat of aphthæ were thrown off, and each new crop appeared to be more abundant, and less amenable to remedies. (*Dewees on Children*, p. 304-305.)

Dr. Eberle says: "I have myself had an opportunity of examining the body of an infant, that had died of this disease (aphthæ or thrush). In this case the aphthæ were very distinct, throughout the whole course of the œsophagus. The stomach and bowels presented nothing that bore any resemblance to this eruption; but there were decided marks of inflammation in the mucous membrane of the small intestines, with a vast number of minute superficial ulcerations, and larger patches of softening of this tissue, throughout the colon, and lower part of the rectum." (*Diseases of Children*, p. 172-173.)

Symptoms.—I shall first describe the characters of the exudation, and then proceed to the consideration of certain general and local phenomena which exist to a greater or less extent in both forms of the disease.

The mucous membrane of the mouth is often somewhat red, dry and tender for a longer or shorter time, (generally from one to three days,) before the appearance of the exudation, and at the same time the papillæ of the tongue swell and become protuberant. Next the exudation shows itself in the form of small, whitish points, sometimes on the tongue first, and in other cases on the inside of the lips, whence it extends to the cheeks, in idiopathic mild cases, and to the roof of the mouth, soft palate, pharynx and œsophagus in the grave, symptomatic form. The points of false membrane first deposited, rapidly increase in size and thickness, so that in from one to three or four days, they assume the form of large patches, or a continuous membrane, which covers the whole or a considerable portion of the cavity of the mouth. When the exudation is recent, it is thin, and its surface smooth; when, on the contrary, it has been longer deposited, it becomes thicker, and its surface is rough. It is at first of a milk white or pearly hue, but when

undisturbed assumes a grayish or yellowish colour. It is soft in consistence, breaking down under the finger like cheese, and presents no traces of organization to the naked eye. It adheres to the mucous membrane with considerable tenacity, at first, but becomes looser after a while, and is detached spontaneously at last without any lesion of the tissue beneath.

The foregoing description applies to the exudation as it appears to the unassisted eye. I pass next to give an account of the characters it presents, when subjected to microscopical examination. These are such as have induced several observers to assert that the deposit consists of a true cryptogamic growth. Dr. Berg (*loc. cit.*) states that the white coating of the exudation consists of epithelium, thickened by the swelling of its constituent cells; from the epithelium there springs a parasitic fungus in greater or less quantity, so that the chief portion of a patch of aphthæ (thrush) is composed either of epithelium or else of the parasitic growth. Under a magnifying power of from 200 to 300 diameters, an aphthous crust is seen to consist of epithelial cells, with a more or less interweaved coat of fibres, and a variable number of spherical or oval cells, without any sign of exudation-corpuscles, but only a small quantity of molecular albuminous deposit. "We can often trace the successive development of these cells from a spherical one of the smallest size, to an oval cell, and thence to a filament; and we have no doubt ourselves that the smaller cells are sporules, out of whose development the larger oval cells are formed, and finally, the filaments in the same manner as has been observed in other fungoid growths of this nature." Numerous projecting fibrils are observed in the circumference of an aphthous crust when submitted to the microscope, but these are rendered infinitely more clear by a weak solution of potash, which dissolves the albumen, and renders the cells of the epithelium transparent, while, at the same time, it diminishes their intimate cohesion, and the network of vegetable fibres is more plainly seen. "These fibres are cylindrical, with sharply-defined dark edges, and their centres are transparent in transmitted light; they are generally equal in thickness, but at times they are, as it were, knotted together, and divided by distinct walls of separation. In their interior,

these fibrils often exhibit nucleated cells; occasionally these are very numerous, and of small size, but at times they are larger. In their course the fibrils divide into numerous branches, whose diameter is not less than that of the original stem, and I have occasionally observed these ramifications to increase in thickness, at their free extremity, and to terminate in a club-shaped end with a species of cell. From the sides of the fibrils spring numerous sporules forming a point of departure for new ramifications. . . . Careful investigation has shown us that these cells are placed upon the sides of the fibrils, and in particular that they are congregated around the terminations of the latter. It must therefore be admitted that the cells and the fibrils are both constituent parts of one and the same organization. When this growth vegetates undisturbed, its fibrils penetrate between the layers of the epithelial cells, but do not extend deeper than the inferior layer, though they spread laterally in every direction. On the free surface of the epithelium, the ramifications rise above the surface, exhibiting at the same time an abundant fructification, which gives a yellowish hue to the exterior."

I regret very much that my limits are such as prevent me from giving some account of the various facts and arguments brought forward by Dr. Berg, to prove the truth of his opinion, that the exudation of thrush is a parasitic growth or vegetation, having the epithelium of the mucous membrane for its soil. I must refer the reader to the very interesting review of Dr. Berg's work, from which we have made the above quotations, and to the work of M. Bouchut on the diseases of new-born children, for further accounts of the cryptogamic theory of thrush.

Symptoms of the mild form of thrush.—This form is the one most frequently met with in private practice. It is mild in all its characters, and often presents no other symptoms than those connected with the mouth. These are *heat* and *dryness*, with *tenderness* of that part. The tenderness is shown by the child's crying and jerking the head backwards when the finger is introduced into the mouth, whereas in health the infant will almost always seize the finger and suck it with considerable force. It is shown also by the refusal to take the breast, or by the difficulty with which it

is done, the child occasionally letting the nipple drop with a cry of pain, then seizing it again, and again letting go with fretting or screaming. In some of the cases there are various signs of disorder of the digestive tube, which are, however, seldom severe. They consist of slight diarrhœa, the stools being at first yellow, and afterwards green and acid, of occasional vomiting, of attacks of colicky pain, and sometimes of feverishness. To show how frequent is the occurrence of diarrhœa in thrush, and to prove also that it is not a necessary accompaniment of the disease, as has been supposed by some persons, I will quote the fact mentioned by Dr. Berg, that of 115 cases, in only 29 did the stools retain the normal yellow colour throughout the whole course of the disease; while in the remaining 86 green evacuations appeared simultaneously with the invasion, or supervened at a later period. We may cite also the cases reported by Trousseau and Delpech, of which only 14 out of 58 presented neither gastric nor intestinal complications.

The amount of exudation is generally small in this form, and it rarely extends behind the soft palate. The *duration* is usually between four and nineteen days, the average being about eight or twelve. The termination is almost always favourable.

Grave form.—It is under this form that the disease is most apt to occur in public institutions for children, and particularly in foundling hospitals. That it sometimes occurs also in private practice, will not be doubted, I think, by any who will read with care the descriptions of the disease given by Underwood, Dewees, and Eberle. I have myself met with two fatal cases in private practice, which presented all the symptoms described by M. Valleix, as characterizing those observed by him in the foundling's hospital at Paris, with the single exception of the ulcerations upon the internal malleoli. They were both children of parents who had every comfort at their command. One died at the age of four weeks, in consequence of the attempt to rear it on artificial diet. The other perished when six weeks old, apparently from some unhealthy condition of the mother's milk, which seems the more probable from the fact that the same mother had previously lost two children under precisely similar circumstances; all the chil-

dren of this person were born vigorous and hearty, and did well for a short time, but soon after the birth, the nipples of the mother became dreadfully excoriated, the digestive organs of the infant began to give way, and death finally occurred with all the symptoms of fully developed thrush. I can surmise now, though no examination was made at the time, that the cause of the disease was a continuance of colostrum granules in the mother's milk.

The most important *symptoms* of the grave form are the buccal *exudation*, various *abdominal* symptoms, particularly diarrhœa, vomiting, and colic, and more or less marked *fever*. The order of succession of the symptoms in severe thrush is not always the same. In most of the cases, the first symptom observed is probably diarrhœa, which is soon followed by fever, and in a few days by the appearance of the false membrane in the mouth. In a smaller number of instances the buccal exudation is the first symptom observed. The characters of the exudation are much the same as those observed in the mild form of the disease, except that the membrane is thicker, covers a larger portion of the mouth, and generally extends to the pharynx and œsophagus. In addition to the plastic deposit, there sometimes exist, especially in very bad cases, ulcerations upon the roof of the mouth, frænum linguæ, and gums. These are generally few in number, and either confined to the mucous tissue, or they may extend to the fibrous texture beneath; the surface upon which they rest is generally softened in consistence; their edges are irregular, soft, and of a whitish or reddish colour. The heat of the mouth is not generally increased, except in very severe cases; the mouth is moist at first, but afterwards becomes very dry, and from the refusal to suck the finger when it is introduced between the lips, and the difficulty with which the acts of suckling or feeding are performed, is evidently tender and painful.

The symptoms depending on the enteritic affection, are *tenderness* of the abdomen, *diarrhœa*, *vomiting*, and *fever*. The abdomen is usually distended by flatulent collections in the bowels, and is more or less painful to the touch, particularly in the right iliac fossa and epigastrium, and in severe cases over its whole extent. At the same time, the child evidently suffers from colicky

pains, as shown by restlessness, by uneasy twisting movements of the trunk, by kicking of the limbs, and by crying, particularly just before, or at the moment of the evacuations. The appetite is usually diminished or entirely lost. The diarrhœa comes on gradually, the stools retaining their natural colour at first, and being merely thinner and more frequent than natural. As the case progresses, they become more and more liquid and numerous, and almost invariably of a bright green colour, and very acid. The green colour of the discharges, and their highly acid condition, is noticed by all observers. *Vomiting* occurs in many of the cases, but is less frequent than diarrhœa. In some instances it is very obstinate and distressing, causing the rejection of whatever alimentary substances the child may take. Under these circumstances it has often been observed to coincide with the presence of a great deal of exudation upon the base of the tongue and soft palate, which has been supposed to act as its exciting cause. In other instances it is not so frequent, and as the matters ejected consist of greenish or yellowish bile, while at the same time the epigastrium is very sensible to pressure, this form of vomiting has been thought to depend upon gastritis.

Fever exists in most cases, from the time that diarrhœa makes its appearance, and sometimes at an earlier period. It is at first moderate, but as the case goes on, often becomes intense, the pulse rising gradually from 80 or 90, to 120, 140, and even 160. The *heat* of the surface, especially of the abdomen, is much increased, and accompanied by dryness. The feverish condition of the system is shown also by the restlessness and fretting of the child, and often by loud, frequent crying. When the exudation extends into the pharynx, the cry usually becomes hoarse and indistinct.

There are two other symptoms which occur in the course of thrush, about which some discussion has arisen. These are the appearance of an *erythematous redness* about the anus, and upon the buttocks, genitals, and upper parts of the thighs, and *ulcerations* upon the internal malleoli. The erythema is stated by M. Valleix to precede the other symptoms in the greater number of instances, whilst MM. Trousseau and Delpech deny the correctness of the assertion, and observed it to follow the diarrhœa in the majority

of their cases. It seems to me that the latter authors are correct in ascribing the erythema to the irritation produced by the contact of the urine with the skin, which is predisposed by the cachectic state of the constitution, to take on inflammation from causes which would not affect it in its healthful condition. The erythema is sometimes followed by papulæ, vesicles, blebs, and ulcerations, all of which probably depend upon the cause just referred to. The malleolar ulcerations are ascribed to the friction of the ankles against each other, a cause sufficient to produce such an effect in a broken down, diseased constitution, though insufficient in a healthy one. I may mention that I have seen the erythema several times in private practice, but never the malleolar ulcerations.

During the acute period of the disease, the *strength* of the child is not much diminished, but as the case approaches its termination, if no favourable change takes place, the patient becomes weak and exhausted; the face assumes a pale and sallow look; the features are sharp and defined, and the eyes dull and surrounded by bluish circles. At the same time the whole body becomes emaciated, the skin loses its elasticity, and hangs in folds or wrinkles upon the limbs, and the surface assumes a dark and dingy hue. As the fatal termination approaches, all restlessness ceases, and the child lies profoundly still, or only moves the mouth from time to time, or utters a faint cry; the diarrhœa diminishes, and the vomiting generally ceases; the pulse becomes very rapid and weak, the extremities cold, and death occurs in the midst of profound quiet, or after a few slight convulsive movements. The *duration* of this form of the disease is very uncertain. It is often less than that of the mild form, since many children perish in the first five days after the appearance of the exudation. In other cases it is much longer, from a few weeks to two months. Relapses are not uncommon.

Before closing my remarks upon the symptoms, it is proper to state that the disease sometimes occurs at the termination of acute local affections, as pneumonia, bronchitis, or pleurisy, under which circumstances, there will be, in addition to the symptoms peculiar to thrush, those of the malady which preceded it.

Nature of the disease.—It is impossible, it seems to me, to de-

termine, at present, whether thrush is, as M. Valleix asserts, a general disease, of which enteritis and the consequent buccal exudation are merely principal phenomena; whether, as MM. Guersent and Blache suppose, it is a superficial inflammation of the digestive mucous membrane, attended with a peculiar exudation as an effect; or whether, as supposed by Gruby, Bouchut, and Berg, it is a true cryptogamic or parasitic growth. Fortunately, the solution of the question is not of very great practical importance, as the causes of the disease, its phenomena, its prophylactic and curative treatment, are all ascertainable by careful observation, as well on one supposition as the other.

Diagnosis.—The diagnosis of thrush is rarely difficult. Aphthæ differ from it in their vesicular nature during the formative stage, in the ulcerations which follow the vesicles, and in the absence of false membranes. From ulcero-membranous stomatitis it may be distinguished, by the formation in that disease of false membrane in layers from the beginning; by the presence of ulcerations; by the spongy, bleeding state of the gums; by the fetid breath; and by the absence of the abdominal symptoms which exist in thrush.

Prognosis.—The prognosis must depend, in great measure, upon the circumstances under which the disease occurs. In private practice, and whenever the patients are suckled by their own mothers, or by healthy nurses, it is seldom a dangerous affection. But in foundling hospitals, on the contrary, where the children are mostly brought up on hand, it is one of the most fatal maladies to which children are subject. The prognosis varies according to the form of the disease. The mild form is rarely fatal, while the grave form is fatal in the great majority of the cases.

To show the frightful severity of the disease under certain circumstances, I may mention that of 140 cases which occurred in the wards of M. Baron, at the Foundling's Hospital of Paris, only 29 recovered; while of 22 cases observed by M. Valleix, in the same hospital, but two recovered (Valleix, *Loc. cit.* p. 74). Again, M. Bouchut states that of 42 cases observed by himself, at the Necker Hospital, 14 were of the idiopathic (mild) form, all of which terminated favourably; and 28 of the grave or symptomatic

form, of which 20 died, and 8 left the hospital still labouring under the disease. Of the 20 fatal cases, 12 presented the lesions of chronic entero-colitis, 4 of acute entero-colitis, 3 of pneumonia, and 1 of hydrocephalus. It may be stated, in conclusion, that the danger is greatest in private practice, when the attack occurs in a child fed on artificial diet; when there is reason to suspect an unhealthy state of the nurse's milk; and in proportion to the extent and quantity of the exudation, its resistance to treatment, and the severity and obstinacy of the abdominal symptoms.

Treatment.—Prophylactic treatment.—The most certain means of preventing thrush are evidently to procure for the child a full, healthy breast of milk, to give it a good habitation, to secure for it perfect cleanliness, and to attend properly to its clothing. When it is impossible, from any cause, to obtain a nurse for the child, the diet ought to be most carefully regulated as to quality, quantity, and times of administration.

General treatment.—It seems to me that the successful management of thrush must depend much more upon judicious regulation of the hygiene of the child, than upon any therapeutical system that can be devised. The most frequent cause of the disease is, as we have seen, artificial diet, or an unhealthy state of the nurse's milk. It is reasonable to conclude, therefore, that attention to the removal or mitigation of these and other unfavourable hygienic conditions, constitute one of the most important indications of treatment.

If a child who has been attacked with thrush is suckled exclusively, the milk of the nurse ought to be subjected to chemical and microscopic examination, and should it be found to present unhealthy characters, another nurse ought to be procured as soon as possible. In all such cases the nurse must pay strict attention to her diet, avoiding all articles which she knows or suspects to disagree with her, and all very rich dishes. Dewees recommends that she should abstain from most common vegetables, except rice, and from all kinds of liquors, especially the fermented.

When the disease occurs in a child who is nursed and fed alternately, and the remark about to be made applies still more strongly to one fed entirely upon artificial diet, the most important remedy

in the case is to procure a good wet-nurse. This is far better than any medical treatment that can be instituted. Often, however, it is impossible, and under such circumstances, the regulation of the diet of the infant ought to be attended to with the utmost care by the physician himself, who should specify its material, quantity, and mode of preparation.

The best substitutes for human milk are said to be goat's or asses' milk. But these can seldom be obtained in this country, and we are obliged, therefore, to resort to the milk of the cow. This should never be given pure to a child under two months of age. It ought always to be diluted with two parts, and if the digestive power be weakened by illness, with three, or even more, parts of water. It is very important to determine the quantity of food to be given the child in every twenty-four hours. From various inquiries and observations that I have made with a view to ascertain this point, I have been led to conclude that a healthy infant of two or three weeks old, will receive from a good nurse, and digest well, about a pint of milk in twenty-four hours. At the end of the first month, and in the course of the second, the quantity taken by the child increases gradually, to about a pint and a half or a quart.

The data upon which I found these assertions are the following. A woman whom I attended after her confinement, had a pint of milk measured, drawn from her breasts daily by the nurse. I asked her how much she thought the child, a vigorous, hearty boy, took during the same time. Her reply was that, judging from the frequency and vigour with which he nursed, she was quite sure he took as much as the nurse. I had another patient, who lost her child in the birth, and who, desiring to go out as a wet-nurse, kept up her milk by means of a breast-pump. Six weeks after her confinement, I had all the milk she obtained in a period of twenty-four hours kept for my examination. It measured just a quart. I made very careful inquiries in regard to the point under consideration, of a very experienced and intelligent nurse, who has been constantly employed in this city for thirty years back. I desired her to answer me accurately two questions : 1. How much milk do you think a healthy mother gives to her child daily after the

flow is fairly established? 2. What quantity of nourishment do you give in twenty-four hours to infants that you are compelled to feed exclusively? The answer to the first was that she had often drawn more than a pint from the breasts in the twenty-four hours, in addition to what a healthy child took, and that she had frequently taken as much as three pints from women who had lost their children. She supposed, therefore, that a hearty child would take during the first two weeks, at least a pint, and much more afterwards. To the second question she replied: that she usually gave to hearty children of one, two, and three weeks old, a pint of food in twenty-four hours.

We may, therefore, I think, assume as a general rule, that a healthy child, within the month, ought to take about a pint of nourishment in the time specified.

An infant labouring under thrush would scarcely take so much as this; but if it take only half a pint or a gill in the day, it is clear that it cannot be expected to live long on so much less than its natural quantity. It ought to take, it seems to me, under these circumstances, about two or three table spoonfuls of food every two or three hours, between morning and evening, and once or twice during the night, which would give it from eight to ten ounces in the day. The quantity must be regulated, however, by the condition of the infant, and particularly by the manner in which it takes the food, when offered. The child must never be forced to take more than it wants. The moment it seems to have had enough, the nurse should cease to offer any more.

Having determined the quantity, the preparation of the food must be attended to. The milk and water ought always to be prepared by boiling for two or three minutes, stirring all the time, after which it is to be moderately sweetened with loaf, and not brown sugar. If this is found to disagree with the stomach, which is to be inferred when it is always rejected by vomiting, and when considerable quantities of undigested curd are found in the stools, the diet must be changed. Under these circumstances we may try thin arrow-root or barley water, containing only a sixth part of milk; or cream and water, one part of the former to three, four, or five of the latter; or we may endeavour to obtain asses' or

goats' milk, and use it diluted with an equal quantity of water instead of two-thirds.

I would recommend in these cases a diet which I have found to agree better with children deprived entirely of the breast, than any other that I have ever directed. I have employed it now in a great many instances, and believe it to be the best substitute for the natural aliment that I am acquainted with. It is made by dissolving a small quantity of prepared gelatine or Russian isinglass in water, to which is added milk, cream, and a little arrow-root, or any other farinaceous substance that may be preferred. The mode of preparation, and the proportions are as follows: A scruple of gelatine (or a piece two inches square of the flat cake in which it is sold) is soaked for a short time in cold water, and then boiled in half a pint of water until it dissolves,—about ten or fifteen minutes. To this is added, with constant stirring, and just at the termination of the boiling, the milk and arrow-root, the latter being previously mixed into a paste with a little cold water. After the addition of the milk and arrow-root, and just before the removal from the fire, the cream is poured in, and a moderate quantity of loaf sugar added. The proportions of milk, cream, and arrow-root, must depend on the age and digestive power of the child. For a healthy infant within the month, I usually direct from three to four ounces of milk, half an ounce to an ounce of cream, and a teaspoonful of arrow-root to a half pint of water. For older children, the quantity of milk and cream should be gradually increased to a half or two-thirds milk, and from one to two ounces of cream. I seldom increase the quantity of gelatine or arrow-root.

I have given this food to a great many children for upwards of a year past, as well to those brought up entirely on hand, as those partly suckled, or weaned, and can truly state that they have thriven better upon it than upon anything that I have ever employed. In several cases it has agreed perfectly well with infants who could not without vomiting, diarrhœa, and colic, take plain milk and water, cream and water, any kind of farinaceous food prepared with water, chicken water, or in fact any other food that had been tried. In the cases of sick children, it ought sometimes to be

made even weaker for a while, than in the first proportions mentioned above.

No general treatment is required in the simple idiopathic form of the disease, beyond regulation of the diet, and the occasional use of warm baths. Local treatment will almost invariably suffice for the cure.

In the *grave form* of the disease, it is necessary after regulating the diet, to employ remedies for the disordered condition of the alimentary canal. These should consist principally of alkalies, astringents, opiates, occasionally a dose of some laxative substance, nitrate of silver, and the external employment of baths, warm cataplasms to the abdomen, and sometimes of revulsives.

The *alkalies* usually employed are soda, lime water, magnesia, chalk, and prepared crab's-eyes; of these I prefer in most cases, the soda, lime water, chalk, or crab's-eyes, to be given in the manner which will be recommended in the article on enterocolitis. Dewees recommends very highly the following formula: R.—Magnes. alb. ust. gr. xii; Tinct. thebaic. gtt. iii; Sacch. alb. q. s.; Aqua font. ℥i.—M. A teaspoonful to be given every two hours until the bowels are tranquil. He says of it that he has "long adopted it with entire success." In conjunction with the internal use of alkalies and astringents, I would recommend the practice pursued by M. Valleix, of employing *opiate enemata*, and warm *poultices* containing laudanum, applied upon the abdomen. The enemata should consist of one drop of laudanum in a tablespoonful of starch water, for young infants, to be used morning and evening. The poultices may be made of indian or flaxseed meal, placed between two pieces of soft gauze flannel, to be secured around the body by a band, and renewed from time to time.

Purgative remedies are much used in this country in all cases of intestinal disorder. I believe them to be unnecessary, and generally injurious in thrush, except at the onset, and occasionally through the course of the disease, when we may suppose the bowels to contain accumulations of partially digested aliment, or highly irritating secretions. Under these circumstances, and only then, from half a teaspoonful to a teaspoonful of castor oil, or a teaspoonful of spiced syrup of rhubarb, containing half a drop of

laudanum, may be prescribed, and repeated in case the same condition of things should recur. Once the diarrhœa with green watery stools established, I believe all cathartics to be, as a rule, injurious.

Opiates in moderate quantities, given in combination with alkalies or astringents, or used by injection or externally, are of the greatest service at all stages of the grave form of the disease. When the diarrhœa is severe and obstinate, and particularly when the stools contain mucus or blood, or are attended with tenesmic straining, nitrate of silver given internally, and used by injection, may be resorted to with very probable benefit. The doses and modes of administration will be described under the head of enterocolitis.

Some authors recommend the application of one or two leeches to the margin of the anus, or over the left iliac fossa. It seems to me that they can rarely be proper, and if so, only in vigorous, hearty children, and in cases presenting strongly marked inflammatory symptoms. When the symptoms indicate great exhaustion, or tend towards a state of collapse, resort must be had to stimulants, of which the best are weak brandy and water, or a mixture of equal parts of wine whey and arrow-root water.

Local treatment.—The local treatment is important in all cases, but I am disposed to think that it is of much less consequence than the general treatment, and particularly attention to diet, and the other hygienic conditions of the patient. Topical remedies undoubtedly have the effect, however, in many instances, of arresting the progress of the exudation, and hastening the resolution of the disease of the mouth; but I have uniformly found in grave cases, that no remedies applied to the mouth, had any decided influence upon the abdominal disease, which is, after all, the cause of the fatal termination in the vast majority of cases. The local treatment ought therefore, it seems to me, to be regarded as adjuvant only to the general management of the disorder.

In mild cases the most suitable local treatment, the one recommended by Underwood, Dewees, Eberle, and Trousseau and Delpech, and that which I have generally employed, is the occasional application to the mouth of borax. It may be used mixed with an

equal quantity of honey, and applied by means of a rag or pencil; or with an equal quantity or two parts of finely powdered white sugar, of which a pinch is to be put upon the tongue every two or three hours; or in solution, in the proportion of a drachm to two ounces of water. The best mode probably is to mix it with honey. If this application fail to arrest the deposit of the exudation, we may resort to alum in powder or solution, or better still, to solutions of nitrate of silver, or careful cauterization with the solid nitrate. The alum may be used in the same manner as borax, or according to the following formula, recommended by M. Valleix. *R.*—*Aluminis* gr. xv; *Mel. rosæ* ʒiiss; *Decoct. Hordei* ʒiiijss.—*M.* In the use of the nitrate of silver, I should resort to a solution of eight or ten grains to the ounce of water; Trousseau and Delpech however, employ one of thirty grains to the half ounce, or more frequently cauterize lightly the whole mucous surface with the solid caustic.

Between the application of any of the above-mentioned remedies, the mouth of the infant ought to be occasionally moistened and cleansed with some of the mucilaginous solutions, as gum water, flaxseed tea, or that made from sassafras pith, slippery elm bark, or marsh-mallow root.

Strict and careful attention must be constantly paid to the state of the skin around the anus, and upon the thighs and buttocks. These parts ought to be well cleansed, after each evacuation of urine or stool, by gentle pressure, and not by rubbing, with a fine sponge dipped into tepid milk and water, then dried with a soft napkin, in the same manner, and well anointed with simple cerate, or what I find better than anything else, Goulard's cerate. These precautions ought to be still more carefully observed if erythema has already made its appearance.

CHAPTER II.

DISEASES OF THE THROAT.

ARTICLE I.

SIMPLE OR ERYTHEMATOUS PHARYNGITIS.

Definition; synonymes; frequency.—Simple pharyngitis consists of an erythematous inflammation of the pharynx, tonsils, and soft palate, unaccompanied by ulceration, deposits of false membrane, or gangrene. It is not mentioned by Underwood. It is described under the title of *cynanche tonsillaris* by Dewees and Eberle, and of *tonsillitis* by Stewart and Condie. It is very frequent both as an idiopathic and secondary disease. I met with twenty-five idiopathic cases during January, February, and March, 1847, in children from eight weeks to 5 years old.

Causes.—It may occur at all ages, and is equally common in the two sexes. It is more frequently a secondary than an idiopathic affection. The diseases in the course of which it is most apt to occur are scarlet fever and measles, and next pneumonia and bronchitis. It is often an accompaniment of simple laryngitis. The idiopathic form is most common in this city in the late winter and early spring months. The twenty-five cases observed by myself, all occurred during January, February, and March, while I did not meet with a single case in the preceding November or December. It is said to prevail sometimes in an epidemic form.

The *exciting causes* of the disease are not easily detected. In some instances, however, I have been convinced that exposure to cold has been the cause of the attack.

Anatomical lesions.—In mild cases the alterations of texture observed during life, and in a few instances after death, the patient

having perished of some other disease, consist of greater or less redness, swelling, softening, and a rough or granular and sometimes œdematous condition of the mucous membrane covering the soft palate, tonsils, and pharynx. The uvula and tonsils are generally tumefied, and the crypts of the latter filled with mucous or purulent fluid, of a yellowish colour. In one very severe case which proved fatal, MM. Rilliet and Barthez found the tonsils very red, soft, only slightly swelled, and infiltrated with pus; the pharynx was covered with a thick layer of bloody mucus; the mucous membrane of the throat was of a dark red colour, thickened, and granular, but not softened. The sub-maxillary glands were of a grayish colour, enlarged and soft.

Symptoms.—Simple pharyngitis of moderate severity, begins with restlessness, irritability, fever, slight cough, and in some instances, pain in the throat, which is complained of by older children, and betrayed in those who are very young, by the refusal to nurse or take food, because of the difficulty of swallowing. The *face* is generally flushed, sometimes very deeply so. Young children are often drowsy, but from irritability and fever refuse to sleep except on the lap. The *fever* is marked by acceleration of the pulse, which rises to 100, 110, or more in children over five years of age, and to 120, 130, or 140 in those under that age, and by unusual warmth or even heat of the skin. At the same time the *respiration* is generally more frequent than natural, but almost always regular; in cases attended with high fever, I have counted the breathing at 42 and 50. *Auscultation* reveals pure vesicular murmur or slight sibilant rhonchus. The *voice* is clear, or, in rather severer cases, obscured and nasal, and in some instances, speaking is painful and difficult. *Cough* is a frequent symptom. It was present in 20 of the 25 cases observed by myself. In 6 of these it was harsh and croupal, so that the children seemed threatened with croup. The croupal sound seldom lasted over one night, after which the cough was merely hoarse, and gradually became loose towards the termination of the attack. In the remaining cases it was rare and dry in the beginning, and more frequent and looser as the disease progressed. *Pain* is a frequent, but far from constant symptom at the onset of the disease. It generally ex-

ists during deglutition. When present it is shown in infants, as stated, by their refusing the breast, or nursing only at long intervals, and with difficulty; while in older children it is complained of. It is not, however, a constant symptom, as I have often seen children of one, two, and three years old, with severe angina productive of violent fever, who swallowed fluids and soft solids without a sign of pain. Of 22 cases in which the state of this symptom was particularly noticed by myself, it was present only in 7. Throughout the acute period of the disease there is generally considerable *thirst*; the *appetite* is diminished or entirely suppressed; the *stools* are usually natural, or there is slight constipation.

The throat should always be examined when there is the least reason to suspect that an attack of sickness depends upon inflammation of that part, and whenever a child has been suddenly seized with fever, particularly in cold weather, and there is nothing more evident by which to explain the illness. To examine this part well, the tongue must be strongly depressed with the handle of a spoon, which should be carried back to the base of the tongue. This may be done in the youngest infant.

The *appearances* presented by the throat are as follows:—the soft palate, uvula, tonsils, and generally the pharynx also, are more or less reddened and swelled, and the mucous membrane commonly looks rough and granular. The fauces are often filled with frothy mucus, and in severe cases, coated all over with mucous or purulent secretions, which sometimes line the inflamed surfaces in such a way as to resemble false membranes. They are to be distinguished only by careful examination, and by removing a small portion on a pencil or sponge mop, in order to ascertain their real nature. I have seen the mild form of inflammation in a child ten days old, in one eight weeks, another three months, and a fourth nine months old.

The *sub-maxillary glands* and neighbouring cellular tissue are sometimes swollen, in consequence of the extension of the inflammation to them. This is often evident to the eye, but is more correctly judged of by the touch. At the same time the glands are usually somewhat painful to the touch. The amount of swelling is

slight in very mild cases, or there may be none at all. In severer cases it is much more considerable.

The *breath* is said to be often fetid. I have not met with this character in the simple disease. *Expectoration* is rarely present. I have never noticed it under six years of age. Slight *nervous symptoms* occur in nearly all the cases, consisting, as already stated, of restlessness and irritability in mild attacks, and of insomnia or drowsiness, with starting and twitching, in those which are more severe.

The fever generally occurs at first only in the after part of the day and during the night, often becoming intense at that time, with restlessness and starting, and subsiding or disappearing entirely towards morning, to recur again the next afternoon or evening. Children not unfrequently play about all the early part of the day, and are attacked with the symptoms just mentioned, as night comes on. The disease generally pursues this course for three or four days, and then passes away entirely, or, if it last beyond that time, the fever becomes continued and the attack runs on for seven, eight, or ten days.

In *grave* cases of simple angina, the disease begins with *vomiting*, *fever*, and severe *nervous symptoms*, in the shape of excessive restlessness, or somnolence, and occasionally convulsions. The fever is violent, the pulse being very frequent and full, and the skin hot and flushed. The intense heat and flushing of the skin, which, in sanguine children, sometimes affects the greater part of the surface of the body, together with the activity of the circulation, not unfrequently make the onset of the disease resemble very closely that of scarlet fever. Four or five cases of this kind that have come under my notice, presented severe nervous symptoms at the invasion. In a girl between two and three years old, they consisted of wildness and ecstatic expression of the face, and trembling uncertain movements of the limbs, which would probably have terminated in convulsions, but for the timely interposition of a warm bath. In the three others, general convulsions occurred. Two of the subjects in which convulsions took place, were between five and six years old, and one between three and four. In two the convulsions occurred at the onset, and in three

on the second day. The convulsive movements lasted from ten to twenty minutes, and were followed by somnolence for a few hours in two, and by stupor for a day in the third. It should be stated, however, that two of these subjects were predisposed by constitution and temperament to spasmodic attacks, as one had had a fit previously from a similar cause, and the other two from difficult dentition. The third had never suffered from any symptoms of the kind, and did not appear predisposed to them.

The *tongue* is generally dry and coated with a thick whitish fur in grave cases; the *respiration* is quick, loud, and nasal; and the *voice* guttural or nasal, and difficult. There is usually extreme *thirst*, and not unfrequently delirium. The throat is commonly violently inflamed, of a deep red colour, and coated over with mucous or purulent secretions. The sub-maxillary regions are often swelled, and the deglutition sometimes, though not always, difficult. When the disease proves fatal, the different symptoms soon reach their height, and death may occur in two or three days. I have never, however, known simple pharyngitis to terminate fatally. The *duration* of the grave cases is variable. In the five that I have met with, it was between three and eight days.

Secondary pharyngitis, which, as has been stated, is a very frequent disease, will be treated of in the articles on the various diseases, in the course of which it occurs.

Diagnosis.—The diagnosis of simple pharyngitis is not always without difficulty, as there are no local symptoms in two-thirds of the cases at the invasion, nor in some instances at any period of the attack. The physician and attendants, therefore, are often deceived as to the real cause of the violent fever which has so suddenly made its appearance, and are disposed to refer it to any but the true one.

It has happened to me several times in cases of children attacked with simple angina, to suspect pneumonia from the sudden occurrence of fever, rapid respiration, slight dry cough, and the absence of pain in the throat, difficulty of deglutition, or other symptoms to call my attention to the real seat of disease. The diagnosis is to be corrected only by the absence of the physical signs of pneumonia, and the consequent necessity of finding some other cause of the sickness. Angina may be mistaken also for

indigestion, which is one of the most frequent causes of sudden fever in childhood, and is accompanied like severe angina by vomiting. The distinction between the two is to be made by careful inquiry as to the history of the attack, by examination of the matters ejected from the stomach, and by inspection of the throat. Severe cases, particularly when ushered in by convulsions, may be mistaken for disorder of the nervous system dependent upon dentition. The only method of ascertaining the truth is again the inspection of the throat. Cases of this kind might also be mistaken for the beginning of scarlet fever. Time only, and the development or absence of the symptoms peculiar to the latter disease, could enable us to determine the diagnosis.

The diagnosis between simple and pseudo-membranous pharyngitis will be given under the head of the latter disease.

Prognosis.—Simple pharyngitis of moderate severity is very rarely, if ever, a fatal disease. Severe or grave erythematous pharyngitis, on the contrary, is often a dangerous malady. The five cases that have come under my care, however, all recovered. The unfavourable symptoms in such cases are: very violent fever, greatly altered physiognomy, difficult respiration, choked and guttural voice, excessive jactitation, delirium, convulsions, and coma.

Treatment.—Mild cases of simple angina need but little treatment. The child ought to be confined to a warm room in all cases, and kept in bed, or on the lap, if it have fever. The diet must be restricted to milk preparations and bread so long as the fever continues. The therapeutical part of the treatment may consist in the use of some mild evacuant, as one or two teaspoonsful of castor oil, half a teaspoonful or a teaspoonful of magnesia, a small quantity of syrup of rhubarb, or what is all-sufficient in many cases, a simple enema. At the same time we may give, if the frequency of pulse, heat of skin, and restlessness be considerable, a few doses of sweet spirits of nitre, or spiritus Mindereri, alone, or combined with from one to four drops of antimonial wine, according to the age. A warm bath, if the child is not afraid of it, is an admirable remedy when there is much excitement of the circulation; or a foot bath, containing salt or mustard may be used. Frictions over the throat and neck are often

very advantageous ; they may be made with hartshorn and sweet oil, with or without the addition of laudanum, or a small quantity of spirits of turpentine may be applied upon the skin, so as to produce slight counter-irritation. When there is much pain and difficulty of deglutition, the case is best treated by the use of nitrate of silver in solution (5 or 10 grains to the ounce), or of powdered alum, applied by means of a large throat-brush.

In the *severe form* of the disease the treatment must be much more active than in mild cases. When the fever is very high, and threatening nervous symptoms are present, the most speedy means of controlling them is a warm bath, lasting fifteen or twenty minutes. If the effects of this should be but slight or transitory, bloodletting must be resorted to. In a very young child the proper means of taking blood is by the application of a few leeches behind the angles of the jaw ; in those who are older, on the contrary, a venesection of from two to four ounces is much better, because at that age, the dread of leeches is so great, that the fright and consequent resistance on the part of the child, is always a serious, and in some cases an insuperable objection to their use. Some evacuant dose should be given early in the attack ; it may consist of castor oil, magnesia, epsom salts dissolved in lemonade, fluid extract of senna, or infusion of senna and manna. The quantity must be sufficient to produce several copious stools, and should it fail to operate in three or four hours, and the fever continue, it is always well to assist it by means of a purgative enema. Two hours after the exhibition of the cathartic, it will be proper to resort to small doses of antimonial wine or tartar emetic solution, with nitre, repeated every hour and a half or two hours, in the manner recommended in the article on pneumonia. If the secretions into the fauces be very abundant and tenacious, so as to impede respiration, the best means of getting rid of them is by an emetic of ipecacuanha, hive syrup, or antimonial wine. If they collect again, the throat ought to be cleansed from time to time with a small sponge-mop. The inflamed surfaces should be touched two or three times a day with a solution of nitrate of silver (from five to ten grains to the ounce). My father has been in the habit of employing with much benefit in the

severe angina of children, whether idiopathic or secondary, a wash made according to the following formula: *R.*—Cupri sulphat., Quiniæ sulphat., āā gr. vi; Aquæ destillatæ ℥i.—*M.* This is applied in the same way as the lunar caustic solution, and I have frequently seen it produce most excellent effects.

The five grave cases observed by myself recovered under very simple treatment. This consisted in the use of the warm bath; doses of castor oil to move the bowels freely on the first day, and of syrup of rhubarb or enemata afterwards to keep them soluble; of doses of antimonial wine and nitre every two hours in such quantity as to avoid sickness; of mustard pediluvia; stimulating frictions to the outside of the throat; applications of lunar caustic solution to the throat internally, three or four times a day; and of rigid diet. In one case the warm bath was used three times in a single day, because of the extreme restlessness and heat of skin, and was productive each time of great benefit.

ARTICLE II.

PSEUDO-MEMBRANOUS PHARYNGITIS.

Definition; synonymes; frequency.—Pseudo-membranous pharyngitis consists in inflammation of the pharynx, accompanied by an exudation of false membrane upon the mucous tissue.

It is the disease called by older writers angina maligna or gangrenosa, cynanche maligna, etc. In this country it is popularly known by the name of putrid sore throat. It is designated angina suffocativa, or sore-throat distemper, by Dr. Sam. Bard, of New York, whose paper (*Trans. Am. Philos. Soc.* vol. i), is the best of the early productions upon the subject. It is the *diphtherite* of M. Bretonneau. Underwood and Dewees make no mention of it. Eberle, in his chapter on tonsillitis, confounds it with simple angina; but it is evident that he had met with the disease from the fact of his remarking that flakes of coagulable lymph, resembling superficial sloughs, sometimes adhere to the inflamed tonsils, and that the inflammation passes down into the larynx in some in-

stances. Dr. Condie describes it under the title of pseudo-membranous or diphtheritic inflammation of the throat.

It is difficult to arrive at a correct appreciation as to its frequency. It may be stated, however, that it is rare as a sporadic affection, while it sometimes prevails to a considerable extent as an epidemic disease.

Causes.—It occurs both in the sporadic and epidemic forms. Guersent states that it is to be met with in Paris at all seasons, and under all temperatures. It is strongly disposed, however, to assume the epidemic form, and may then prevail over districts of greater or less extent.

It has been thought by many to be propagated by direct contagion. Such is the clearly expressed opinion of MM. Trousseau (*Dict. de Med.* t. x, p. 393), Valleix (*Guide du Med. Prat.* t. iv, p. 350), and Guersent (*Dict. de Med.* t. iii, p. 128–129). M. Bretonneau (*Traité de la Diphthérie*), is strongly disposed to the same opinion, without, however, positively adopting it. Rilliet and Barthez are fully convinced that the disease is contagious. I have met with but one instance in my own practice which seemed to show that it possessed this character. This was the case of a boy two years and a half old, who was attacked with the disease, while his sister, an older child, was already dangerously ill with it. On the other hand, I have met with four cases in families in which several other children were allowed free access to the sick room, none of whom were attacked.

Dr. Geddings, of South Carolina, in a valuable monograph on “pseudo-membranous inflammation of the throat,” (*Am. Jour. Med. Sci.* vol. xxiv, p. 82,) says that diphtheritis depends on an epidemic constitution of the atmosphere, but that “under particular circumstances, as when many persons are crowded together, when ventilation is imperfect and cleanliness is neglected, there can be no question of the generation of a contagious influence, capable of transmitting the disease from one person to another.” Dr. Bard (*Loc. cit.*) states that the disease was of an “infectious nature,” and that the infection depended not so “much on any generally prevailing disposition of the air, as upon effluvia received from the breath of infected persons. This will account why the disorder

should go through a whole family, and not affect the next-door neighbour; and hence we learn a very useful lesson, namely, to remove all the young children in a family, as soon as any one is taken with the disease; by which caution, I am convinced, many lives have been, and may again be preserved." It is most frequent between the ages of two and eight years, and more common in boys than girls. It is said that children of feeble constitution, and those subjected to bad hygienic conditions or debilitated by severe illness, are particularly exposed to it, especially in the sporadic form.

The secondary form occurs most frequently as a complication first of scarlet fever, and then of typhoid fever and measles.

Anatomical lesions.—The false membranes covering the pharynx, soft palate, and tonsils, are of a yellowish-white or grayish colour, of rather tough consistence, and of variable thickness. They may consist of one or several layers, and adhere with moderate tenacity to the mucous membrane. They are sometimes ash-coloured, and being softened by the pharyngeal secretions and tinged with blood, which is often exuded from the mucous tissue in diphtheritic inflammation, have under these circumstances, frequently been mistaken for sloughs of the mucous membrane, thus giving rise to the old titles of angina gangrenosa, putrid sore throat, etc. The *mucous membrane* is generally injected and red, and often presents ecchymosed spots. In some cases it is softened and roughened, or even deeply ulcerated, so that the false membrane may rest upon the muscular tissue of the pharynx. The ulcerations, though rare in the primary, are not uncommon in the secondary form. The *sub-maxillary* glands are almost always enlarged, but very seldom in a state of suppuration.

In the secondary form of the disease, the mucous membrane is more violently inflamed. It is of a deep red colour, rough, and very much thickened and softened. The tonsils are large and soft, uneven, and often infiltrated with pus. It is not unusual in this form, to meet with ulcerations of the mucous membrane. False membranes are almost always present; generally on different portions of the fauces, and more rarely over their whole extent. They are generally rather soft and thin, of a whitish, grayish, or yellow colour, dispersed in fragments and easily torn. The inflamed

parts are usually bathed in purulent fluid. The sub-maxillary glands are large, red, and soft.

Symptoms; duration.—The disease begins usually, but not in all cases, with slight fever. The strength and appetite are not much disturbed at first, but, as the attack progresses, the former is diminished and the latter suppressed; the thirst remains natural. There is at the same time, in some, but not all cases, pain in the throat, which may or may not be accompanied by difficulty of deglutition. Both these symptoms, however, are not unfrequently absent for several days. In a fatal case at three years of age that came under my notice, there were neither complaints of pain, nor difficulty of swallowing, so that the parents had not the least suspicion of the throat being the seat of disease, though I found it violently inflamed, and covered with deposits of thick false membrane in points. If the fauces be examined on the first day of fever, the exudation may often be found even at that time, though it is sometimes not formed before the second day. The fauces generally present slight swelling and redness before the appearance of the false membrane, which almost always shows itself first on one of the tonsils only, in the form of whitish or opaline spots, like coagulated mucus, which soon run together and extend over the whole gland, and then to the soft palate and pharynx, though it sometimes remains limited to the tonsils and soft palate. A little later in the attack the plastic deposit exists in the form of layers of greater or less extent; it has lost its transparence, become firmer in consistence, thicker, and changed from a white to a yellowish-white or lardaceous and sometimes grayish colour. The sub-maxillary glands are almost always enlarged and painful to the touch about three or four days after the appearance of the pseudo-membrane. The breath is offensive but not fetid. When this form of the disease, which is the one most frequently observed, is left to pursue its natural course, the pseudo-membrane becomes thinner, assumes a grayish tint, and falls off about the sixth or seventh day. When on the contrary, topical remedies are applied to the throat, the membrane is often detached after one, two or three days, but is reproduced several times before the conclusion of the case.

In another and more violent form of the disease, the pseudo-membrane, about the time that it begins to be detached, assumes a grayish or blackish colour, and hangs in shreds from the surfaces to which it was attached. The fauces, under these circumstances, present a gangrenous aspect, the mucous membrane having an appearance as though it were falling off in sloughs; the breath is extremely fetid, and there is more or less abundant salivation, or in some cases an exspuition of sanguinolent fluid. There can be no doubt that it was from misconception of such cases as these, that the titles of gangrenous and putrid sore throat arose.

As the exudation disappears from the pharynx, the swelling of the parts affected gradually subsides. The mucous membrane, from which the plastic deposit has just fallen, is more or less injected and red; the tonsils and soft palate are sometimes found to be reduced below their natural size.

The *general symptoms* of pseudo-membranous pharyngitis are often slight compared with the dangerous character of the local affection. There is generally but little *fever*, attended with very moderate heat of skin during the first few days, after which it often increases and the skin becomes hot and dry, though, not unfrequently, these symptoms are but slightly marked throughout the attack. When, on the contrary, the fever is more violent during the first day or two, it usually soon subsides, though in some instances, it remains intense, and in one of the cases observed by myself, the pulse was full and frequent, and the heat very great after the second day. The principal symptoms connected with the *digestive organs* are loss of appetite and moderate thirst. These are not generally present in the beginning, but make their appearance a few days after the invasion. Vomiting is rare and the stools are normal.

The voice is commonly obscured and nasal, but not hoarse nor whispering unless the disease extends into the larynx, in which case the symptoms will be those of true croup, already described. *Cough* sometimes exists, but it usually resembles in sound that produced by the action of hawking rather than a common cough, and is altogether different from the tone of the cough of laryngitis.

The only other symptoms which require mention are the presence of more or less marked languor, depression, and loss of strength.

The pharyngeal inflammation and exudation frequently exhibit a strong tendency to extend to the larynx, and it is this which often causes the fatal termination. At other times they spread to the nasal passages, and thereby add greatly to the danger of the case. Again, the false membranes are formed in some rare cases upon different portions of the general integument, particularly upon the alæ nasi, behind the ears, about the anus, vulva and nipples, and upon a blistered or any excoriated surface.

The *duration* of the disease, independent of complications, is usually about seven, eight, or nine days. If it extend into the air-passages very soon after the invasion, it may cause death within a few days. In most of the cases, however, the larynx does not become implicated under five or six days. In one of my cases, death occurred on the sixth day, and in another on the fifth; in both from the extension of the disease into the larynx. Bard says that of seven deaths, five occurred before the fifth, and two about the eighth day.

Diagnosis.—The diagnosis of pseudo-membranous pharyngitis can present no difficulties, if the throat is but examined at an early period. When there is neither pain in the throat, nor difficulty of deglutition, the practitioner might possibly be deceived as to the nature of the illness. The swelling of the lymphatic glands under the jaw, the embarrassed movements of the neck, and the absence of other causes to explain the sickness of the child, ought to lead to an inspection of the fauces, which would, in an instant, reveal the true character of the attack.

The distinction between simple and pseudo-membranous angina can only be made out during the existence of the pharyngeal exudation, as the symptoms of the latter disease are nearly identical with those of the former, before the deposit and after the fall of the false membranes.

Prognosis.—If the disease remain limited to the pharynx, it is almost always a very curable affection. When, on the contrary, it extends to the nasal passages, the prognosis is more unfavoura-

ble, and when the larynx becomes implicated, the prognosis is exceedingly grave; if the disposition to the production of false membrane spread to the skin, rectum or vulva, the prognosis is also very grave, and death generally occurs in a state of profound adynamia.

Treatment.—The treatment may be usefully considered under two heads, the *local* and *general*. It is now commonly conceded that the former is more important than the latter. The great object to be held in view, is to prevent if possible, the extension of the pseudo-membrane from the fauces into the larynx and nasal passages, which is generally supposed to be gained more certainly by the use of local remedies than by general treatment.

Local treatment.—The most important of the local remedies are the nitrate of silver and muriatic acid. These are the two remedies most highly recommended by MM. Bretonneau, Valleix, Grisolle, and Rilliet and Barthez. Dr. Geddings (*loc. cit.*) speaks very highly of the success of the caustic treatment in his hands, in the epidemic which occurred in Charleston during 1837 and 1838. He employed either the nitrate of silver or muriatic acid.

The nitrate of silver is employed in solution or substance. The latter form is objected to by many on account of the risk of its slipping from the port-caustic into the pharynx, and thence passing into the stomach. The solution is therefore generally preferred. Bretonneau employs it in the proportion of half an ounce of the nitrate to an ounce and a half of water. The solution ought in fact in violent cases, to be saturated; while in those which are less severe, one of twenty grains to the ounce would be sufficiently strong. It may be applied either by means of a piece of sponge fastened upon a proper handle, or what I prefer, a camel's hair pencil, nearly as large as the end of the little finger. The application should be made once, twice, or even three times in the course of twenty-four hours. Dr. Geddings recommends, when it is desirable to use the solid nitrate, to reduce it to powder, and to roll the sponge probang previously moistened with mucilage of gum arabic and squeezed, in the powder until a sufficient quantity adheres, and to apply it thus prepared to the diseased parts.

The muriatic acid is employed by M. Bretonneau either pure or mixed with honey. When the limits of the pseudo-membrane can be seen in the pharynx, he uses the concentrated acid, and carrying the sponge, after it has been dipped into the acid, and squeezed so as to be merely moistened, rapidly into the pharynx, he cauterizes lightly and withdraws it. When, on the contrary, the limits of the membrane cannot be seen, he dilutes the acid with an equal quantity of honey, and leaving more of it on the sponge than in the previous case, he recommends that the latter be passed down over the glottis, and then pressed against the base of the tongue, by raising strongly the handle to which it is tied, in order to express a few drops upon the mucous lining of the larynx. The cauterization is to be performed once or twice a day, according to the necessity of the case. For children under ten years of age, the sponge ought to be about half as large as a pigeon's egg. The sponge is to be fastened to a piece of flexible whalebone, by making a crucial incision into it, introducing into this the end of the whalebone, and securing it with good sealing-wax, which is not acted upon by the acid as any ligature would be. When about to be used the whalebone is warmed and curved into such a shape as will allow it to pass into the pharynx without touching the roof of the mouth. M. Valleix proposes that the sponge should be fastened to the whalebone with waxed thread, and this to be covered with sealing-wax, to preserve it from the action of the acid. This would certainly be safer than the mere wax itself.

Applications of powdered alum, and chloride of lime are recommended by writers of high authority. It seems to me that in slight cases, in which the disease shows but little disposition to extend, such applications may answer very well, but when the attack is threatening, and especially when the exudation is spreading, we should neglect all minor remedies of this kind, and resort at once either to lunar caustic or muriatic acid. If, however, the powders are employed, they may be applied by means of a throat-brush, or by causing a sufficient quantity to adhere to the end of the forefinger of the right hand, and conveying it upon this to the diseased surfaces.

There is no real difficulty in making use of any of these appli-

cations, if the children be properly managed. One or two assistants must hold the patient in such a way that the head shall be thrown backwards, and the hands and feet secured. The physician must depress the tongue with the handle of a spoon held in the left hand, while he holds in the right the pencil or sponge-mop. If the child refuses to open the mouth, it can generally be made to do so by holding the nose in order to force it to breathe through the mouth. If this fail, all that is necessary is to press the handle of the spoon against the teeth, when the patient will soon become too much fatigued to offer further resistance.

General treatment.—*Bloodletting* may be resorted to with advantage very early in the attack, if the child is vigorous and strong, the fever violent, and if there are no signs of prostration. When, on the contrary, the case is not seen within the first two or three days, depletion can seldom be resorted to with safety. By some it is proscribed entirely in the treatment of the disease. Thus, M. Valleix (*Loc. cit.*, t. iv, p. 369,) says: "I will merely state that there is not a single case on record in which the disease was evidently arrested by *antiphlogistic* treatment, however energetic it may have been." I believe, however, that I once saw the disease arrested by depletion. During the last week of October 1845, my father and myself were in attendance upon a girl five years of age, labouring under a most violent attack of the disease, which had extended into the larynx, and for several days exposed her life to the most imminent hazard. During the extremity of her illness, her brother, a fine hearty boy two years and a half old, was taken sick in the evening of one day with considerable fever. On the following day, my father found the fauces very much inflamed, while at the same time there were patches of pseudo-membrane on each tonsil, and high febrile reaction. The boy was bled at once to four ounces. Four grains of calomel were given, and a few hours afterwards a dose of purgative medicine. The throat was touched with a solution of nitrate of silver, of ten grains to the ounce. The exudation was arrested at this point, though the fever continued for two days longer. It may be said that the nitrate of silver arrested the disease, but the solution was not a caustic one, and therefore hardly likely, it

seems to me, to have produced, by itself, so powerful an effect. I am disposed to believe from my own experience in this and other cases, that when resorted to early, and in vigorous subjects, it is a highly important and powerful remedy. I have employed it, on the contrary, later in the disease, without any good effects, and should, under such circumstances, depend rather on the local treatment, and the employment of mercurials.

Mercury.—The preparations of mercury are undoubtedly those which are most powerful in causing the dissolution and absorption of the pseudo-membrane. But as Rilliet and Barthez remark, so long as the disease remains confined to the pharynx, there is but little danger attendant upon it, and it would be unnecessary, therefore, to resort to so powerful an agent as mercury in such cases. We can ascertain with some degree of certainty whether the inflammation is likely to extend into the larynx or not, by learning whether the disease be sporadic or epidemic, and if epidemic, whether it has shown a disposition to pass down into the air-passages. If it be a sporadic case, or if the epidemic has not in general attacked the larynx, we may rely upon the local treatment, and bloodletting as advised above. If, on the contrary, the disease be epidemic, and has shown a disposition to propagation into the larynx, the case should be treated with mercury, as this remedy has seemed to exert a more powerful influence in arresting the formation of the deposit than any that has been resorted to. The preparation generally made use of is calomel, which may be given in doses of from one to three grains every two hours, until the disease appears to yield, or until some of the effects of the remedy on the constitution are visible. It is better in general to combine a small portion of opium with it, in order to prevent too early an action upon the bowels.

Emetics.—Purgatives.—Emetics are useful when the exudation shows a disposition to extend to the larynx, or when there is much difficulty of breathing from tumefaction of the fauces, or from accumulations of the pseudo-membranous deposits. I would recommend under these circumstances the use of alum in the manner proposed in the article on pseudo-membranous laryngitis. If this be not employed, ipecacuanha or tartar emetic

ought to be resorted to. The emetic may be repeated in six or twelve hours, if the same indication should continue or recur. A purgative dose is useful at the commencement of the disease as an antiphlogistic and evacuant. After that period, only laxatives need to be employed in order to keep the bowels soluble.

Tonics and stimulants are to be resorted to only in the gangrenous form of the disease, or towards the termination of the ordinary form, if the patient become weak and prostrated. In the gangrenous form the tonic treatment should be combined with the local treatment already described. Under these circumstances, the diet ought to consist of nutritious milk preparations, and of light broths, while wine and brandy in the form of whey, or milk punch, may be given in connexion with quinine, or some of the preparations of bark.

CHAPTER III.

DISEASES OF THE STOMACH AND INTESTINES.

GENERAL REMARKS.

THE diseases of the digestive tube are involved in so much obscurity in consequence of the various forms in which they present themselves, and of the different opinions held by authors as to their nature, that I find myself greatly perplexed as to what may be the most proper manner in which to treat of them. After careful consideration, however, I have resolved to divide them into two classes, one of which will include all that seem to depend on simple functional derangement, independent of any anatomical alteration, cognizable by our senses; and the other those which depend on evident inflammation or its consequences. It seems to me that this division is shown to be correct, by the following considerations:

1. I believe that I have often met with cases of derangement of the digestive tube which could not be explained as to their causes, symptoms, course, and mode of recovery, on the supposition of inflammation or other appreciable anatomical alteration.
2. There are on record a considerable number of cases of greater or less derangement of the functional expression of these organs, in which the most careful examination after death could detect no alteration in the tissues to explain the symptoms. Such are the cases referred to by Billard, who says (*Mal. des Enfants*, p. 392): "Many children at the breast have diarrhœa without enteritis; they lose colour, become etiolated, fall into a state of marasmus, but at the autopsy not a trace of inflammation of the intestines is found." Berton (*Mal. des Enfants*, 2me ed. p. 574) states that of 57 cases of gastro-intestinal disease observed by himself, there were 4 in which not a trace of inflammation nor any appreciable

lesion of the digestive tube could be found. Rilliet and Barthez (t. i, p. 491,) remark that in about every twelve children affected with more or less abundant diarrhœa, in whom we might expect to find colitis, there will be one in whom the gastro-intestinal tube will be found in a state of perfect integrity. They add that this conclusion is deduced from a comparison of nearly three hundred autopsies.

3. It is the opinion of several competent observers that such a division of the diseases of the digestive tube ought to be made. Billard treats of stomachal and intestinal indigestion, which, he says, may exist independent of inflammation. Barrier (*Trait. Prat. des Mal. de l'Enfance*,) is of opinion that it is indispensable to distinguish certain lesions of secretion, which he describes under the title of diacrisis (a word first employed by M. Gendrin,) from the inflammations of the gastro-intestinal tube. He asserts (t. iv, p. 19,) that gastro-enteritis, gastritis, and enteritis, rarely constitute in children from one to fifteen years of age, complete and essential morbid conditions, conditions, that is to say, governed in their manifestation, course, duration, termination and treatment by the same laws, which preside over other essentially inflammatory diseases. In proof of this he states that in 122 cases of disease of the abdomen observed by himself, there were 54 of diarrhœa, 10 only of inflammatory or catarrhal gastro-intestinal disease, 2 of verminous affection, and one of ulceration of the duodenum. Of these 67 cases, he says that five sixths at least of the attacks of diarrhœa ought to be classed amongst the diacrisis or lesions of secretion. After describing the alterations which occur in the follicular diacrisis, he says (loc. cit. p. 33): "These alterations are evidently not of an inflammatory nature, and will not justify us in giving to the disease the title of gastro-enteritis, or colitis, as has been done by most of the later writers, and particularly Billard, who attributed them to follicular gastritis or enteritis." M. Barrier therefore describes, first, the inflammatory affections of the digestive tube, under the usual title of gastro-intestinal inflammation; and then the diacrisis or lesions of secretion of the gastro-intestinal mucous membrane. Of the latter class he makes five divisions: 1, follicular or mucous diacrisis; 2, acescent diacrisis, 3, serous diacrisis; 4, ventose diacrisis; 5, verminous diacrisis. M. Bouchut

(*Man. Prat. des Mal. des Nouv-Nés*,) divides the diarrhœas of children into catarrhal or spasmodic, and inflammatory diarrhœa or entero-colitis. The former disease he believes to depend on a functional lesion with hyper-secretion of the intestinal mucous membrane, the anatomical cause of which escapes our search. It is independent, he says, of any appreciable alteration of the digestive tube.

I think it must be admitted from the facts and opinions just stated that there are two distinct morbid conditions of the digestive tube; one, in which there are no evident anatomical lesions, and another which depends upon inflammation and its results. To the first of these conditions I will apply, when it affects the stomach, the term indigestion; and when it affects the intestines, that of simple diarrhœa. To the second class I shall apply the usual terms, gastritis, enteritis, and colitis. I would remark, however, that it seems to me most probable that these two states are often merely different degrees of disease, and that simple functional derangement will very often become inflammation, if it continue for any length of time. The follicular or mucous diacrisis of MM. Gendrin and Barrier probably depends at first upon functional disorder of the secretory apparatus of the digestive tube, which frequently passes into inflammation and its consequences.

Before beginning the history of the diseases of the stomach and bowels, I would call the attention of the reader to the well-established fact that it is much more common in children to meet with affections of these two portions of the alimentary canal occurring simultaneously, than with affections of either alone. Of 150 cases of inflammation of the infra-diaphragmatic portion of the digestive tube, carefully collected by Billard, there were 90 of gastro-enteritis, 50 of enteritis without gastritis, and only 10 of gastritis without enteritis. Of 57 cases of gastro-intestinal affections observed by M. Berton (*loc. cit.* p. 574), there were only 4 of gastritis alone, whilst there were 27 of gastritis complicated with some intestinal lesion, 4 of enteritis, 11 of entero-colitis, and 4 of colitis. In 3 there was merely slight development of the isolated follicles, and in the remaining 4 not a trace of inflammation nor any other lesion. Rilliet and Barthez state that they have met with 61 cases

attended with some lesion of the stomach, in only 15 of which was that organ alone affected, whilst in the remaining 46 there was either duodenitis, enteritis, colitis, follicular enteritis or colitis, or lastly, softening of the mucous membrane. The authors of the *Bibliothèque du Médecin Praticien* state (t. v, p. 573,) "that it is rare to find any serious alteration of one of its (gastro-intestinal canal) portions, without the others participating to a greater or less extent." M. Bouchut (loc. cit.) appears to think that diseases of the stomach never occur in children as a separate lesion, at least he asserts this of softening of that organ (p. 231), and treats of the other alterations of its mucous tissue only under the head of entero-colitis.

SECTION I.

FUNCTIONAL DISEASES OF THE STOMACH AND INTESTINES.

ARTICLE I.

INDIGESTION.

Definition ; frequency ; forms.—By the term indigestion, I mean that condition of the stomach in which its function of digestion is disturbed or suspended, independent of inflammation or other disease of the organ, appreciable by our senses. It is a very frequent affection during the whole period of childhood, and is one of great importance on this account, and from the fact of its laying the constitution open by the debility and cachexia which it produces, to various secondary affections. In my description of the disease, I shall distinguish between the forms which occur during infancy, and after the completion of the first dentition.

Causes.—The principal causes of indigestion in infants are an unhealthy state of the milk of the nurse, the use of artificial diet, and lastly, an impaired condition of the digestive function, which disables the stomach from digesting even the most healthful aliment.

The milk of the nurse may be too old for the child, for it has been found that a breast several months old, sometimes, though not always, disagrees with a young infant, in consequence no doubt of the milk being thicker and richer at that time than immediately after parturition. The breast-glands may continue to secrete colostrum for weeks or even months after parturition, and when this is the case the child is almost sure to suffer from indigestion and diarrhœa. The milk may be unwholesome because the nurse is in bad health, or because her diet is not properly regulated. That the diet of the nurse affects her milk, I have no doubt, though this has been denied by some persons.

I have known several children to suffer from indigestion, attended with vomiting, acid secretions, colic, and diarrhœa, in consequence of the nurse having indulged in a very rich diet, and particularly in vegetables and fruits. I do not mean to assert that all nursing women should abstain from fruits, or even live on a very simple diet, for I have known some who could make use of the richest food, and eat abundantly of all kinds of vegetables and fruits, without the least injury to their milk. But there are others who cannot do this without occasioning indigestion in their infants, either because their milk-glands extract something hurtful from such food, or that their children are unusually susceptible to the action of the materials absorbed from that kind of food. Again, it is clearly proved, it seems to me, by recorded cases, and by the opinions of various authorities, that the milk of the nurse is affected by her moral condition. Children have been known to suffer greatly, and even to perish from taking the milk of a nurse who had just before undergone a fit of violent anger. The depressing moral emotions, as anxiety, grief, fear, and despair, are well known to affect the milk secretion, in such a way as sometimes to occasion indigestion.

The use of artificial diet for young infants, or as the expression is, "bringing up on hand or the bottle," is, I believe, by far the most frequent cause of indigestion during infancy. Very many children with whom this is attempted die of indigestions, chronic diarrhœas, gastritis, entero-colitis, and thrush. Very few escape frequent attacks of one or other of the diseases just named.

Much depends, no doubt, on the selection and preparation of the food. It may be stated as a well-established fact, that a diet consisting wholly or in great part of farinaceous substances, very rarely fails to disagree with the child, and to produce indigestion and other disorders of the digestive system, which often prove fatal; while one in which cow's or goat's milk enters as the principal ingredient, though infinitely inferior to the natural aliment, and often productive of indigestion, is far less injurious than the one before spoken of.

A third cause of indigestion was stated to be the absence or loss of the digestive power of the stomach, independent of the nature of the food. This is a condition similar to the dyspepsia of the adult. It may be congenital or may result from causes brought into action after birth. It often remains as a consequence of previous indigestions from improper or excessive feeding. It exists during the invasion, course, and convalescence of various diseases. Dentition frequently diminishes or impairs the tone of the digestive function, so that the child is often unable, during that process, to digest aliment which had agreed with it perfectly well at other times.

The causes of indigestion after the completion of the first dentition are congenital feebleness of the digestive function; the want of power of that function, which remains often for years in children reared upon artificial diet, and in those who have been debilitated by frequent attacks of disease of any kind; the habitual use of improper diet; the eating of crude, indigestible food; the process of the second dentition; the want of due exercise in the open air; residence in large cities; and undue exercise of the mental faculties in the conduct of the education of the child.

Symptoms.—I shall describe first the symptoms of indigestion as it occurs during infancy, and secondly as it occurs during childhood, or after the completion of the first dentition.

Indigestion during infancy may be advantageously considered under two heads: as occasional or accidental, and as habitual. By the former I mean that which occurs in a healthy infant from a transient cause, as repletion; a momentarily unhealthy state of the nurse's milk from some imprudence on her part as to diet,

from a moral cause, or from sickness; and that which depends upon the passing influence of dentition. By habitual indigestion, I mean the form of the affection which is long continued in consequence of a persistence of the cause.

The symptoms of *occasional* or *accidental* indigestion in infants are: paleness and contraction of the face; restlessness and peevishness; moaning and crying, or in some cases, screaming; nausea, shown by excessive paleness, often by very great languor, and by occasional retching, which may either subside without vomiting, or as more frequently happens, terminate in that act; flatulent distension and hardness of the abdomen, especially in the epigastric region, often accompanied with eructations; and in many of the cases simple diarrhœa. These symptoms usually come on soon after nursing freely, or after a very hearty meal of artificial food, in a child previously in good health. The attack seldom lasts more than a few hours or one or two days. The vomiting which almost always takes place, and which relieves the stomach from the offending cause, very often accomplishes the cure.

Habitual indigestion in infants causes a train of symptoms which are different from, and much more severe than those just described. Of these the most important are: frequent attacks of nausea and vomiting, and of simple diarrhœa repeated for days, weeks, or months in succession; paleness, or some other unhealthy tint of the cutaneous surface; continual restlessness and discomfort, with fretting or crying, particularly in the after part of the day and during the evening and night, in place of the natural ease and quiet of a healthy infant; constant fits of the most violent screaming from colic, sometimes lasting for hours; dull and languid expression of the countenance, or else an uneasy, contracted look, like that produced by continued suffering; more or less emaciation; failure of the natural growth in stature and size, so that the child is small and puny for its age; want of calorific power, causing the child to suffer unusually from cold, as shown by frequent coolness of the hands and feet; irregular appetite, which requires to be tempted by frequent changes of the food, or more or less complete anorexia; and lastly, the various symp-

toms which indicate an impoverished state of the blood and bad nutrition.

In some cases there are added to the above symptoms, those of gastritis or entero-colitis, to be hereafter described. Indigestion probably seldom proves fatal in infants, except from the occurrence of some inflammatory complication, as for instance, one of the diseases just named, or acute disease of some other principal organ.

Indigestion in children who have completed the first dentition may, as in the case of infants, be occasional or habitual. Occasional indigestion occurs in strong and vigorous, as well as in more delicate subjects. The attack generally begins within a few hours or a day after the child has eaten some indigestible substance, with languor and chilliness in older children, and with languor and peevishness in those who are younger; after which there is headache, pain in the stomach in most of the cases, and very often a disposition to somnolence. If the child is attacked with vomiting soon after the appearance of these symptoms, and ejects the offending material, it will often seem perfectly well from that time. If, however, this does not take place, fever, sometimes of a violent character, is almost certain to make its appearance. The pulse becomes very frequent, rising to 120, 130, or even higher, and being full and resisting; the skin becomes flushed, dry, and very hot; the appearance of the tongue is not generally changed early in the attack; there is considerable thirst; the child is restless and uneasy, tossing from side to side, or lies in an uneasy sleep, attended with frequent starting and jerking of the limbs or crying out; the abdomen is natural, or hard and distended over the epigastric region. When the symptoms just described make their appearance suddenly, by which I mean in the course of a few hours, in a child two, three, four or five years old, after it has eaten some indigestible substance, there is reason to fear an attack of convulsions. The probability of the occurrence of this accident is great in proportion to the earliness of the child's age, and the impressibility of its nervous system. The attack is particularly to be apprehended, and should be carefully guarded against, whenever the fever is violent, when there are urgent complaints of headache, when the restless-

ness and agitation are very great, or when there is somnolence, with frequent startings or twitchings of the muscles. Convulsions sometimes occur without any previous warning, or after such slight signs of disorder as would fail to produce uneasiness in the parents or attendants.

The symptoms produced by occasional indigestion generally continue until nature relieves the stomach by vomiting or diarrhœa, or until the remedies proper in the case, the most important of which are evacuants, have been administered. It happens not unfrequently that symptoms of gastric or intestinal disorder remain for some days after the violence of the attack has subsided, and in some instances the disturbance is so great as to occasion gastritis, entero-colitis, or dysentery.

Habitual indigestion in children who have completed the first dentition, is not at all an uncommon affection. It is a condition analogous to, if not identical with, the dyspepsia of the adult. The symptoms of this form are the following. The general appearance of the child is delicate, as shown by a pallid or sallow tint of the skin, instead of the ruddy complexion of health, by thinness and want of proper development of the limbs and trunk, and by softness and flaccidity of the muscular tissues. There is an habitual air of languor and listlessness, with absence of the usual gaiety and disposition to play natural to the age, and the child often complains of being tired. The appetite is feeble or uncertain, being sometimes absent, and at other times too great; or it is peculiar, the child being willing to eat of dainties, but refusing food of a simple character. The tongue presents nothing peculiar. It is however more frequently somewhat furred than clean and natural. The temper is usually irritable and uncertain. The child rarely sleeps well; on the contrary, the nights are restless and much disturbed, the sleep being broken and interrupted by turning and rolling, by moaning or crying out, and by grinding of the teeth. These latter symptoms, together with the picking at the nose, which is a frequent accompaniment, are almost always referred by the parents and nurses to worms, and it is often impossible to convince them to the contrary, even though frequent and violent doses of vermifuges have failed to show the existence

of entozoa. The state of the bowels is uncertain. In some instances they are very much constipated, requiring frequent doses of laxatives, or careful regulation of the diet, to keep them soluble; in others they are inclined to be loose, and when this happens, the stools are often lenteric. In others, again, constipation and diarrhœa alternate. The abdomen is usually natural, or somewhat enlarged from flatulent distension; complaints of pain are not uncommon. This form of indigestion, like dyspepsia in the adult, is generally a very chronic affection, seldom lasting less than several weeks or months, and sometimes for years.

Diagnosis.—The occasional indigestion of infants is not likely to be mistaken for any other complaint. The suddenness of the attack, the character and quantity of the matters ejected from the stomach, the absence of symptoms indicating the invasion of any other disorder, the short duration of the symptoms, and the rapid recovery, all render the true nature of the case very clear. That which occurs in older children, on the contrary, is not so easy of diagnosis. In many cases the invasion is not unlike that of scarlet fever. The vomiting and frequency of the pulse, the great heat of the skin, and in some cases a certain suffusion of the integument dependent on the activity of the circulation, all render the case doubtful for some hours, or for a day, after which time the difficulty ceases, from the development of the symptoms peculiar to each disorder. I believe that not a few cases of simple angina are mistaken for indigestion, owing to the absence of complaints of sore throat, and the neglect of the physician to examine that part. In such cases the vomiting and sudden attack of fever are ascribed, for the want of another mode of explaining them, to gastric derangement. The diagnosis can be made only by examination of the fauces. The diagnosis of indigestion accompanied by convulsions will be considered in the article on the latter affection.

The habitual indigestion of infants is not likely to be confounded with any other disease. The absence of fever, of tenderness of the abdomen on pressure, or other acute symptoms, all indicate the dependence of the disorder on functional distress of the stomach. The same remarks apply to this form of the disease occurring in

older children. Nevertheless, the practitioner should never neglect to make a careful examination, both of the physical and rational signs, of all the important organs of the body, as it sometimes happens that latent disease of some one of them is the cause of the gastric difficulty.

Prognosis.—The prognosis of occasional indigestion is nearly always favourable. It is rarely a dangerous disorder, unless accompanied by convulsions, or some other signs of violent disturbance of the nervous system. Under the latter circumstances, the prognosis should be very cautious, as the termination is not unfrequently fatal in consequence of injury done to the nervous centres. It should be recollected also that this form of indigestion sometimes becomes the exciting cause of inflammation of the stomach or intestines, in which event the prognosis will be that of those diseases.

Habitual indigestion in infants is a serious complaint, and ought always to awaken the solicitude both of the physician and parents; for though a simple functional disease of the stomach is not probably often fatal, it is exceedingly apt to prove so by the induction of gastritis, chronic enteritis, colitis, or thrush, or by its laying the system open to other diseases, and rendering it less able to withstand them, should they happen to occur. In older children it is not, according to my experience, so dangerous a malady. I have never as yet seen it terminate fatally.

Treatment.—The treatment of *occasional indigestion* in infants ought to be very simple. The child has generally relieved itself by vomiting before the physician is called. If, however, it continues pale and languid, with vomiting or retching after the stomach seems to have been emptied, the proper plan is to make use of remedies to calm the irritability of the organ. This can almost always be accomplished by giving a teaspoonful every ten or fifteen minutes, of a mixture of lime water and milk, consisting of one-third milk to two-thirds lime water, or of equal proportions of each. At the same time a small mustard plaster, weakened with wheat flour, may be applied to the epigastrium, or a warm indian mush poultice in a flannel bag, laid over the whole abdomen. Should these means fail to relieve the sickness, from

half a drop to a drop of laudanum, or two drops of paregoric may be administered, and repeated if necessary in two hours. The child generally recovers its usual health after the sickness has entirely ceased. If, however, it remain fretful and uneasy, if it cry much as though in pain, it is probable that a portion of aliment has passed in a partially or wholly undigested state into the intestine. The suspicion will be confirmed if the abdomen is found upon palpation and percussion to be swelled, hard, and resonant from flatulent collections in the bowels. Under these circumstances, a laxative ought to be given. The best dose is half a teaspoonful or a teaspoonful of castor oil, a teaspoonful of simple or spiced syrup of rhubarb, or, if there have been evidences of an acid state of the stomach, from a quarter to a third of a teaspoonful of the best magnesia.

The *occasional indigestion* of older children demands a different and more energetic treatment. After ascertaining that the child has eaten something indigestible, we should inquire whether there has been vomiting. If there has been none, or if only slight, it will be proper to give an emetic immediately. The best one under the circumstances is ipecacuanha. This rarely fails to produce a full effect, and does not perturbate the system, or irritate the stomach like tartar emetic. It may be given either in powder or syrup. The dose is familiar to every one. If the ipecacuanha be not at hand, we may use hive syrup, which is kept in almost every house, or a teaspoonful of powdered alum in honey or molasses, to be repeated, if necessary, in fifteen minutes. Alum is less apt to fail than either ipecacuanha or hive syrup. If the child continue unwell after the operation of the emetic, which is often the case, and particularly if the fever be considerable, a purgative should be given as soon as the stomach will bear it. The best dose is castor oil, which is the most speedy and least irritating. It may be given in orange juice, which forms an excellent vehicle, or, if the child is old enough, in the froth of beer or porter. A dessert-spoonful is generally enough. If the oil cannot be taken, we may give infusion of senna and manna, the fluid extract of senna mixed with spiced syrup of rhubarb, syrup of rhubarb alone, magnesia to be followed by lemon-

ade, salts and magnesia or the former alone, or lastly a sedlitz powder. If the fever continue, and the cathartic fail to operate in four or six hours, a purgative enema ought to be given to hasten its effect. A bath at about 96° or 97° will almost always be found useful in these cases. The child should be kept in the bath from eight to twelve or fifteen minutes. The only circumstances which form an objection to this remedy are the facts of the patient being so irritable, or so fearful of the water, as to make it necessary to contend with him in order to succeed in using it. When this is the case it had better not be employed, and sponging with tepid water and spirit should be substituted. If the child complains of pain in the stomach, the application of a warm mush poultice over the epigastrium or whole abdomen will be found of much service.

When, in this form of indigestion, the febrile reaction is violent as it often is, and particularly when there are signs of great disturbance of the nervous system, consisting of excessive agitation, complaints of severe headache, drowsiness, moaning or crying out in the sleep, or twitching and jerking of the muscles, the physician should beware of a convulsive attack. In such cases as these the patient ought to take a purgative dose of calomel (from three to four grains), have a warm bath at once, soon after an injection, and if not considerably relieved in a very few hours, be bled at the arm to three or six ounces. The remedies ought to be prompt and energetic, for the case is pressing. A convulsion is always a dangerous event in childhood, and should be prevented, if possible. About two hours after the calomel has been given, a cathartic dose had better be administered, in order to insure an action upon the bowels, and to carry the calomel out of the system. These means rarely fail to afford relief in a few hours. The diet should be absolute during the violent stage of the attack, and the usual diet is to be resumed only by degrees. The drinks may be plain water or gum water taken cold.

It not unfrequently happens that occasional indigestion is followed by gastritis or enteritis, or by habitual indigestion lasting for weeks or even months. These different sequelæ must be treated according to the plan proper for each.

The *habitual indigestion* of both infants and older children requires a very different treatment from the occasional or accidental form. In both the indications are nearly the same. The most important are very careful regulation of the diet in all its details, the use of tonics and stimulants, to restore tone and vigour to the digestive function, the employment of remedies to correct the state of the bowels, whether they be relaxed or constipated, and attention to securing the child proper exercise, exposure to the air, and suitable clothing.

If the symptoms of the disorder occur in a child at the breast, the milk of the nurse should be carefully examined in order to ascertain whether it be good. If found to possess any unhealthy qualities, the nurse ought to be changed at once. Attention to this point alone will almost certainly cure the child. It needs no other remedy.

If the patient is fed wholly or in part, it is essential to regulate the diet to suit the state of the digestive function. Milk ought in all cases to form the basis of the food, unless it has been found by patient trial to be absolutely repugnant to the stomach. I have often found that infants who had been thought quite incapable of digesting cow's milk, could do so very readily when it was very much weakened with water. The usual proportions for an infant of a few months old, are half and half, or two parts milk for one of water. When these are found to disagree, it is well to try three, or even four or five parts of water to one of milk, and if the stomach digest this, as it often will, the proportion of milk may be slowly and cautiously increased to the usual standard. If we conclude that milk cannot be digested by the child, it is best to try cream. Of this, one part to three or four of water, may be given. When neither of these can be taken, some of the farinaceous substances may be tried; arrow-root, sago, barley, tapioca, oatmeal, or rice. I am clearly of opinion, however, that these articles prepared with water alone, rarely agree with children when they are continued for any considerable length of time. Some infants of six or eight months old, it may be remarked, who cannot digest more than very small quantities of milk, will take and digest well, very delicate broths made of chicken or mutton,

or small quantities of the lightest meats, as mutton, chicken, or very tender beef, minced up extremely fine, and given by teaspoonfuls.

In cases of this kind I have found a diet consisting of gelatine, milk, cream, and arrow-root, prepared in the manner directed in the article on thrush, (see *page 193*), to suit better than anything else. I have met with several children, and with two in particular, whom it was necessary to feed to the amount of a pint or a pint and a half a day, in addition to being nursed occasionally, who could take neither milk and water, cream and water, milk and arrow-root, oatmeal gruel, rice gruel, nor indeed anything that was tried, without vomiting, colic, and severe diarrhœa, who digested perfectly well and thrived admirably upon the preparation alluded to. I have now used it during more than a year, and have recommended it for a great many children, and do not hesitate to say that it agrees with a larger number than any other diet I have ever employed or seen employed.

The diet of older children labouring under chronic weakness of the digestive function is as important as that of infants. Two chief ends should always be borne in mind in selecting it, digestibility and nutritiousness. The former is all important, for without it, the stomach, constantly irritated by improper food, has no chance of regaining its tone, while the latter is necessary in order to sustain the strength of the child, and allow it to carry on its growth. I have generally found it most prudent, and often really necessary, to specify as to the substances to be given at each meal. The morning and evening meal ought to consist of bread and milk, mush and milk, or of milk, warm water and sugar (called in this country children's or cambric tea), and bread and butter, and nothing else in most of the cases. It is sometimes proper to allow a soft boiled egg, particularly if the child be very fond of it. The dinner ought to consist of light broths containing rice, with bread or toast, or of the plain meats, as mutton, beef, chickens, turkeys, birds, or fine game. No vegetable ought to be allowed in most of the cases except rice, as all others, even the potato, are very apt to disagree. I believe that the potato is more digestible when roasted than when boiled. If the child require anything between breakfast and

dinner, it may have what is allowed at breakfast, or dry bread, and nothing else. There are various articles of diet which should be absolutely forbidden, amongst which are hot and sweet cakes, and hot bread of all kinds; sausages, not unfrequently given to children in this country; corn-beef, ham, veal, pork, goose, ducks, fish; all manner of dessert, except rice pudding, or curds and whey, often called junket; sweetmeats, candies, fruits, except some of our finest summer ones; and to conclude, everything which long observation and experience have shown to be unsuitable for a dyspeptic stomach.

It is sometimes very difficult to find anything to agree well with the child. In one case of a child three years old that came under my observation, neither milk, bread, nor meat, could be taken. The caseum of milk seemed to be absolutely indigestible, as it would be rejected from the stomach many hours, or even a day or two after the milk had been taken, in the form of masses of dry, fibrous cheese, of an oblong shape, nearly or quite as large as a peach-stone. After trying various articles I found that the child digested raw oysters, soda biscuit, and rennet-whey, and upon these articles alone she lived for two weeks, at the end of which time she had improved so much as to be able to take the white meat of chicken very finely minced, and gradually regained her previous health.

After regulating the diet, such remedies as tend to invigorate the digestive function ought to be prescribed. The most important of these are the vegetable and mineral tonics, and mild stimulants. I have found quinine, iron, and small quantities of port-wine or brandy, to succeed better than anything else. To a child under two years old, from a quarter to half a grain of quinine, and to one over that age, a grain, may be given three times a day, and continued for two, three, or four weeks. It is best given to young children diffused, without being dissolved, in a mixture of equal parts of syrup of gum and ginger; while to those who are older it may be administered in pill. The best preparations of iron are the iodide, or the pure metallic iron prepared with hydrogen. Of the former, half a drop to one drop for infants, and from one to two drops for older children, may be given three times a day; of the

latter a quarter of a grain for infants, and half a grain to a grain for those who are above that age, may be given three times a day. The metallic iron is best administered in pill or suspended in syrup of gum arabic. When there is any suspicion of a scrofulous taint in the child's constitution, or when it is disposed to have chronic irritations, excoriations, or ulcerations of the nostrils, or papulæ or pustules about the eyelids or other parts of the body, it is useful to give the iron in compound syrup of sarsaparilla, of which half a teaspoonful three times a day is quite enough. In connexion with these remedies a little port-wine or brandy, and the former is preferable in children over a few years old, on account of the possibility of their contracting a taste for the brandy, may be allowed twice or three times a day, or at dinner only. To young children one or two teaspoonfuls of brandy may be given in the course of the day, mixed in water; of the port-wine from a teaspoonful to a tablespoonful, according to the age and strength of the patient, may be repeated morning, noon, and night.

If the bowels are inclined to constipation, they should be kept soluble by laxative enemata, and by the use of rhubarb or aloes; when relaxed, the frequency of the discharges may be controlled by the cretaceous mixture, by anodyne enemata given once or twice a day, by the aromatic syrup of galls, (to be described under the head of entero-colitis,) or by some of the astringents in common use.

In all cases of chronic indigestion in children, it ought to be regarded as an essential part of the treatment to secure to the patient a proper amount of exercise in the open air. In summer the child should pass several hours of every day in the air. It ought, indeed, if the heat of the sun can be avoided by proper shade, to pass the whole day in this way. In winter it is, of course, impossible to carry this system to the same extent, but the child should nevertheless be taken out at least once a day; this may be done in the coldest, and even in damp weather, if sufficient clothing be worn. If a child comes back from a walk with warm limbs, and with its cheeks in a glow, there is little danger of cold. The quantity of clothing must depend on the constitution and idiosyncrasy of the patient. Some need twice as much as others. The

proper amount is best determined by the temperature and coloration of the surface after a walk.

ARTICLE II.

SIMPLE DIARRHŒA.

General remarks.—I have already said that I should treat of two different morbid conditions of the intestinal tube, one in which there is no evident anatomical lesion to explain the symptoms, and which appears to depend on simple functional derangement, to be designated by the title of simple diarrhœa; and another in which there is evident inflammation with its results, to be described under the titles of entero-colitis and cholera infantum. The reasons for adopting this division have already been given in the general remarks upon the diseases of the stomach and intestines, and it is unnecessary to repeat them at this place.

Dewees, Eberle, and other writers treat of the diseases of the intestines under two heads only, those of diarrhœa and cholera infantum. Stewart and Condie treat of the same diseases, but describe inflammation of the intestines also, by the titles of enteritis and colitis. Most of these writers make different forms of diarrhœa, the feculent, bilious, mucous, chylous and lenteric, and it would seem most natural that I should follow the same plan. I am disposed to believe, however, that they ought not to be regarded as constituting separate and essential morbid conditions of the intestinal tube, but that they are, on the contrary, merely degrees or stages of simple diarrhœa or functional derangement, and entero-colitis or inflammation of the intestines. We may in fact have feculent, bilious, mucous, or lenteric discharges at different stages of both these diseased conditions. It seems to me most proper therefore not to consider them as distinct affections, though I shall continue to employ the terms, in order to express the characters of the diarrhœa in different diseases of the intestinal tube. I would remark in further elucidation of this point, that the feculent diarrhœa of the above authors, comes as a general rule within the class of simple diarrhœa, whilst in other instances it is merely one

of the symptoms of the first stage of entero-colitis ; and that the bilious, mucous, and lenteric diarrhœa may exist both in the functional and inflammatory diseases of the bowels.

Definition ; frequency.—By simple diarrhœa, I mean the form of diarrhœa which exists without perceptible signs of inflammatory action in the intestine ; which is known by post-mortem examinations to occur without appreciable anatomical lesions ; and which we must conclude, therefore, to depend on simple functional derangement.

It is undoubtedly a very frequent ailment in children, more especially from birth to the termination of the first dentition. It is of common, though of less frequent occurrence from the last mentioned period to the age of eight or ten years, after which, according to my experience, it becomes rare.

Causes.—The causes of the disease during infancy are *unfavourable hygienic conditions*, as the habitation of unwholesome, ill-ventilated, damp, and filthy dwellings, or of contracted and crowded quarters of cities and towns ; an *unhealthy state of the milk* of the nurse ; the use of *artificial diet* at too early an age, especially when badly chosen ; *cold ; dentition ;* and lastly, great *atmospheric heats*. The most important of these are improper alimentation, by which I mean the use of artificial diet, and particularly one consisting chiefly of farinaceous substances to the exclusion of a proper amount of milk, and dentition. For a fuller account of the influence of these different circumstances on the digestive organs of children, the reader is referred to the remarks on the causes of entero-colitis.

The chief causes of the disease after the first dentition are, according to my experience : the habitual use of *improper food* ; the *loss* of digestive power, which often follows a severe indigestion, or an attack of some acute disease ; the *debility of constitution* which attends sudden and rapid growth ; the *want* of proper exercise and exposure to the air ; the predisposition which exists in some children from *hereditary* causes ; and the disturbing influence of the *second dentition*.

The system of indiscriminate diet allowed to children in this country is, it seems to me, a fruitful cause of gastric and intestinal

complaints. I believe that, as a general rule, children over two and three years of age, are allowed amongst us to eat of the food prepared for the older members of the family. Now, any one who will reflect upon the variety of dishes habitually placed upon an American table, ought not to be surprised to see children permitted a choice amidst such profusion, pale, thin, delicate, exposed to frequent indigestions, attacks of diarrhœa and entero-colitis, to gastric fevers, and the host of minor ills attendant upon feeble digestive powers. I am acquainted with some families in this city, the children of which, from the age of two years, are allowed habitually to breakfast upon hot rolls and butter, hot buckwheat cakes, hot indian cakes vulgarly called dabs, rice-cakes, sausages, salt fish, ham or dried beef, and coffee or tea; to dine upon a choice of various meats and a great variety of vegetables, which latter they often prefer to the exclusion of meat, and then to make a rich dessert of pies, puddings, preserves, or fruits; and lastly to make an evening meal of tea and bread and butter almost always relished, as the term is, with preserves, stewed fruits, hot cakes of some kind, or with radishes, cucumbers, or some similar dish. Add to such meals as the above the eating between whiles of all kinds of candies and comfits, which children here regularly expect in larger or smaller quantity, cakes both rich and plain, fruits to excess and at all hours from soon after breakfast to just before going to bed, raisins and almonds, and nuts of various kinds, and the wonder is not that we are a pale, thin, dyspeptic, and anxious-looking race of people, compared with Europeans, but that we have any health at all, when our children are allowed to make use of the indiscriminate and unwholesome diet just described. Such a system undoubtedly occasions frequent attacks of the disease under consideration, and unless the diet be changed early in the attack, it is very apt to become chronic. It has been stated that simple diarrhœa sometimes followed as a consequence of indigestion. I have known such a result to occur in children previously in fine health, and to continue for several weeks or months. In these instances, the disorder appears to depend in good measure on the loss of the digestive power of the stomach. This seems proved by the great influence which the character of the food has

upon the malady, which is always aggravated by the use of any articles except those universally acknowledged to be the most digestible, and also by the frequent co-existence of lientery when the food is not of the lightest kind.

I have several times met with cases which I could ascribe to no other cause than debility and want of power of the digestive organs, dependent upon too rapid growth. That sudden and rapid growth may produce feeble digestion, or, in other words, a dyspeptic state, is, in my opinion, proved by the following consideration. It is attended with loss of appetite, emaciation, paleness, languor and weakness, and frequent attacks of diarrhœa, or a chronic form of that disorder; all of which symptoms are greatly influenced by the regimen of the child, and are most readily removed by attention to that point, and by the use of tonics and stimulants.

The other causes enumerated need but little comment. I will merely remark that I have several times observed a predisposition to weakness of the digestive organs, transmitted apparently from parent to child. As to the influence of the second dentition, I have no doubt that it is a frequent cause of the complaint, and believe that it is too little attended to by practitioners.

Symptoms.—I shall describe first the symptoms of simple diarrhœa in infants, and afterwards those which characterize the disorder in older children. In infants the appearance of the diarrhœa is usually preceded or accompanied by slight disturbance of the *temper* and *comfort* of the child. There is some degree of *restlessness*, *peevishness*, and disposition to cry; the child sleeps less than usual, and often starts and moans during sleep; all of which symptoms are more marked, as is the case indeed in nearly all the ailments of children, during the night. Though the symptoms described are observed from time to time, and particularly during the night, they are not always present, as the infant will occasionally through the day seem perfectly well and comfortable, with the exception perhaps of slight paleness and languor, almost always perceptible upon its countenance. There is no *fever* in these cases, or at least nothing more than unusual warmth of the hands, feet, and abdomen, at night. If a

marked febrile reaction take place, there would be reason to suspect the existence of some degree of entero-colitis. The *mouth* often becomes, after a few days, a little warmer and less moist than usual; the *tongue* is generally moist and only slightly coated; and the *appetite* is commonly diminished, as shown by the child's nursing with less eagerness and at longer intervals than before. In very mild cases the *stools* are at first, and sometimes throughout the attack, feculent; the only differences from their ordinary characters which occur, being that they are more frequent, thinner, more copious than usual, and that the odour is changed so as to become acrid and offensive. In severe cases, the stools contain less feculent matter, become yet more fluid and sometimes watery, and exhibit small particles of a greenish colour, scattered through them; or the whole of the discharge is of a deep green colour, and is intermixed with portions of mucus. In many of the cases, whitish lumps, evidently consisting of undigested curd, are observed mixed with the other substances upon the napkin. The number of stools varies from two, three or four, to six or eight in the twenty-four hours. The number last mentioned is seldom exceeded, so long as the diarrhœa remains simple. The *abdomen* is seldom distended, or painful to the touch. The *general appearance* of the child almost always shows the effects of the malady upon the constitution, after a few days. The countenance becomes paler and thinner; the eyes look somewhat hollow; the edges of the orbits are more defined, and often present a pale bluish circle; slight emaciation takes place, and the flesh of the child becomes softer and more relaxed than before the attack. The *duration* of the disorder is generally short, as it seldom lasts more than three or four days, or a week. It may terminate in complete restoration to health, without its having exposed the life of the child to danger, or, if the causes which gave rise to it continue in action, if the child is of delicate constitution or the treatment not correct, and especially if of too perturbing a character, it is very apt to run into entero-colitis, and expose the patient to all the dangers of that disease.

In older children (after the first dentition), the disease is much less frequent than in infants, and presents a different train of symptoms. Often it is nothing more than slight disorder of the

bowels, amounting to three, four, or five stools, thinner and more abundant than usual, accompanied by slight colicky pains, and unattended by fever or other signs of sickness, which, after continuing for one, two, or three days, ceases, and the child regains its usual health. Some children are particularly liable to these attacks, and suffer from them every few weeks, or after any indiscretion in diet; whilst in others they are rare, let the diet be what it may.

There is another form of simple diarrhœa, however, of which I have seen nine cases, much more troublesome than the one just described. It occurs in children from two and a half to seven and eight years of age, lasts a considerably longer time, and is much less under the control of remedial measures. This form of the disease has never in the cases that I have seen, been accompanied by fever, or by any constitutional symptoms rendering it necessary to confine the child either to the bed or house. The only symptoms beside the diarrhœa which I have observed, have been some degree of paleness, and moderate emaciation; slight weakness, shown by an indisposition on the part of the child to play with its usual spirit, by an inclination to lie about from time to time through the day on the sofa or floor, and by complaints of "being tired;" irritability of temper and peevishness; irregular appetite; picking of the nose; and restless, disturbed sleep at night, attended with moaning, crying, starting, and grinding of the teeth; all of which symptoms generally convince the mother that the child is suffering from worms. The abdomen is sometimes slightly tumid, but remains natural as to tension, and is not painful on pressure. There is no pain except slight colics in some cases. The stools have generally numbered from three to five, and in a few cases as many as six or eight a day. They are semi fluid in consistence, often of a very offensive odour, and consist usually of feculent matter, which is sometimes clay-coloured, more frequently dark-brown, and, in other instances, deep yellow or orange in colour. They are often also of a frothy character. In two of the nine cases that I have seen, there was lientery whenever the aliment was otherwise than of the lightest and most digestible kind. In all, the diarrhœa was evidently greatly influenced by the diet, showing, it

appeared to me, an intimate dependence of the malady upon the condition of the stomach, which seemed to have lost in a greater or less degree its digestive power.

The *course* of the disease in this form was variable. In some it would last a few weeks, and then, under the influence of diet and remedies, cease, to recur and run the same course after a short period. In others it has lasted a much longer time in spite of all treatment that I attempted. In three of the cases it continued between three and four months, with occasional slight remissions, brought about apparently by remedies which a day or two after would seem to lose their effect. In two others it lasted about two months; in another six weeks; in another a month; in the remaining two cases the exact duration is not recollected.

Diagnosis.—The diagnosis of simple diarrhœa will rarely present any difficulties, since there is nothing with which it could be confounded, except the diarrhœa from tubercular ulceration of the bowels, or entero-colitis. From the former it is to be distinguished by the history of the case, and by the signs of tuberculization in other parts of the economy; from the latter by the absence of signs of inflammatory action.

Prognosis.—The prognosis is favourable so long as the disease remains simple. The physician should never forget, however, the disposition which is inherent in it to pass into entero-colitis, nor fail to make the possible occurrence of this transition one element in his prognosis. During infancy it is always more serious than after that period, from the feebleness of resistance on the part of the constitution to disease at that age, which undoubtedly allows this simple affection to prove fatal in some instances, probably from the shock to the nervous system. After infancy it is rarely a dangerous disorder, both because of the greater stamina existing at that age, and from the fact that the disposition to extension of disease is less strong.

Treatment.—The *prophylactic management* of simple diarrhœa is the same as that which is proper for entero-colitis, and as that affection will be treated of at considerable length in a future article, I must, on account of my limited space, refer the reader there for information on this point.

After the disease is established the treatment must consist first in attention to the *diet*, *exercise*, and state of the *gums* of the child. In many cases, careful regulation of the diet and exercise, and lancing the gums when they are much distended and vascular from the pressure of the advancing teeth, will suffice to arrest the disorder in a few days, without the necessity of resorting to drugs, which ought certainly to be avoided whenever it is possible to do so. If the child is at the breast, we must ascertain whether the milk of the nurse is good, by inquiry as to its appearance, by examination with the microscope, and by reference to her health, diet, temper, &c., all of which circumstances more or less affect the mammary secretion. If we conclude that the milk is good, or that it has been disturbed in its healthy properties only by a transient cause, the child must be continued at the breast, with the precaution, however, of not allowing it to nurse quite as much as usual. An infant suffering from any kind of diarrhœa, had better be restricted entirely to the breast, unless it be clear that the supply of milk is quite insufficient. If we determine that the milk is unhealthy, the nurse must either be changed, or the child weaned; of course the former alternative is infinitely preferable if the child is under a year old, or even eighteen months if it seems to have a rather delicate constitution.

If the case occur in a child already weaned, or in one fed partly on artificial diet, the regulation of the kind, preparation, and quantity of aliment is of the utmost consequence. It ought to consist chiefly of milk or cream weakened with water, unless it has been clearly shown by previous trial that these articles do not agree with the child. I prefer before any kind of diet that I have ever employed, or known to be employed, that made from cow's milk, cream, arrow-root, and gelatine, in the manner described at page 193. The proportions of the milk, cream, and arrow-root, must vary with the age and digestive power of the patient. I will merely state, as a general principle, that during the existence of diarrhœa, or at least the early stage of it, and before the strength has been reduced by the disorder, the proportions of cream and milk ought to be considerably less than in health. Not only this, but the total quantity of food in the day should be diminished, unless the ordinary amount seems to be really

necessary for the sustentation of the strength. If it be found, however, after patient trial, that the child either will not take, or does not digest this kind of food, we may try arrow-root or rice water, thin gruel or panada, alternated with very carefully prepared chicken or mutton water. If the child is six or eight months old, it often suits well to allow it a piece of juicy beef or a chicken bone to suck, or from one to several teaspoonfuls of meat of chicken or mutton minced very fine.

For older children with a common attack of simple diarrhœa, the diet should consist for a few days of boiled milk with bread of gruels made with boiled milk and arrow-root, rice-flour, sago, tapioca, or common wheat flour, and of small quantities of light broths. Meats are, for the time, improper, and all vegetables, with the exception of rice, yet worse.

In the cases of infants it is best to recommend a continuation of the ordinary exercise, unless the weather be cold and damp. Indeed, in good weather, exposure to the air and proper insolation are more important during the existence of this disorder than even during health. The same remarks apply to older children, with the exception that they ought not to be allowed to fatigue themselves, particularly in warm weather, as this would have a tendency to aggravate the complaint.

When the disorder occurs in a teething child, the gums ought always to be examined by the physician, and if found swelled, vascular, of a deeply red colour, and hot, with the outline of the advancing tooth perceptible, they should be freely incised to the tooth. If, on the contrary, the tooth is too deep to be felt, I would advise only a slight and superficial scarification in order to relieve the tension of the gum, and yet to avoid coming in contact with the tooth, which is sometimes injured by the lancet, when touched before the deposit of enamel is fully completed.

The *therapeutical management* of the disease should be as simple as possible. The fewer drugs we can succeed with in the gastrointestinal complaints of infants and children, the better, it seems to me. When, however, the diarrhœa continues for some days in spite of attention to the points already mentioned, we must resort to some of the means which have been found most useful in check-

ing the inordinate action of the bowels. The most important are a careful employment of laxatives and the use of opiates and astringents. I have generally commenced the treatment by the exhibition of a teaspoonful of castor oil, containing from half a drop to a drop of laudanum, for young infants, and two drops for older children. This dose alone given for two evenings in succession has oftentimes sufficed to effect the cure. If the diarrhœa persists after this, we must resort to some of the astringents. The one most commonly employed is the chalk mixture, which is officinal in our pharmacopœia. A teaspoonful of this is to be given after each loose evacuation, or three or four times a day. If the case prove obstinate, it will be found useful to add to each dose of the chalk preparation, a small quantity of laudanum or paregoric, or some astringent tincture, the best of which is the tincture of krameria. When the chalk mixture fails entirely, powdered crab's eyes will sometimes succeed; or we may resort to the aromatic syrup of nut-galls. The formulas and doses for both these remedies will be found in the article on entero-colitis. If the discharges are small and frequent, mixed with mucus and somewhat painful, it will be found that small opiate injections, (from one to two drops of laudanum in a tablespoonful of prepared starch for young infants, and from three to six drops in double the quantity for older children,) or the use of Dover's powder in combination with chalk or sugar of lead, will often succeed in arresting the disease. For further and more complete information in regard to astringents, I must refer the reader to the article on entero-colitis, where they will be fully discussed.

The chronic form of simple diarrhœa which I have attempted to describe, occurring in children who have completed the first dentition, has always proved difficult to manage. From the experience I have had, it seems to me that the best mode of treating it is by proper regulation of the diet, and by the use of tonics and stimulants, and occasionally of opiates. I was led to adopt this plan in consequence of having failed entirely to control the symptoms by the treatment generally successful in simple diarrhœa, and by the opinion which I came at last to form, that the disease depended in great part on a loss of the digestive power of the stomach

and duodenum. The diet must depend on the peculiarity of the individual; what we should seek is such an one as will be easily digested by the patient, the materials of which shall not appear in the stools, and one which does not manifestly increase, if it fail to moderate, the frequency of the discharges. The one which I have found to succeed best, consists of boiled milk with stale bread for breakfast and tea, and the tenderest meats, as very fine beef, mutton, chickens, or birds, with rice as the only vegetable, for dinner. If the child likes flour or rice pap, it may have either in place of the bread and milk. If it will take none of these, it may have milkwarm water and sugar, with bread; or very delicate mush and milk, or milk toast. Should it refuse the dinner recommended above, we may substitute delicate soup, or some of the milk preparations. Between meals it ought to be allowed nothing but dry bread. All rich food, dessert, fruits, all vegetables except rice, candies and comfits, all kinds of cakes and hot bread, in fact, everything except the articles which I have mentioned or similar ones, ought to be rigidly, systematically, and perseveringly forbidden. Until this has been done for many days, or for several weeks, the disease has always, according to my experience, obstinately persisted.

I have already said that I have not found the ordinary remedies for simple diarrhœa to exert much effect upon the disease. On the contrary, the treatment for dyspepsia, that is to say, simple but nutritious diet, exercise, and the use of tonics and stimulants, have always removed it in a longer or shorter time. The tonics which I have employed are port wine, quinine, and iron. From a dessert to a tablespoonful of port wine was usually given in water three times a day, in connexion with iron. The preparations of iron used were Vallet's mass, of which from half a grain to a grain was given in pill three times a day; or the solution of iodide of iron in the dose of first one, and then two drops, three times a day, in water, continued for one or two months. I have sometimes combined with each dose of the solution of iron, a drop of laudanum, especially if there were pain; or the opiate might be given by injection every evening. The quinine was generally administered alone in the dose of a grain three times a day, for one, two, or

three weeks. It has not, however, proved so useful as port wine and iron.

In a case attended with all the symptoms usually thought to indicate worms, the use of wormseed oil was followed by the expulsion of several very large lumbricoides. The child did not recover, however, for some weeks afterwards, and not until he had taken port wine and quinine for a considerable period. In other cases in which the verminous symptoms were also strongly marked, and in which the same remedy was given, no worms were expelled.

SECTION II.

DISEASES OF THE STOMACH AND INTESTINES, ATTENDED WITH APPRECIABLE ANATOMICAL LESIONS.

ARTICLE I.

GASTRITIS.

General Remarks.—There are but two diseased states of the stomach attended with organic lesions, which demand our attention. These are inflammation and softening. The medical authorities of the day are divided on the question, whether these conditions ought to be regarded as distinct and separate diseases, or whether softening is not merely a secondary lesion,—the consequence of inflammation, or a cadaveric alteration. I shall consider both under the single head of gastritis or inflammation of the stomach, believing myself justified in so doing by the opinions of MM. Valleix, Rilliet and Barthez, Bouchut, Dr. Carswell, and other writers. The former author (*Guide du Med. Prat.* t. v, p. 118) says, “It seems to me, therefore, impossible, in the present state of the science, to distinguish during life, the cases of simple pale softening with thinning, from those in which softening is associated with evident traces of inflammation.” At page 145 of the same volume, he says: “A description of the symptoms of pale softening with thinning of the gastric mucous membrane might therefore be drawn; but as it would differ in no respect from that which I have already presented of chronic gastritis, it would be useless to reproduce it here, or, to speak in clearer terms, I believe it results from the preceding discussion, that we ought to confound, in regard to the symptoms, this form of softening with chronic gastritis, of which it is generally a consequence, either pathological, or cadaveric.” Rilliet and Barthez treat of the two

conditions collectively, after stating (t. i, p. 453), that a careful study of their cases failed to show any important differences between the symptoms of inflammation and softening of the stomach. The same authors, in speaking of softening (*Loc. cit.*), say: "Our cases have in effect led us to regard this affection merely as a secondary lesion, and not as a primary disease influencing the whole organism, revealing itself by special symptoms, and pursuing a regular course." M. Bouchut (*Loc. cit.* p. 231) says: "Never, indeed, in young children, does softening of the stomach constitute an isolated disease; what has been asserted of that alteration belongs in fact to entero-colitis, which we have just described."

The authors of the *Bib. du Med. Prat.* (t. v, p. 600) are of opinion that it is doubtful whether softening ought to be regarded as a distinct and idiopathic disease or not, but that it is a pathological and not a cadaveric lesion, they think cannot be contested. Dr. Carswell (*Cyclop. Prat. Med.* vol. iv, p. 13 and 15), says it may occur either as a pathological or post-mortem lesion, and that the former is a consequence of inflammation. He states that when softening of the gastro-intestinal mucous membrane is a consequence of inflammation "the symptoms are those of gastritis or gastro-enteritis," and adds: "It need hardly be observed that there are no symptoms referable to the state of softening which we have described, considered in itself, and as a termination of inflammation of the mucous membrane." M. Barrier (*Mal. de l'Enfance*, t. ii, p. 118), says he cannot agree with those who regard softening of the gastro-intestinal mucous membrane as a specific disease. He considers it to be a simple lesion of tissue "generally produced after death, and which, when it commences during life, never appears except as the consequence of an anterior morbid condition." He supposes both gelatiniform and pale softening to be the result either of a merely chemical action of the gastro-intestinal fluids "which may commence before death, but which is chiefly exerted in the interval between the fatal event and the autopsy;" or to be a result of inflammation or of one of the diacrisis (diseases of the secretory function).

Definition ; frequency.—By the term gastritis is meant inflammation of the mucous coat of the stomach. It appears by the consent of all, to be of rare occurrence as an idiopathic affection in children. M. Valleix (t. v, p. 80) says, “we must conclude, therefore, that if gastritis occur in children, it is at least much more rare than in adults.” The author refers, in the above quotation, to the idiopathic form of the disease, which he regards as of rare occurrence, while he states that the secondary form is very frequent. Rilliet and Barthez state (*Loc. cit.* p. 462), “that the lesions of the stomach are scarcely ever idiopathic.” At page 453, they assert that it ought not to occupy an important place in the nosology of infancy: “Primary, it is almost always a disease of slight severity ; secondary, it is but an epiphenomenon of dangerous diseases, or the consequence of active medication ; lastly, often latent, it entirely escapes investigation.” M. Bouchut says of the stomach (*Loc. cit.* p. 215), “This organ, which has been thought to play so great a part in the production of the diseases of children at the breast, does not at all deserve the attention bestowed upon it.”

Causes.—The causes of gastritis and softening of the stomach are not well understood. The only ones which seem clearly ascertained, are the action of irritating substances, and particularly of active medical agents, introduced into the organ ; the predisposing influence of certain diseases ; and the solvent action of the gastric juice after death in the production of softening. Rilliet and Barthez state that, in their experience, one of the principal causes of gastric inflammation and softening was the application of energetic remedies to the gastro-intestinal mucous membrane, and particularly the use of tartar emetic potions continued for several days in succession. They also mention the use of kermes mineral and croton oil as having had the same effect. It is proper to state, moreover, that these effects almost always occurred when the disease for which the remedy was given was secondary, and very seldom when idiopathic.

The diseases in the course of which gastritis and softening of the stomach are most apt to occur are : cerebral affections, especially

tubercular and simple meningitis, and apoplexy; the eruptive fevers; and inflammations of the thoracic and abdominal organs.

Some observers go so far as to assert that the softening, which is generally confined to the mucous coat, but in some cases extends to the others also, is always the result of a cadaveric change. Thus, M. Bouchut is of opinion that "it is a consequence of the acidity of the fluids contained in the digestive tube of young children, which are exceedingly acescent in the disease to which we refer" (entero-colitis). M. Valleix concludes that in a certain number of cases there exist signs of inflammation which cannot be mistaken, and that this very inflammation may perhaps favour cadaveric softening in the parts attacked (t. v, p. 144). Rilliet and Barthez speak of inflammatory softening, but remark that in a large number of cases the alteration ought to be regarded as cadaveric. Dr. Condie (*Dis. of Child.* p. 186, 2d ed.) says, "we are still convinced, from the result of our own observations, that the gelatinous softening so frequently observed in children that have died of acute gastritis, is invariably the effect of intense inflammation of the mucous and other tissues of the stomach." Dr. Carswell, as has already been stated, believes it to exist both as a consequence of inflammation and as a post-mortem change.

I believe that the indigestions of children are not unfrequently followed by slight gastritis, as I have often met with cases which have been followed by fever, disposition to nausea or vomiting, anorexia, and loss of digestive power for several days.

Age seems to exert but little influence on the production of gastritis, which occurs indifferently in very young and in older children, while softening is generally acknowledged to be much the most frequent in infants, and in children under six years of age.

Anatomical lesions.—The pathological appearances in gastritis are redness, softening, thickening, ulceration and the presence of pseudo-membranes upon the mucous membrane. Writers describe different forms of gastritis, according to the lesions found after death. The most important of these are the erythematic, pseudo-membranous, and ulcerative. The first of these, the erythematic, is characterized by redness, softening, and thickening of the mucous mem-

brane. The redness, which is one of the most important features, may exist in the form of vascular arborizations, ecchymoses, or uniform coloration of a rosy, deep-red, brownish-red, or purple tint. Softening is thought by Rilliet and Barthez to be almost as important a sign of inflammation as redness, though they state that it may exist independently of inflammation. In most cases of erythematic gastritis, the softening is such that the mucous membrane may be removed with very slight force, and that it will yield no strips; while in those which are very severe, the least scratch reduces the membrane to a pulp, and leaves the sub-mucous tissue exposed. When thickening is present it generally affects several neighbouring points simultaneously, which project somewhat above the healthy tissue, and give to the inner surface of the organ a rough and unequal appearance, quite different from its ordinary smoothness and polish. In some few cases the thickening implicates the sub-mucous coat also, which becomes fibrous and resisting.

The pseudo-membranous form of gastritis presents little whitish portions of false membrane, which are smooth, polished, and of an irregular shape, or thin, soft, rough, of a more or less deep yellow colour, and which, isolated and distant from each other at first, become more abundant and extensive, and at last cover nearly the whole diameter of the organ. They are but slightly adherent to the mucous surface beneath.

The ulcerative form of the disease is not a rare affection: it occurs in two varieties; one in which the ulcerations affect the follicles of the stomach, and the other in which the mucous membrane itself is ulcerated. The pathological lesions of the former variety will be fully treated of in the article on entero-colitis, and I shall therefore confine my remarks entirely to the latter variety. The ulcerations of the mucous membrane are of a circular or oval shape, or occur in winding lines of various lengths, and from a third of a line to a line in width. The circular and oval ulcerations are of various sizes, from the head of a pin to that of a small bean; the smaller ones generally, but not always, affect the whole thickness of the mucous membrane, so that they rest on the sub-mucous tissue, while the larger implicate the sub-

mucous tissue also, and therefore rest on the muscular coat. The edges of the winding ulcerations are usually soft and sometimes redder than the rest of the mucous membrane, whilst their depth is formed of sub-mucous tissue, and is of a grayish-white colour. At a more advanced stage, they increase both in length and breadth, unite after a time at their edges or extremities, and at last form extensive ulcerations, in the midst of which are seen small portions of softened and reddened mucous membrane. The ulcerations of this form do not extend to the sub-mucous tissue, which, on the contrary, is generally thickened.

I have next to describe softening of the stomach, which has been erected into a special and distinct disease, and about the true nature of which there is very great discussion; for while, as we have already seen, some observers assert that it is the result of acute inflammation, others ascribe it entirely to a post mortem chemical action of the fluids contained in the stomach, and others again to inflammation, or some lesion of the nerves of the organ. In regard to this vexed question, I can merely express an opinion formed from the study of some of the best authorities upon the subject. That a large number of the cases of softening depend on cadaveric change, will not, it seems to me, admit of doubt. That some are the consequences of inflammation, is, I think, equally clear; whether the inflammation be the immediate cause, or, as M. Valleix surmises, merely predisposes the tissues of the stomach to be more readily acted upon by the fluids which it contains. Whether there be a third set of cases which should be regarded as forming a distinct disease, in which the softening depends on some peculiar unknown condition of the organ, independent, however, of inflammation or of a chemical action of the gastric juice, seems to me very doubtful, and certainly far from being proved in the present state of knowledge on the point.

Dr. Carswell (*Loc. cit.* p. 14,) describes softening from inflammation as presenting various degrees. It may be such that the mucous membrane breaks as soon as it is seized between the fingers and forceps; in the second degree, the edge of a scalpel or the finger passed lightly over it, converts it into a soft, somewhat opaque, creamy-looking pulp; in the third and last degree, a

stream of water a few inches in height carries it away. The softened portions may be quite pale, or they may present various shades of redness. The redness may be confined to the softened part, or extend to the neighbouring portions, and may vary from a slight rosy, bright, or dark red, to a purple or brown tint. In pale inflammatory softening, the colour may be pale gray, or yellow, very much like the natural tint, or paler than usual. Dr. Carswell does not believe that inflammatory softening extends from the mucous to the other coats of the organ, so as to produce perforation. He states, on the contrary, that the kind of softening which occasions that accident depends on the chemical action of the gastric juice.

Dr. Carswell describes the appearances of post-mortem softening. The softening is generally met with in the fundus of the organ; its degree varies between slight diminution of the consistence of the tissues, and that in which the mucous membrane resembles a quantity of albumen covering the sub-mucous coat; the softened portion is generally very pale and transparent. The principal distinction between inflammatory and post-mortem softening, according to Carswell, is, that in the former the mucous membrane, "instead of being transparent, is more or less opaque, and even when it is completely disorganized, it resembles a mixture of flour and water or milk, rather than an albuminous or gelatinous fluid. Such is in fact, the principal character of inflammatory softening of the mucous membrane in whatever organ it occurs; whereas the transparent gelatiniform softening is never observed except where the chemical agent is formed by which it is produced, viz., in the alimentary canal, and in some of the neighbouring organs, for the reasons which we have already given."

The gelatiniform softening, which is that described by M. Cruveilhier, as a disease peculiar to children, and which reduces the mucous membrane, and sometimes all the other tissues of the stomach, to the consistence of mucus or jelly nearly transparent in character, is, as we have just seen, supposed by Dr. Carswell to be invariably the result of post-mortem changes. MM. Rilliet and Barthez, on the contrary, (*Loc. cit.* t. i, p. 451,) while they state that this form of the lesion scarcely ever coincides with in-

flammation in the same patient, surmise that it may have followed inflammation, though at the time of death all appearances of the latter have perhaps disappeared. They add, however, that "it is probable that softening, particularly the gelatiniform, may commence as such, but of this we have no proof."

Symptoms.—It is very difficult to draw an accurate picture of the symptoms of inflammation and softening of the stomach, for the following reasons: that they have not as yet been studied with a sufficient degree of care; that they are, as was stated in the early portion of the article, seldom idiopathic, but almost always secondary affections in the course of other maladies; that the symptoms which betray them resemble so closely those of intestinal diseases, as to make it very difficult, if not impossible, to draw a distinction between the two; and lastly, that in the great majority of cases, gastric complaints coexist with intestinal lesions.

The most important symptoms are vomiting, diarrhœa, loss of appetite, thirst, epigastric tenderness, sometimes tension of the abdomen, and slight febrile reaction.

Vomiting is the most important of the different symptoms of gastritis. It is not, however, according to Rilliet and Barthez, invariably present. It was observed by them particularly in cases following the administration of active remedies, while in those which occurred spontaneously, it was much less common. It shows itself particularly after the taking of food or drink. Sometimes when the stomach is empty, there is simply nausea and retching. In severe cases the vomiting is frequent and accompanied by violent straining and pain. *Diarrhœa* exists in most cases, whether the attack be one of simple gastritis, or accompanied with enteritis. The *appetite* is generally lost or greatly diminished. *Thirst* is commonly acute, and often intense. The *tongue* is described by some writers as being generally red, and sometimes smooth and glazed. The authors above quoted, state, on the contrary, that it presents nothing peculiar in most cases. It was generally moist, only slightly coloured, covered with a white or yellow coat of variable thickness, and in some rare instances, red on the edges and tip, or gluey, or even dry and harsh. As a general rule, the *abdomen* is normal, according to the same

authors, though in some cases there is more or less swelling and tension. According to most writers there is generally tenderness on pressure in the epigastrium, and Dr. Condie mentions unusual heat of the same region. Infants and young children are commonly restless and uneasy, as though in more or less pain, while those who are older complain of burning in the region of the stomach. It is well to remark that Rilliet and Barthez state that tenderness on pressure often exists, not at the epigastrium, but in one of the iliac fossæ, or at the umbilicus, even when the stomach alone is inflamed. The condition of the circulation, and indeed all the symptoms, depend so much upon the nature of the concomitant malady, that it is difficult to ascertain what are their real characters in simple gastritis. Most writers agree that *fever* usually accompanies the disease, and that it is commonly of the remittent type. It is certain, however, from other observations, that it does not always exist.

In very violent cases there are added to the symptoms just described, those indicative of an adynamic state of the nervous system:—prostration, cool or cold skin, with perspiration; weak, rapid pulse; singultus; sometimes convulsions, and death.

Diagnosis and Prognosis.—The *diagnosis* must rest chiefly on the existence and frequency of vomiting; on the presence of epigastric pain or tenderness; of swelling and tension of the abdomen; excessive thirst; and the absence of other disease which might account for the illness of the child. It is not possible in the present state of knowledge, to draw a distinction between inflammation and softening, since, as we have seen, the symptoms of the two conditions are the same.

The *prognosis* will depend on the severity of the gastric and constitutional symptoms, and of the concomitant disease, when the attack is secondary. When there is incessant and obstinate vomiting, so that not even water in small quantities can be retained after several hours of sickness; when the tongue is red and glazed, or dry and brown; when adynamic symptoms make their appearance, and emaciation makes rapid progress; it is much to be feared that extensive softening has taken place, and that the case will prove fatal.

Treatment.—The two most important points in the treatment

are the withdrawal of whatever may have produced, or may tend to keep up the disease, if they can be detected, and strict attention to diet. Whenever, therefore, the symptoms have made their appearance after the exhibition of powerful drugs, as tartar emetic, ipecacuanha, or cathartics, their use ought to be instantly suspended. The child should then be put on the strictest diet. If at the breast, it must be allowed to nurse only at rare intervals, and to take but little at a time. If fed on artificial diet, it should be restricted to barley or arrow-root water, or to very weak milk and water. Nothing solid, and no rich liquid nourishment ought to be allowed, unless the child is in a state of weakness and debility from previous or concomitant disease, such as to make it absolutely necessary to endeavour to maintain its strength. Billard even recommends that the child be sustained by means of nutritive enemata, consisting of farinaceous substances, whilst the digestive function is allowed a total rest.

Antiphlogistics are useful and proper when the disease occurs in a strong and healthy child, when associated with fever, and when there is nothing in the nature of the accompanying disease, if it be a secondary case, to prevent their employment. The most suitable mode of depletion is by leeches, which should be applied to the epigastrium. It is best to take but a very moderate quantity of blood, for fear of exhausting the patient. After the use of the antiphlogistic remedy, a warm bath will be found of great service in moderating the heat of the skin, and rendering the child more comfortable. Small pieces of ice ought to be put into the mouth occasionally, as a refrigerant, or small quantities of iced drinks may be allowed from time to time. As soon as the bleeding from the leech-bites, if leeches have been employed, has ceased, a warm light mush poultice to the epigastrium, is a valuable and useful remedy. Some writers recommend the use of blisters to the epigastrium. I should much prefer the warm poultice or the occasional application of a mustard poultice. Dr. Condie recommends small doses of calomel, from a quarter to half a grain every one or two hours. *Opiates* are useful in allaying nausea and vomiting, and appear to exert a favourable influence on the progress of the disease.

When vomiting is frequent and troublesome, it may generally be allayed by the administration of lime water and milk, given in teaspoonful quantities, every fifteen minutes or half hour ; by observing the precaution of allowing the food and drink to be given only in the smallest quantities (teaspoonful to a tablespoonful), and at considerable intervals ; by the application of warm cataplasms over the abdomen, or a spice plaster to the epigastrium ; or, lastly, by the exhibition of a few drops of laudanum, or paregoric, to be repeated if necessary. If the child becomes weak and exhausted, with coolness and abundant moisture upon the limbs, we must resort to the administration of some kind of stimulant. The best are probably weak brandy and water, given in very small quantities, wine whey, or milk punch ; or we may employ the aromatic spirits of hartshorn.

ARTICLE II.

ENTERO-COLITIS.

General Remarks.—In treating of inflammation of the intestinal tube, I shall combine under one article inflammation of the large and small intestine, inasmuch as it appears from the researches of different observers that they coincide in the majority of cases. It would seem from the statements of Billard, that it is not unusual to meet with enteritis alone in the first year of life, for of 80 cases of inflammation of the intestinal tube, during that age, carefully observed by him, there were 36 of enteritis ; 30 of entero-colitis : and 14 only of colitis. Bouchut, on the contrary, (*Loc. cit.* p. 210,) says that entero-colitis is almost peculiar to young infants. He adds that the principal morbid alterations of the disease are found in the large intestine, and, by extension, in the termination of the small intestine. Rilliet and Barthez, whose observations apply to older children (over 15 months), say : “ Enteritis by itself is rare ; it often coincides, on the contrary, with colitis : colitis without enteritis is very frequent.” (T. i, p. 487.) M. Legendre, (*Bibliothèque du Med. Prat.* t. v, p. 649,) found the

large intestine alone diseased in 9 of 28 cases of diarrhœa, while of the alterations of the small intestine he says, (p. 652,) "Never isolated, but always united with similar lesions of the large intestine, these alterations are, in general, less serious than those found in the latter portion of the digestive tube."

Another motive for describing the diseases of the whole intestinal tube under one head, is the difficulty, not to say impossibility, of recognising during life the affections of its different portions. Billard (p. 428), recognises this difficulty, for he says: "In consequence of the impossibility we have found to exist of tracing with exactitude the series of symptoms proper to inflammation of the different portions of the digestive tube, we shall content ourselves with presenting an analytical sketch of the causes, symptoms, and ordinary course of inflammation of the mucous membrane of the intestines in general." Rilliet and Barthez, and M. Bouchut, also describe enteritis and colitis together, under the title of entero-colitis.

Writers make several divisions or forms of disease of the intestinal mucous membrane. Of these, the most important are the erythematous, pseudo-membranous, and follicular inflammations, softening, and gangrene. The whole subject is involved in much obscurity, in consequence of the variety of the lesions, and the different views as to their nature, which have been adopted by different authors. The follicular form of disease particularly, has given rise to a great deal of discussion, some asserting that it is not an inflammation, but a simple functional derangement of the secretory apparatus of the bowel, while others as strenuously maintain its inflammatory nature. In the present article, I shall, under the title of entero-colitis, devote particular attention to the erythematous and follicular forms of inflammation, and to softening of the mucous coat of the bowels: the pseudo-membranous form of inflammation and gangrene are rarely met with, and are therefore of much less importance.

Definition ; symptoms ; frequency ; forms.—By the term entero-colitis is meant inflammation with its attendant lesions, ulceration, softening, thickening, pseudo-membranous exudations and gangrene of the intestinal mucous membrane.

Under this title I shall describe the different kinds of diarrhœa treated of by Underwood, Eberle, and Dewees, under the titles of bilious, mucous, and chronic diarrhœa, and by Dr. John Cheyne, (*Essays on Dis. of Children*. Edinburgh, 1801-2,) under that of Atrophia Ablactatorum or Weaning-brash.

Entero-colitis is one of the most frequent of children's diseases. It appears from a table published by Dr. Condie, (*Dis. of Child.* note, p. 89,) that in the ten years preceding 1845, there were 6068 deaths in Philadelphia under fifteen years of age, from diseases of the digestive organs; of this number 4786 were from diarrhœa, dysentery, cholera infantum, and inflammation of the stomach and intestines, and as entero-colitis exists in by far the greater part of these diseases, we may understand how extremely frequent an affection it is. The deaths from affections of the digestive organs during the period referred to, constituted about a fourth of the whole mortality under fifteen years of age; whilst those from diseases of the brain are stated to have been rather more than a fourth, and from diseases of the respiratory organs nearly a seventh. It appears, indeed, that entero-colitis, in the form of diarrhœa, dysentery, cholera infantum, or what is called in the bills of mortality, inflammation of the stomach and intestines, is by far the most fatal disease of childhood. We may appreciate yet more accurately the importance and frequency of the disease, by reference to the statements of Rilliet and Barthez, who say (t. i, p. 483,) that, taking into consideration all the cases they observed, including tubercular cases, they find that of every two children that die, one presents a more or less serious lesion of the large intestine. They add: "if it be recollected that this holds true particularly in regard to younger children, it will be seen that it is rare for a child to die between two and five years of age, without having either colitis or softening of the large intestine." Bouchut states that entero-colitis is one of the most dangerous affections of children at the breast; "It is the most common of all those incident to that age." (p. 210.)

I shall describe two forms of the disease, the *acute* and *chronic*. The acute form is accompanied by active and inflammatory symptoms from the first, and runs its course in a few days or weeks;

the chronic form is unaccompanied by acute symptoms, and lasts several weeks or months.

Causes.—The most frequent cause of enteritis in children, the one most clearly and positively ascertained, is, it seems to me, improper alimentation. This may consist either of an unhealthy milk of the nurse, or, what is much more common, improper artificial nutriment. The kind of food most apt to produce the effect is one composed exclusively or in considerable proportion of some of the feculent substances, which constitute so large a portion of the diet of children throughout the civilized world. To prove the truth of this assertion it is only necessary to quote the opinions of those who have most carefully studied the subject. M. Valleix (*Guide du Med. Prat.* t. iv, p. 60, 61, and *Bulletin Gen. de Therap.*, article Acute Enteritis of Adults and new-born Children, March, 1845) clearly asserts that the most frequent cause of muguet, which he believes to be essentially connected with enteritis, is a too exclusively feculent alimentation. In the article last cited, while speaking of the great importance of this cause, he says: "What proves that my assertion is not hypothetical is, first, that all the deaths from enteritis in children that I have seen, occurred in those who had been placed upon this kind of regimen, and second, that the disease did not occur in any of those observed by me in private practice for whom I had directed an exclusively milk diet up to four, five, or six months of age." He adds that M. Trousseau has arrived at similar opinions, after studying the same diseases at the Necker Hospital; and that he, on account of the danger of a system of diet disproportioned to the digestive powers, recommends that children should be confined almost exclusively to the breast until after the first dentition is completed. Barrier, speaking of the follicular diacrisis (*Loc. cit.* t. ii, p. 40), states that the artificial food given to children at the period of weaning is a frequent cause of the affection, and that of all the different kinds of food habitually employed at that period, feculent substances are the most injurious. I have, myself, frequently known entero-colitis to follow the employment of artificial diet either alone, at the period of weaning, or in children who were partly nursed. Children fed wholly on artificial diet

from birth, rarely escape according to my experience attacks of the disease, which in many prove fatal. I have, on several occasions, seen children recover rapidly from the disease, after suffering more or less for weeks, by the suspension of a diet consisting wholly or in too large proportion of farinaceous materials, and the substitution of one of milk and cream, prepared with gelatine, and containing a very small quantity of arrow-root, rice, or wheat flour. (See *article on thrush*, page 193.) It is not merely the quality, but the quantity also of artificial food that proves injurious to infants. Over-feeding has always been recognised as a fruitful source of bowel complaints in early life. Another cause is the preparation of the food in too thick and rich a manner, thereby overtasking the stomach, intended during the early months to receive only the thin milk supplied by nature. The custom, therefore, of feeding infants on thick oatmeal gruel, with but little or no milk, on what is called cracker victuals (pounded crackers with water and sugar, or milk), on thick bread and milk, on preparations of rice of too solid a nature, or indeed, on any kind of diet not consisting chiefly of milk, and in which feculent substances enter merely as secondary constituents, may safely be asserted to be the most frequent cause of the disease under consideration.

An unhealthy character of the milk of the nurse is also known to be a cause both of simple diarrhœa and entero-colitis. When the granules which exist as a physiological element in the colostrum secreted during the first few days after childbirth, continue to be secreted after that period, the infant is almost certain to suffer from entero-colitis, and not unfrequently to perish, unless weaned or transferred to another nurse. It is said, also, that when the mammary secretion is acid, instead of alkaline, when it contains mucus or pus globules, when the nurse is liable to vivid moral emotions of any kind, or when addicted to intemperance, the child is very apt to suffer either from the disease under consideration, or from simple diarrhœa.

After the causes just enumerated, the one which appears to exert the strongest influence is dentition. That the evolution of the teeth, though a physiological process, is a powerful predisposing cause of diarrhœa and enteritis, there cannot, it seems to me, re-

main a doubt at the present time. It is one recognised by many of the most able writers and observers of the day, and by most practitioners. Rilliet and Barthez agree with Trousseau in the opinion that the simple diarrhœa so apt to occur in children at the epoch of the first dentition, is often the origin of chronic intestinal lesions which finally reduce them to extreme debility and emaciation. They say that careful investigation will generally show that nearly all the cases of inflammation and softening date either from the epoch of dentition, from the period of weaning, or from the time at which some considerable change in the character of the regimen was made. M. Bouchut states that of 110 children in whom the first dentition was going on, 26 escaped any indisposition, 38 suffered from restlessness, colics, and occasional diarrhœa, so mild as to excite no alarm in the parents, whilst 46 had abundant diarrhœa. In 19 of the last series it appeared coincidently with the fluxion of the gums, occurring at the time of emergence of each tooth, and disappearing entirely in the intervals; in the remaining 28, in all of which the process of dentition was difficult, the diarrhœa persisted and gradually assumed the characters of entero-colitis. M. Legendre and M. Barrier (*Loc. cit.*) both agree in ascribing very great effect to the influence of dentition in the production of diarrhœa and entero-colitis. The former asserts the diseases referred to to be much the most frequent between the ages of six or seven months, and two or two and a half years, which includes exactly the period occupied in the first dentition, while they are only met with exceptionally after three years of age.

The act of weaning is very apt to result in the production either of simple diarrhœa or entero-colitis, in consequence, no doubt, of the irritation set up in the gastro-intestinal surface, by the change of food made at the time. The diarrhœa which occurs at this period was formerly, and is still, not unfrequently, called *weaning-brash*. Dr. Stokes (*Cyclop. of Med. Art. Enteritis*) says of this disease that it "is manifestly an acute enteritis, produced by the change of food, and in which nature seeks to relieve the inflammation by a super-secretion."

We may conclude, therefore, in the words of Rilliet and Barthez (*Loc. cit.* p. 541), "that the greater number of cases of entero-

colitis in young children are caused by dentition, weaning, and any very sudden change of regimen or other hygienic conditions."

Various other causes are cited by writers. Amongst the most important are excessive heat at certain seasons; unfavourable hygienic conditions as to habitation, ventilation, clothing, cleanliness, and want of exposure to the air; the existence of certain diseases; and a lymphatic constitution, or one debilitated and exhausted by any cause.

That heat of weather acts as a predisposing cause to enterocolitis and diarrhœa, is clearly shown by the fact of the much greater prevalence of these diseases, and particularly of cholera infantum or summer complaint, during the three summer months. M. Valleix has shown, also, that the acute enteritis of new-born children is much more prevalent during the warm, than the cold season of the year.

It is scarcely necessary to do more than state the fact that the unfavourable hygienic conditions above referred to, act as predisposing causes to the disease. This is clearly shown to be true by the evidence of many writers, and by the very extensive prevalence and great fatality of the affection in hospitals, and amongst the children of the destitute classes of society in cities and towns.

Enterocolitis is prone to occur as a secondary affection in many of the acute diseases of children. It is by far the most common in the course of the eruptive fevers, particularly measles, and in that of typhoid fever. It is also a frequent complication in the latter stages of pneumonia.

That children of feeble constitution and lymphatic temperament are more disposed to the disease than others, is, I think, sufficiently proved by the evidence of various observers. Lastly, that the incautious and excessive use of perturbing systems of medication, addressed to the digestive tube, often occasions diarrhœa and enterocolitis, is, it seems to me, fully shown by the researches of Rilliet and Barthez, and by my personal experience.

Anatomical lesions.—It has already been stated that the alterations of the large intestine are, as a rule, much more frequent and serious than those of the small intestine. It appears from the researches of MM. Rilliet and Barthez, and Legendre, that enteritis rarely ex-

ists alone, whilst colitis, by itself, or combined with enteritis, is quite frequent. M. Legendre states that inflammation of the small intestines never occurs without corresponding lesions of the large bowel, while in 28 cases of diarrhœa, he found the large intestine alone diseased in 9. From a table of different intestinal lesions, given by Rilliet and Barthez (*Loc. cit.* t. i, p. 488), it appears that they have met with 45 cases of erythematous, pseudo-membranous, ulcerative or pustular enteritis; with 113 of the same forms of colitis; with 90 of follicular enteritis; 64 of follicular colitis; and with 28 of softening of the small, and 35 of softening of the large intestine. It seems clearly established, therefore, that inflammation of the large is considerably more frequent than that of the small intestine, and much more apt to exist alone.

It has already been stated that my remarks would be confined chiefly to the erythematous and follicular forms of inflammation, and to softening of the intestines. But even here we are met by a difficulty, since some writers confound the two forms of inflammation together, and regard them merely as different degrees of the same alteration. Such is the view taken by the English authors that I have consulted, and by MM. Legendre and Bouchut. Rilliet and Barthez, on the contrary, describe the anatomical lesions of the two forms separately, with great care, but confound them together in their description of the symptoms. Barrier, as we have already seen, makes of the follicular form a disease altogether different from ordinary inflammation, and calls it follicular diacrisis. For my own part, I am strongly disposed to believe that erythematous and follicular inflammation, and softening of the intestinal mucous membrane, are indeed, as asserted by Legendre and Bouchut, and by some English writers, merely different degrees of the same disease. That they very often coincide in the same individual is proved by the observations of different authors, and particularly by those of Rilliet and Barthez, who have given a table of 185 autopsies (t. i, p. 488), showing the exact manner in which they are united in the same individual. From this table it appears that of the whole number, there were only 2 cases of enteritis, 32 of colitis, 11 of entero-colitis, 12 of follicular enteritis, 3 of follicular colitis, and 13 of follicular entero-colitis, existing each alone, un-

combined with other lesions ; there were also 18 cases of softening of the small or large intestine without other alterations ; while the remaining cases, 97 in number, consisted of the different lesions enumerated, variously combined in the same individual.

Inasmuch, however, as the relation of the two forms to each other is not as yet fully determined, and as a separate description will be more accurate than one in which the two are mingled together, I shall adopt the former plan, stating, however, the fact which is acknowledged by all, though variously interpreted, that they very often co-exist in the same individual.

Erythematous inflammation is generally slight, both in degree and extent, in the small intestine. In some few cases it is general, and then appears in the form of redness produced by arborizations. In other instances it appears in spots of more or less vivid inflammation, which may extend throughout the small intestine, or be limited to certain portions. Though sometimes confined to the upper part of the bowel, constituting duodenitis, it is much more apt to exist in the lower part of the ileum, where it generally assumes more serious characters than above. At the latter point it appears in the form of more or less bright injection with tumefaction and sometimes softening of the mucous membrane.

The large intestine is generally contracted and lessened in size, according to Bouchut. This condition is mentioned also by Dr. Cheyne, in his remarks on atrophia ablactatorum, (*Loc. cit.*,) and by Dr. Eberle as existing in a case examined by himself, (*Loc. cit.* p. 239,) in which he found the whole length of the colon contracted to a size that scarcely admitted the little finger. The erythematous inflammation generally presents itself in the shape of arborizations or spots, and seldom of bands. The inflammation is generally most acute in the cæcum, descending colon, and rectum, particularly the latter, where it often assumes great severity. The colour of the mucous membrane varies from a pale rosy to a deep scarlet tint, which is either uniform, and depends on minute injection of the capillaries, or in some cases affects only the summits of the folds of the mucous tissue. The mucous membrane is often thickened, and still more frequently softened. Of the latter alteration, however, I shall speak after a time ; while of ulceration, which

is still more common, notice will be taken under the head of the follicular form of the disease.

Follicular inflammation.—The follicular apparatus of the intestinal tube, consists of isolated and agminated glands. The isolated follicles are abundant in the stomach, and exist throughout the length of the intestinal tract. They are most abundant in the superior and inferior portions of the small intestine, less so in the middle, and numerous again in the large intestine, particularly the rectum. The agminated follicles, as is well known, are found chiefly in the ileum along the free edge of the intestine, and become more and more numerous as we approach the cæcum. The isolated follicles are not very distinct in their normal condition, but undergo various changes when affected with disease. M. Gendrin (*Trait. Philosophique de la Med. Prat.* t. iii, p. 6,) says that they are scarcely so large in their normal condition as the head of a small pin, and that they consist of little white bodies, upon which we can rarely distinguish with the naked eye, but always with a lens, a grayish point, which is the excretory orifice. He distinguishes the crypts into simple and compound. The simple have just been described; the compound are formed of an agglomeration of several simple crypts or cryptiform granulations, having a common reservoir and excretory canal. It must be observed that he does not mean by the compound crypts, the glands of Peyer, which he elsewhere describes under the title of cryptous plaques. He states that the simple crypts are found in the stomach, especially the pyloric half and along the great curvature, in the duodenum, and in the jejunum, in such quantities that they seem to be almost confluent. As we descend into the ileum they become larger and less frequent. They are rare in the large intestine, where instead of them are found the compound crypts, which are there very numerous. The latter exist also in the stomach and duodenum, but are rare in the small intestine.

The alterations of the follicular apparatus of the gastro-intestinal mucous membrane, constituting the follicular inflammation of several writers, may be referred to two heads, first, increased development without apparent inflammation, and second, inflammation, with or without disorganization.

The first condition, or that of increased development without evident inflammation, presents the following characters. The isolated glands have become enlarged, and seem therefore more numerous than in the healthy condition; they appear in the form of lenticular grains seated in the texture of the mucous membrane, sometimes projecting from its surface, sometimes not, and in other instances appearing to be situated beneath it; the excretory orifices of the glands are often enlarged and tumid, and easily distinguished under the form of a grayish or blackish point in the middle of the gland; in other cases the orifices cannot be distinguished until slight pressure is made upon the crypts, when a drop of mucus may be seen exuding through the open point. The colour of the follicles in this condition is dull white, rosy, or yellowish; they are generally from a third to two thirds of a line in diameter. Dr. Horner, (*Am. Journ. Med. Sc.* Feb. 1829,) speaks of them in this state of development as resembling "small grains of white sand sprinkled over the mucous membrane, and about the size of a millet seed."

The agminated glands or plaques of Peyer are found in the same state of increased development. They are tumefied; project above the level of the surrounding mucous membrane, and are evidently enlarged, without, however, always presenting evidences of inflammation.

M. Barrier describes another condition of the follicles, which is met with chiefly in the large intestine. This is an enlargement of the orifice of the gland, which will easily receive a small probe, and sometimes measures near half a line in diameter. This dilated orifice, which might readily be mistaken for an ulceration, leads into a little cavity, which is the follicular sac itself.

Authors are very much divided as to whether the alterations of the follicles just described ought to be regarded as the result of inflammatory action or not. Billard says it is not of "evident inflammatory nature;" and in another place, that he does not consider it a "frank inflammation of the muciparous follicles," but as "a degree intermediate between the normal and inflammatory state." M. Barrier, on the contrary, says that these alterations are evidently not of an inflammatory nature, and that they do not entitle

the disease to the name of gastro-enteritis or colitis. He, therefore, follows M. Gendrin, and expresses the condition in which they occur, by the word *diacrisis*, or altered secretions. Rilliet and Barthez believe the alteration to depend upon inflammatory action, without, however, affirming it positively. The authors of the *Bibliothèque du Médecin Praticien*, (t. v, p. 657,) state that it cannot be doubted that inflammation plays some part in the anatomical alterations of the secretory apparatus of the digestive tube just described, and those we shall speak of directly. For my own part, I am clearly of opinion that they are in all probability the first stage of inflammation; for, as we shall presently see, when the condition persists for some length of time, the follicles almost invariably become ulcerated and surrounded by patches of inflammation, and though it is possible, as M. Legendre supposes, that the surrounding inflammation may be the result of ulceration of the crypts, it is difficult to understand how that ulceration could occur independently of inflammation.

The other changes we have to notice are evident inflammation and ulceration of the follicles. M. Legendre (*Biblioth. du Med. Prat.* t. v, p. 650) says that after the morbid development of the follicles, (which he calls the first degree or stage of disease,) has existed for some time, if the causes which produced it continue in action, the alteration becomes the point of departure of numerous ulcerations, which are deeper in proportion to their time of duration. The researches of the French observers prove that the alterations, and particularly the ulcerations of the follicles are more frequent and to a greater extent, in the large than in the small intestine. M. Legendre states that in 28 cases of diarrhœa, he found the large intestine alone diseased in 9; while of the small intestine he says, that the morbid modifications of its follicular apparatus never occurred alone, but were always combined with similar lesions of the large bowel, and, moreover, were generally less considerable than those of the latter: from these circumstances he is led to infer that in chronic diarrhœas, the small intestine is last attacked. A reference to the dissections of Dr. Horner, and especially to those of Dr. Hallowell, (*Am. Journ. Med. Sc.*, July,

1847,) will show that these statements as to the seat of the follicular lesions hold good also in regard to cholera infantum.

I shall first describe the ulcerations as observed in the *large intestine*. In the forming stage they appear in the form of superficial, circular erosions, from one to two thirds of a line in diameter, generally neither injected nor protuberant. In this stage they may easily escape observation, under superficial examination. Each of these ulcerations will be found developed upon a follicle. When more advanced, the mucous membrane is seen to be riddled, not with superficial erosions, but with true ulcerations, of a perfectly circular shape, affecting the whole thickness of the membrane; their edges, either pale or injected, circumscribe a small, grayish, semi-transparent corpuscle, of the size of the head of a pin, from which by pressure a drop of opaque, grayish mucus may be made to escape. In a still more advanced stage may be observed, sometimes in the last half of the intestine, but most frequently in the rectum only, deeper and larger ulcerations, which, when isolated, are perfectly circular, and measure from a line to a line and a half in diameter, but which, from the running together of two ulcerations, are sometimes irregular in shape, and of a larger size. The bottom of these ulcerations is formed of the sub-mucous, and often of the muscular tissue; their edges are of a slate-gray colour, thickened, and sometimes detached; their depth is occasionally covered with a pultaceous, apparently pseudo-membranous layer, of a grayish-white colour. That the large and deep ulcerations just described, even when most extensive, are originally seated in the muciparous crypts, is proved by the presence amongst them of other ulcerations of more recent date, and smaller size, which present in their centres a well-marked mucous follicle, and show clearly the origin of the larger and more advanced ulcerations.

The mucous membrane itself presents different appearances according to the date and degree of the ulcerations. When the superficial erosions alone are present, it sometimes retains its ordinary normal grayish tint, but, more generally, is of a rose-gray colour, dotted with little patches of a deeper red, produced by very fine arborizations; or, lastly, it presents a very minute red punctuation. Be-

sides the injection, there are usually softening and thickening of the membrane. The redness, softening, and thickening, are all most considerable around the deep ulcerations above described.

Small Intestine.—The lesions of the follicles of the small intestine are generally much less considerable than those of the large. Simple morbid development of the isolated and agminated follicles are almost the only alterations that are found. The follicles, especially the agminated, often have the appearance of being ulcerated, but a careful examination will generally show that this is not the case. The appearance depends on the fact of the orifices of the glands being dilated, upon unequal tumefaction of the surrounding mucous membrane, and upon the presence in the plaque of small, irregular, grayish points, consisting of a pul-taceous matter, which makes the plaque look more projecting than usual. If, however, the pultaceous layer be gently rubbed with a piece of linen, it can be easily detached, upon which the mucous membrane beneath is found red, softened, and thickened, but not ulcerated. The lining membrane of the small intestine seldom presents any important changes in follicular disease. It usually retains its natural colour, consistence, and thickness. When, however, the crypts are much altered, it is generally red, softened, and thickened.

Softening of the mucous coat is very generally present to a greater or less degree in entero-colitis. Bouchut states that in young infants the last eight or ten inches of the ileum are the portion of the small intestine generally diseased. The softening is sometimes accompanied by inflammation and thickening. In two cases he found the mucous membrane white and opaque, with an entire destruction of its consistence from the pylorus to the ileo-cæcal valve. In the large intestine its consistence is rapidly modified, so that it is generally impossible to obtain strips. He adds that this condition always coincided with vivid redness. Legendre says that the mucous membrane of the small intestine is not softened unless the alterations of the muciparous crypts are very marked and extensive. In the large intestine he found the mucous tissue slightly softened around ulcerations of recent origin and slight extent, while around those of greater depth, the softening existed

in a much more advanced degree. Rilliet and Barthez, whose observations were made in children over fifteen months old, describe both pale and gelatiniform softening as frequently occurring in the small intestine. They say that it generally occupies the whole extent of the mucous membrane from the duodenum to the ileo-cæcal valve, that it is rarely limited to the inferior, and still more rarely to the superior portion of the bowel. Both varieties are common also, in the large intestine, and more frequently affect the whole than only a part of that bowel, though sometimes limited to the cæcum, colon, or rectum.

Symptoms ; duration.—In infants the *acute* form of enterocolitis generally begins with restlessness and fretfulness. The mother observes that the child sleeps less than usual, and for shorter periods, and that its sleep is uneasy and broken by sighing or moaning, or by occasional expressions of pain flitting across the face. It takes the breast less frequently, and is satisfied to nurse for a shorter time, showing thereby an evident diminution of appetite. At the same time it is apt to reject the milk which it has taken in larger quantities than usual, and this is often observed to have a very acid smell. After these symptoms have lasted a few days, and sometimes without them, the peculiar symptoms of the disease, the diarrhœa and other abdominal symptoms, make their appearance, and are accompanied by febrile reaction in most cases.

In older children the acute form may come on suddenly, with diarrhœa, loss of appetite, thirst, sometimes vomiting, abdominal pain and fever, from the first ; or, as happens very frequently, the case begins with slight diarrhœa, unaccompanied by fever, or other signs of sickness, and it is not until after several, or eight, ten, or even more days, that signs of inflammation make their appearance.

After the disease is established, the most important symptoms are the following. The *diarrhœa*, which is the most prominent and characteristic, presents various characters. In order to appreciate this symptom as its importance requires, the practitioner ought always to see the napkins of the child at least once, and often more frequently, in the day. It exists in almost all cases of enterocolitis,

in the erythematous and follicular inflammations, and in the ulcerations and softening which accompany or succeed simple inflammation. It is seldom absent, and yet that it is so sometimes, is proved by the facts mentioned by Rilliet and Barthez, who state that they have calculated, from their cases, that it is wanting in about one of every twelve cases of inflammation or softening of the intestine. They add, however, that it is absent only in slight attacks, and is always present when the disease is severe. It varies greatly as to the frequency, abundance, and characters of the stools. It varies also in its mode of progress, so that it presents great differences as to all these points from day to day, and at different portions of the same day. We may remark in general, however, that in proportion to the severity of the inflammation, so is the diarrhœa violent and constant, and that it usually increases as the signs of inflammation become more and more marked. It is rare to have severe diarrhœa when the anatomical lesion is of slight extent, though this does sometimes happen. The *number* of the stools, as has been stated, is exceedingly variable. This depends in great measure upon the violence of the case; for while in those which present the symptoms of an inflammation of small extent, the stools seldom amount to more than six or eight a day, in those in which the evidences of more extensive and severer inflammation are present, there will be fifteen, twenty, twenty-five or even more per diem. The *consistence* of the stools may vary between that which characterizes them in a state of health, and that of the thinnest serous fluid. The *materials* of which they are composed consist chiefly of mucus, bile, serum, small portions of feculent matter, portions of undigested caseum or other food, and blood. M. Bouchut (*Loc. cit.* p. 219), describes those of very young children as presenting the following characters.

1. They are semifluid, homogeneous, greenish, and similar to cooked vegetables; neutral.
2. Semi-fluid, homogeneous and green; often acid.
3. Semi-fluid, heterogeneous, greenish, and mixed with yellowish fragments of ordinary fæces; neutral.
4. Semi-fluid, heterogeneous, greenish, and mixed with fragments of undigested caseum; acid.

5. Diffluent, greenish, heterogeneous, composed of a large quantity of water in which float yellowish and greenish, or whitish particles; acid.

6. Diffluent, greenish, like the preceding, and mixed with gas of a mawkish and sometimes sourish smell.

7. Diffluent, completely serous.

8. Bloody stools are very rare at this age. We have met with them once only in a child affected with acute hepatitis.

Such are the appearances of the stools in children who have not completed the first dentition. After the epoch of the first dentition the disease becomes much more rare, and when it occurs, is generally of a milder character, so that the discharges differ less from their healthy characters. Under these circumstances, they are usually less frequent, not often exceeding six, eight or ten in the day, and generally retain their yellow colour or become brownish; they are commonly of a semi-fluid consistence, and may be called bilious. When, on the contrary, more frequent, they become fluid, abundant, mixed with mucus, and are either of a light yellow or brownish, or more rarely of a greenish colour. In some cases there are, in addition to the substances mentioned, pus, which indicates suppuration of the lower portion of the intestine, and fragments of false membrane. Moreover, it is very common in older children to observe traces of blood in the stools, sometimes in considerable quantities. I may remark that I have several times met with stools containing blood in children within the year, but much less frequently than after that age. The presence of blood generally coincides with small and frequent stools, attended with much straining, and often severe pain, and almost always indicates follicular inflammation and ulceration of the large intestine.

The serous fluid alluded to sometimes constitutes the whole of the discharge, so that the napkins are merely wetted through, without any or but a very small quantity of solid matter being left upon them. This kind of stool is very frequent in the cholera infantum of this country. The *odour* of the stools is important. In the beginning, while the discharges still retain some of their natural characters as to colour and consistence, it is often very offensive, but as the case goes on, and the greenish colour predominates,

it is either sour, or becomes very slight. In some violent cases, in which the discharge consists of a watery, dark-brown fluid, the odour is fetid.

After diarrhœa, the most important symptoms are those which concern the *form*, *size*, and *tension* of the *abdomen*, and the presence or absence of *pain* or tenderness on pressure. In infants the abdomen is more distended than usual; but, according to Bouchut, the tension depends on the muscular effort made by the child to resist the hand of the physician. He says that when it is carefully examined, while the attention of the child is attracted in some other direction, it is found to be soft and supple, and rarely painful to the touch. In older children it is, in many acute cases, but not in all, enlarged, sometimes tense and sonorous, and very generally painful to the touch. The seat of pain is variable, but generally occupies one of the iliac fossæ or the umbilicus. It is seldom acute, though the child not unfrequently shrinks away and cries out, from fear of the examination, as though it were excessive. It is easy to distinguish when the pain is real and when apparent, by withdrawing the attention of the child, by some device, from the examination, in which case it will cease to notice the palpation more than is natural under the circumstances; or by touching some other part of the body, when, if the crying and shrinking depend on fear or nervous excitation, they will be as violent as when the abdomen is touched. Pain to the touch is an important symptom, as it is very generally indicative of acute enteritis. *Gurgling* is rare, according to Rilliet and Barthez, in ordinary entero-colitis, though very generally present in typhoid fever.

Vomiting is very common in young infants, and is generally repeated several times a day. In severe and rapid cases it is a very troublesome and alarming symptom. In older children it is much less common, and is never really violent, except in some of the most acute cases. In them it is confined to the first few days of the attack.

After the diarrhœa is fairly established, young infants are almost always either very irritable, peevish, and restless, or weak, languid, and subdued. Their slumber is short and disturbed, and generally they sleep much less in the twenty-four hours than when in health,

unless under the influence of anodynes. Older children are generally somewhat restless and irritable, but much less so than infants. There is seldom any disorder of the intelligence, though in acute cases there is sometimes slight delirium or headache. *Fever* exists in all acute cases. It is seldom continuous in infants except for the first few days, after which it almost always assumes the remittent type. It is marked by increased frequency of the pulse, which rises to 120 and 140, or in bad cases much higher; by heat of skin, often intense during the exacerbations; by thirst and diminished appetite; and by dryness and heat of the mouth. In older children the pulse is not generally so high as in infants, and in many of the mild cases the fever is very slight or there is none at all. In acute cases, however, it is sometimes continuous and marked by rapid pulse and great heat of skin.

The *tongue* is generally normal, though sometimes red on the edges and tip in acute cases. It is seldom dry, except during the fever. *Appetite* is almost always lost, and *thirst* generally increased, though to a less degree than in diseases of the stomach.

The *countenance* presents nothing peculiar except that the features are, according to Rilliet and Barthez, drawn down towards the inferior portion of the face. Emaciation always takes place as the disease progresses, and in very severe cases, occurs with the greatest rapidity, so that in a very few days the child will be reduced from an appearance of vigour and strength, to that of the greatest debility. As this occurs the flesh loses its firmness, the skin hangs in folds upon the trunk and limbs and is dull and dirty in its tint, the eyes become sunken and surrounded with bluish circles, and the whole appearance of the child is that of misery and exhaustion.

In infants it is very common to meet with erythema of the buttocks and thighs, produced by the contact of the acrid stools and urine with those parts. This symptom is said by Bouchut to exist in five-sixths of the cases. I feel quite sure that it does not exist in so large a proportion of those which occur in private practice, though I have met with it in some instances. When severe it is generally accompanied by papules which ulcerate after a time and form superficial ulcerations upon the skin. These ulcerations

sometimes run together and become of considerable size and depth. In the form of the disease met with in the children's hospitals in Paris, erythema and ulcerations of the heels and internal malleoli are also met with, and constitute a serious complication in the case. They are said to depend on want of cleanliness, and the rubbing together of the feet of the child, unprotected by covering. I have never met with them in private practice.

The *duration* of the disease is stated by the French writers to be generally about fifteen days, at the end of which time convalescence is usually established. It may be shorter or longer. According to my own experience it is entirely uncertain. Most of the cases that have come under my notice have been rather shorter. The disease subsides gradually. The number of stools diminishes; they become less abundant and more consistent, and return to their natural colour and odour; the pain on pressure, and the enlargement and tension of the abdomen disappear; and as this occurs, the fever subsides, the appetite returns, the temper improves, and the child enters into full convalescence.

The *chronic form* of entero-colitis generally follows the acute, though it sometimes presents many of the features peculiar to it from the first. It differs from the acute form chiefly in the absence or the much slighter degree of fever and other constitutional symptoms in the early stage. The diarrhœa is less abundant and less frequent. At first the child retains its spirits and many of the signs of health. But gradually its strength fails, the temper becomes irritable, the complexion grows dark, sallow, and unhealthy, the skin becomes dry and harsh, and in consequence of the emaciation which takes place progressively with the other symptoms, hangs in folds around the shrunk extremities, or is drawn tightly over the joints and other osseous protuberances. The tongue is generally moist and natural, though in some cases red and dry, whilst in others it, together with the lips, partakes of the pallor which pervades all parts of the body. The abdomen is usually distended and sonorous on percussion, and may be painful or not on pressure in different cases, or in the same case at different periods of the disease; its parietes sometimes offer no resistance to the touch, so that the intestinal convolutions may be readily felt

by the hand, or even between the fingers; and in some cases I have seen them so thin and relaxed, though the abdomen was more prominent than natural, that the outlines of the intestines, and even the peristaltic movements were visible upon the exterior. The appetite generally persists in spite of the gravity of the disease, and is sometimes increased. The stools, as has been stated, are not so frequent as in the acute form, seldom numbering over six or ten in the day and night. They consist of the products of an imperfect digestion, not unfrequently containing the alimentary substances in the state in which they were swallowed, mixed with mucus, serum, pus, and sometimes blood. Their consistence varies constantly, but they are usually semi-fluid. Their odour is seldom natural, but often extremely offensive.

The *course* of the disease is very irregular. Even in the worst and most prolonged cases intermissions or remissions occur, so that the child will often improve greatly for days or weeks, and then suddenly relapse into as bad a condition as ever. In favourable cases these remissions become more and more frequent, and the symptoms gradually improve, until at length the child is restored to health. In fatal cases death is occasioned by the utter deterioration of the general health which finally occurs, and the child perishes worn out by long illness, or, as more frequently happens, some complication arises which hurries on the fatal event. Thrush is a frequent complication of chronic entero-colitis, and doubtless often hastens the death by the impediment which it occasions to the nursing or feeding of the child. Vomiting has almost always occurred towards the close of the fatal cases that I have seen, especially in those in which extensive thrush was present.

The *duration* of this form is of course very uncertain. It may last for weeks or months. I have known it to last two and three months in several cases, and in two others it lasted with occasional intermissions, in one a year, and the other eighteen months.

Diagnosis.—The diagnosis of acute entero-colitis is not difficult. There is no disease with which it is likely to be confounded. The characteristic features of the malady are the diarrhœa and other abdominal symptoms, and the absence of signs of

other disease. The secondary cases are distinguished by the occurrence of the usual symptoms of entero-colitis during the progress of the primary malady.

The chronic form is not likely to be mistaken for any other disorder, unless it be the diarrhœa which occurs in tubercular disease, from which it is to be distinguished by the presence in the latter of the signs of tuberculization of other organs.

Prognosis.—Acute entero-colitis is always a serious disease in infants. The prognosis will depend in great measure on the circumstances under which the affection has been developed. It is much more unfavourable in a child fed on artificial diet, either wholly or in part, than in one who is nursed at a fine breast of milk. It is more unfavourable also in weak and delicate than in robust and vigorous children, and in those of poor people, who live in crowded unhealthy portions of cities and towns, whose habitations are small, damp, and ill-ventilated, and whose food is coarse and insufficient or improper, than in those placed in more fortunate and more healthful hygienic conditions. In hospitals for children it is a very fatal disorder, owing to the bad hygienic conditions under which the inmates are placed. In children, who have passed through the first dentition, the prognosis is, as a rule, favourable. The disease is seldom dangerous when it occurs as a primary affection, while as a secondary affection, on the contrary, it is much more apt to be serious.

The unfavourable symptoms are: great frequency of the stools; collapse; violent vomiting or retching; and dangerous cerebral symptoms, as coma, rigidity of the limbs, paralysis or convulsions.

Treatment.—The *prophylactic treatment* of the disease is important. It includes attention to *diet, dress, exercise, and habitation*. It has already been stated that one of the most frequent causes of the malady is the attempt to bring up the child on artificial diet, and particularly on one of an improper kind. It is clear, therefore, that to avoid the disease, it is necessary that the child should, if possible, be nursed. If this cannot be done, the diet ought to be wisely selected and regulated in all its details by the physician. The one which is most proper is evidently that which most resembles the natural aliment of the infant. In my

hands that which has best succeeded is prepared of cow's milk mixed with a small quantity of cream, and with water in which a certain proportion of gelatine has been dissolved, in the manner described at page 193. A regimen consisting of farinaceous substances prepared with water alone, or milk and water alone, has not answered in my hands nearly so well as that preparation. It is particularly important that the food should not be made too thick, whatever its ingredients may be. For this reason thick gruels of all kinds, cracker food as it is called, bread and milk, or thick rice and milk, should be absolutely forbidden to children under eight or ten months or a year old. Though I have seen some few children thrive upon such diet, the great majority suffer from frequent attacks of indigestion and simple diarrhœa, or are seized with entero-colitis, and either perish, or make it necessary to change the diet.

The *dress* ought to be arranged according to the season. *Exercise* in the open air is of the utmost importance, so much so, indeed, that every effort should be made to insure a certain amount of it every day. This is, after diet, the most important point in the prophylactic treatment.

Diet in the attack.—After the disease has made its appearance, the diet should be very carefully regulated. This constitutes, in truth, the most important point in the treatment. If the child is nursing, it ought to be confined entirely to the breast, and should the nurse have a large quantity of milk, must not be allowed to nurse very often, nor very long at a time. If there be the least suspicion that the milk of the nurse is unhealthy, it should be examined with the microscope, and if found to contain colostrum granules, a new nurse must be provided. If the disease comes on shortly after weaning, and persists for several days in spite of careful diet and treatment, it is safest to restore the child to the breast. When this cannot be done, we must select that form of artificial diet which seems most suitable. The best is, in my opinion, the cow's milk prepared with the solution of gelatine in the manner already recommended, but made very weak for a few days. I have often found it necessary, under these circumstances, to add four and

even more parts of water to the milk, instead of two or equal parts, as is the usual custom.

In older children the diet, for a few days, ought to consist of nothing but barley or arrow-root water ; after which thin preparations of arrow-root, rice-flour, sago, tapioca, or wheat-flour, made with milk, or milk and water, with small quantities of bread, or, if the child refuse such articles, panada, or very thin chicken or mutton water may be allowed. The quantity of food, whatever it be, ought to be much less than usual, and in very severe attacks must be just enough to sustain the strength of the child, and no more. This system of diet is to be persevered in until the disease is removed, unless the child refuses it absolutely, in which case, we may allow pure milk, small quantities of ice cream, a little bread and butter, and small portions of chicken or mutton, well cooked, and cut up very fine. The return to old habits as the child recovers, or after full convalescence is established, ought to be made carefully and gradually, as there is no disease in which relapses are so apt to occur from neglect of this precaution.

Therapeutical Treatment.—I have found a large number of the mild cases that have come under my notice, all of which occurred in private practice, to recover under very simple treatment. When the patient is an infant at the breast, before the period of dentition, the simple direction not to allow it to nurse as much as usual, the use of a warm bath morning and evening if the skin be heated and the child restless and fretful, the administration of a small dose of castor oil, (half a teaspoonful to a teaspoonful,) or of spiced syrup of rhubarb in the same quantity, with half a drop to a drop of laudanum, followed in one or two days, if the disorder continues, by some simple astringent remedy, generally suffices to effect a cure. When, on the contrary, the case depends on an unhealthy or insufficient milk, when the child subsists entirely on artificial food, and when the disease coincides with the process of dentition, the attack is kept up and aggravated by these causes, and it is more difficult to obtain a cure. In the former case the diet is, of course, of all importance. In the latter, the gums must be carefully examined, and if found to be swelled and inflamed, and the teeth near the surface, should be freely incised. After these

matters have been attended to, the kind of treatment will depend on the character of the general symptoms and the violence of the enteritic disorder. When the fever is violent, the discharges frequent, painful, and mixed with mucus or blood, and the abdomen tumid, tense, and painful to the touch, it is proper to make use of *depletion* in strong and hearty children. When, on the contrary, the child is pale and delicate, it is better, it seems to me, to dispense with bloodletting in any form. In young infants only leeches need, as a general rule, be used. They should be applied over the seat of tenderness, generally one of the iliac fossæ, in such number as to take about an ounce of blood, or in very hearty, sanguine children, two ounces. Dr. Stokes (*Loc. cit.*) is of opinion that it is sometimes necessary to bleed, even in infants, as he has seen the disease resist detractions of blood by leeching, and yield immediately to venesection. When it is impossible to bleed from the arm, he proposes the application of a leech or two to the back of the hand or foot, and then immersing the part in warm water, by which method he states that a considerable quantity of blood may be obtained. In such instances I have always been able to bleed the child from the saphena vein as it runs over the inner malleolus, and would much prefer this plan, because we can readily observe the amount of blood that flows, which cannot be done when the blood is allowed to flow into water. Dr. Stokes recommends a second application of leeches should the first fail to relieve the symptoms. In older children we may substitute venesection for leeching if we deem it better, taking from two to six ounces of blood according to the age and strength of the patient. During the fever the use of *warm baths* at about 96° or 97° will be found of very great service. They should be employed once or twice, or even three times a day, if the heat of skin, frequency of the circulation, and restlessness, continue. It will often be found very beneficial to envelope the child in a warm blanket for half an hour after the bath, as this will sometimes produce fine perspiration.

The internal remedies during the early stage should consist of one or two laxative doses, guarded by small quantities of an opiate; or we may administer what is regarded with great favour by most physicians in this country, *calomel*. When the febrile symptoms are

strongly marked, I believe that this is a very useful remedy in many instances. It is given differently by different practitioners. Some prefer one or two large doses, while others use it in minute quantities, and repeat it more frequently. It seems to me that this ought to depend on the nature of the attack, and the age and constitution of the child. In delicate subjects, and those within the year, I would always prefer to employ small doses, about a quarter or sixth of a grain, to be repeated every two hours until a grain has been taken, after which I would administer a small quantity of castor oil or syrup of rhubarb. In stronger and older children, on the contrary, in whom the attack is violent, it is often more useful to give from one to four grains in a single dose, and follow it by the laxative in a few hours.

Dr. J. Cheyne (*Loc. cit.*) recommends calomel very strongly in the treatment of the disease, which, as has been stated, he calls atrophía ablactatorum. He gave it in doses of half a grain morning and evening, continued for a week or ten days, or until the discharges assumed a more natural appearance. Dr. Stokes (*Loc. cit.*) states that the internal remedies from which he has obtained the most advantage, are a combination of a mild mercurial with Dover's powder, and gummy solutions. The mercurial which he employs is the hydrargyrum cum cretâ.

I am very much in the habit, in all cases of entero-colitis, of administering *opiates* in some form. Some writers object to their employment in the early stage as injurious. I have never been deterred from using them, however, except in cases presenting manifest signs of cerebral irritation in connexion with the febrile symptoms. When there has been nothing more than irritability, restlessness, and insomnia, when there is evident pain during the discharges, and when the latter have been very frequent, I have always made use of such remedies without hesitation, and I believe without injury, but on the contrary, with very great benefit. I am very glad to find that Dr. Stokes also employs opium without hesitation. He says "it is a remedy that requires caution in its exhibition, but one of great utility." It generally lessens the number of discharges, and very often it seems to me, diminishes the heat of skin and frequency of the circulation, by allay-

ing irritability of the nervous system, and at the same time greatly promotes the comfort of the child. I have used it in the form of laudanum or paregoric, given in combination with a laxative early in the case, or by enema, and afterwards in that of the Dover's powder or powdered opium, mixed with calomel. For a child under six months old half a drop of laudanum is enough to give per orem. Of the Dover's powder, about a sixth or eighth of a grain may be administered mixed with the same quantity of calomel, to be repeated every two or three hours until three or four doses have been taken, or until the child shows some degree of drowsiness from the action of the opium, after which it ought to be suspended for six or eight hours, and then resumed. If it is desirable to give the opiate by enema, about one or two drops may be administered in a tablespoonful of thin starch. In cases of older children, the doses must of course be larger. For those more than a year old, about two drops of laudanum may be given with castor oil or rhubarb; or a quarter of a grain of Dover's powder with the same quantity of calomel, or finally, from two to four drops of laudanum by enema. During the acute period of the disease, and particularly when the abdomen is distended and painful, warm mush poultices, made light and thin, placed between pieces of flannel, and applied over that region, will be found very useful and soothing remedies; they should be renewed every few hours.

Generally speaking the acute constitutional symptoms either subside or disappear under the above treatment, and very often the diarrhœa also ceases and the child recovers. When, however, the diarrhœa persists, it is necessary to resort to two other classes of remedies, upon which great reliance is placed in the treatment of the affection. These are *astringents* and *absorbents*, of which the most important are prepared chalk, powdered crab's eyes, acetate of lead, rhatany, kino, and catechu. The chalk may be used in the form of the officinal *Mistura cretæ*, a teaspoonful of which is given after each loose evacuation, or several times a day; when the case is severe, its efficacy is much increased by the addition of tincture of krameria, in the proportion of a drachm to two or three ounces of the mixture, of some opiate preparation, or of ten or fifteen drops of the aromatic syrup of galls (to be described pre-

sently), to each teaspoonful; chalk may be used also with great advantage in powder, combined with Dover's powder, and sometimes with calomel, or in the form of the Hydrargyrum cum cretâ, which is a favourite prescription of many physicians, in the dose of from a quarter of a grain to a grain three or four times a day.

The powdered *crab's eyes* will sometimes arrest cases in which prepared chalk fails to produce any effect. It is generally employed in mixture. The formula which I employ is the following: *R.*—Ocul. cancror. pulv. 3i; Acaciæ pulv. 3ii; Sacch. alb. ̄i; Aquæ fontis, Aquæ cinnamom. āā 3iss. Misce. A teaspoonful to be given four, five, or six times a day. M. Bouchut recommends the following prescription of Hufeland's: *R.*—Ocul. cancror. pulv. gr. x; Aquæ scæniculi, Syrup. Rhei, āā 3ss. Misce. Give a teaspoonful every hour.

Acetate of lead has been highly extolled by many writers in the treatment of the diarrhœas of children. I have had but little experience in its use, and am therefore unable to offer an opinion in regard to the influence which it may exert. It may be given in doses of from a sixth to an eighth of a grain, alone, or combined with chalk or Dover's powder, every two hours. *Krameria*, *kino*, and *catechu* may be exhibited alone, in the form of infusion or solution, or they may be given in conjunction with the chalk mixture. I have frequently employed the tincture of *krameria* in the latter way, and believe it adds very much to the efficacy of the remedy. About one or two drachms may be added to two ounces of the mixture, and the usual dose given. I have used, with much advantage, either alone or with chalk or crab's eyes mixture, an aromatic syrup of *galls*, in the dose of from fifteen to forty drops three or four times a day, or, when the discharges are very frequent, every two or three hours. It is prepared according to the following formula: *R.*—Gallæ opt. pulv. 3ss; Cinnamom. pulv. 3ij; Zingib. pulv. 3ss; Spts. Vini Gall. opt. Oss. Misce. Let the ingredients stand in a warm place for two hours, and then burn off the brandy, holding some lumps of sugar in the flames. Strain through blotting paper. Dr. Eberle (*Loc. cit.* p. 221) highly recommends the root of the *geranium maculatum*. He says it makes an "agreeable and efficient astringent," and is less

apt to derange the digestive organs, and occasion irritation of the mucous membrane of the bowels, than kino. He uses it in the form of a decoction made with milk, by boiling an ounce of the fresh root in a pint of milk, until half is evaporated. The dose is from a teaspoonful to a tablespoonful four or five times a day, according to the age of the patient.

The *nitrate of silver* is highly recommended as a remedy of late years by several writers. It is given both internally and by enema. The modes of administration will be described in the remarks on the treatment of the chronic form of the disease.

Revulsives are often of much service in treatment of this, as of almost all the diseases of childhood. When there is much restlessness and irritability, with heat of the head and trunk, and coolness of the extremities, it will be found that mustard pediluvia, or sinapisms to the extremities, often allay these symptoms and greatly comfort the little patient. When the abdomen is tense and painful and the discharges preceded or accompanied by movements or crying indicative of pain, the application of a poultice of mush and mustard from time to time, to be followed by a simple mush poultice, sometimes acts very usefully.

Tonics and stimulants are often necessary in weak and delicate children from an early period in the attack, and in those who are stronger, after the disease has lasted for some time, and the acute symptoms have ceased, and been followed by weakness and exhaustion. The best tonic is, probably, *sulphate of quinine* in doses of from a quarter of a grain to a grain three times a day, continued for one, two, or three weeks, if necessary. Old *brandy* has answered better in my hands, as a stimulant, than wine, wine-whey, or any of the tinctures. It may be given to the youngest children in doses of five or six drops every two hours, or a teaspoonful may be added to a wineglassful of sweetened water, and a teaspoonful given whenever the child will take it. I have been obliged, in several cases, to continue the use of the brandy for three, four, and five weeks. At the time when we are obliged to resort to this class of remedies, it is almost always necessary also to pay attention to the improvement of the diet.

The proportion of milk to water ought to be increased, if it has been small heretofore; and we should employ every means to induce the child to take a sufficient quantity without overloading the stomach. At this stage small quantities of animal broths are proper, or the child may be allowed to suck pieces of juicy meat, or to eat very finely minced meat of chicken or mutton. The diet is in fact a most important part of the treatment at this period. Dr. Stokes says of it that "many children are lost by the practitioner neglecting this point."

Treatment of chronic entero-colitis.—The management of the hygiene of the patient is more important than any other part of the treatment, in this, as in nearly all the diseases of the digestive organs in children; for cases will often recover when the diet, drinks, and exercise are properly regulated, without the use of any drugs whatever, whereas, most assuredly, none or but a very small proportion of them would terminate favourably under the best and wisest therapeutical medication, were the hygiene of the child entirely neglected. The remarks that have been made as to the diet most proper in the acute form will apply here. If the child has been weaned only a few weeks before the time at which we are consulted, and the case is at all serious, it is better to advise the procuring of a wet-nurse. I have several times known cases of the disease which had resisted the most carefully managed artificial diet and therapeutical treatment, recover in a few days after the child had been restored to the breast. It is often, however, impossible to follow this course, from the refusal of the parents to obtain a nurse, or of the child to take the breast of a stranger, and we are obliged to rest content with artificial food. I believe that the kind of diet which suits the largest number of children is one of milk. Within upwards of a year I have found the gelatine food already described, to answer better than any that I have ever essayed. It ought to be made very light and thin. About a scruple of gelatine should be dissolved by boiling in half a pint of water. Towards the end of the boiling, a gill of cow's milk and a teaspoonful of arrow-root made into a paste with cold water, are to be stirred into the solution, and from one to two tablespoonfuls of cream added just at the termination of the cooking. It is then to be sweetened moderately

with white sugar, when it is ready for use. The whole preparation should occupy about fifteen minutes.

When cow's milk, mixed with water alone, or prepared in the manner just recommended, evidently disagrees, I have sometimes found cream with water alone, or better still, with the solution of gelatine in water, in the proportion of one part of cream to five or six of the latter, to suit very well. In other cases, very carefully prepared chicken or mutton water, given several times a day, or but once, according to the taste and fancy of the child, will answer better. It sometimes happens that the child will refuse everything that has been mentioned, and yet the prostration and emaciation are such as to make it essential to procure some aliment that it will consent to take. I have, under such circumstances, given small portions of bread and butter, or stale sponge cake, with weak brandy and water, if the child is old enough to swallow solid food. Sometimes it will eat small quantities of meat, and when this has been the case, I have not hesitated to allow a chicken bone, with a little meat attached to it, or a piece of ham, or better still, a portion of roast beef, or of the tender loin of beef-steak, to be held in the hand and sucked; or we may give the white meat of chicken cut up very fine, or torn into the finest shreds. Of the latter about a teaspoonful is sufficient for the first day, given with a little brandy and water. The quantity can be gradually increased afterwards. There is another article which I have sometimes given when children have been exhausted for want of food, and when they require constant change in order to be tempted to take it. This is the yolk of a *hard*-boiled egg, which has the great advantage of being very nutritious if digested, and of not being injurious, should it happen to pass into the bowel in the crude state, as it falls into a state of fine powder, which is not irritating to the mucous coat.

The quantity as well as quality of the food is of the utmost importance, and should be strictly regulated by the physician, and attended to by the mother or nurse. As a general rule the child may be allowed as much as it wants of proper food, since the appetite is almost always greatly diminished, and it is not likely therefore, that too much will be taken. If, however, there is disposition to nausea or vomiting, or, if the appetite remains as

good as usual, the quantity must be restricted. The difficulty in most cases is to get the patient to take enough, and not to prevent it from taking too much, for I have very often ascertained upon careful inquiry, that the quantity was entirely too small to support the strength of the constitution. A hearty child, six months old, fed solely on artificial food, will generally take between a pint and a quart of fluid in the twenty-four hours, while at a year old, it will take usually fully a quart or more of fluid nourishment, besides eating small quantities of solid food. Now, I have frequently known children labouring under chronic entero-colitis, not to take more than one or two gills of food in the day, which is manifestly much too little. When this is the case, therefore, we should always endeavour to stimulate the appetite and digestion by means of tonics and stimulants, and by causing to be presented to the child such a variety of food as may entice it to take a larger quantity than before.

The *therapeutical treatment* of the chronic form consists principally in the administration of tonics, astringents, and absorbents. Of these the most important are the powdered chalk and crabs'-eyes, and the different vegetable astringents, which have already been noticed in the remarks on the acute form. These are to be given in the manner there recommended, and it is therefore unnecessary to repeat what has already been said. In addition to these there are some remedies which are particularly adapted to the chronic form of the disease. Amongst them are *nitrate of silver*. Dr. Eberle (*Loc. cit.* p. 251) says he has found its internal administration to produce the happiest effect in a few instances. His prescription was a grain of the nitrate dissolved in an ounce and a half of gum arabic water, with the addition of twenty drops of laudanum. The dose was a teaspoonful three times a day. He adds that he has never "known the slightest inconvenience to result from the use of this article in chronic mucous inflammation of the bowels, when administered in a mucilaginous solution and in very small doses." It has been much used of late years in France. MM. Trousseau and Pidoux recommend its internal use in the chronic diarrhœas of children occurring during dentition, after bismuth, powdered crabs'-eyes, and diet have failed to effect a

cure. Their formula is as follows: **R.**—Argent. nitrat. gr. $\frac{1}{3}$; Aquæ destillat. 3vi; Syrup. sarsp. 3iiss.—Misce. To be given in eight or ten doses. At the same time they employ an enema composed of a grain of the nitrate in three ounces of distilled water. It is highly recommended also in these cases by Hirsch of Königsberg. His formula is as follows: **R.**—Argent. nitrat. crystall. gr. $\frac{1}{4}$; Aquæ destillat. 3ii; Acaciæ pulv. ʒii; Sacch. alb. 3ii.—Misce. A teaspoonful of this mixture to be given every two hours, and an enema, consisting of a quarter of a grain of the salt, with mucilage and a little opium, to be administered. (*Ranking's Abst.* No. vi, p. 61.) I have employed this remedy in the proportion of from half a grain to a grain in a gill of water, by injection, morning and evening for several days, with very decided benefit, in three cases of diarrhœa following summer-complaint, in which the stools were frequent, mucous, sometimes streaked with blood, and accompanied by tenesmus. Trousseau and Pidoux also recommend in this class of cases the *sub-nitrate of bismuth* in the dose of from two to nine grains in the twenty-four hours. It may be given in powder, or suspended in syrup or milk. Bouchut recommends injections of from ten to twelve grains of extract of rhatany, or six to ten of tannin in about five or seven ounces of some vehicle.

Drs. J. Cheyne, Eberle, Dewees, and Condie, all recommend calomel in the treatment of the chronic disease. I am of opinion that it is often useful when given in very minute doses ($\frac{1}{6}$ to $\frac{1}{10}$ of a grain), in combination with Dover's powder, three or four times a day, for three or four days, after which I would rather depend on astringents combined with opiates, and upon the use of injections of nitrate of silver. I have in several cases derived considerable benefit from the use of Hope's camphor mixture given in the dose of from five to fifteen drops three or four times a day in water.

It should never be forgotten in the treatment of chronic diarrhœa in children, that the most important point of all is the regulation of the diet and other hygienic conditions. I am fully convinced that I have seen several children saved from death by attention to these points, and by the persevering and careful em-

ployment of tonics and stimulants. It often happens, after the disease has lasted for some weeks or months, that the function of the stomach is almost wholly lost. The child either refuses food or takes so little that the quantity is evidently insufficient to carry on the vital processes, or the greater part of what it takes is rejected by vomiting, or lastly, much of it passes off through the bowels, and appears in the stools in an undigested state, forming what is called lientery. If this condition of things is allowed to continue the emaciation and exhaustion make rapid progress, and the case must soon terminate fatally. Under these circumstances all the ingenuity and skill of the physician are required to find means to restore vigour to the digestive function, and to recall the appetite of the patient. If the stomach is frequently sick it is best to abandon all remedies but those which are stimulating and strengthening, and especially to forbid all such as are in the smallest degree nauseous. I would indeed depend entirely on the use of repeated doses of the oldest and most delicate brandy that could be found, of which from one to two teaspoonfuls may be put into a wineglassful of cold water, and the whole given by teaspoonfuls in the twenty-four hours. At the same time, the food ought to be chosen with the greatest care, endeavouring always to please the fancy of the child as much as possible, and it should be given in *very small quantities* often repeated. While this is being done, an occasional dose of anodyne, just enough to tranquillize without stupifying, may be given. If the rectum will retain it, it is better to give it by enema. In some cases I have found the aromatic syrup of galls given with brandy, to be taken by the child without any difficulty or disgust.

Exercise and exposure to the air are all-important. In some very severe and tedious cases, change of residence or travelling has been known to effect a cure after all remedies and other means had failed. In one case, in this city, which had lasted with but short intervals for two years, I obtained a perfect cure by persuading the parents to send the child into an elevated part of the country in the month of May, where it was kept until July, after which it was removed to the seaside until the end of August. Nothing was done in the mean time except to regulate the diet

most carefully, and to keep the child the greater part of the day in the open air.

ARTICLE III.

CHOLERA INFANTUM.

Definition ; synonymes ; frequency.—Cholera infantum can be defined only by an enumeration of its characteristic features. These are its occurrence in very young children, and in the summer months ; the evidences in the early stage of violent irritation and hypersecretion of the gastro-intestinal mucous surface, and at a later period of inflammation, ulceration, softening and thickening of the same surface, particularly of the ileum and large intestine ; its chief symptoms are vomiting and purging ; fever, generally of a remittent type, varying often with collapse ; rapid emaciation ; and towards the close, violent cerebral symptoms.

The common name of the disease is summer complaint. Though rare in Europe, in comparison with its frequency in this country, it is nevertheless described with sufficient accuracy to point out a clear identity of the two, by Billard, under the title of follicular enteritis ; by Barrier, under that of apyretic and febrile follicular diacrisis, the latter term being taken from Gendrin ; and by Copland under that of choleric fever of infants.

It is of all the diseases which prevail amongst children in this country, one of the most frequent and important. It appears from Dr. Emerson's tables (*Am. Journ. Med. Sciences*, vol. i, 1827), that from 1807 to 1827, a period of twenty years, there were 3576 deaths from cholera under five years of age. This is the largest number of deaths, from any one disease, given in the table. The next largest item of mortality is under the head of convulsions, of which it appears that 3192 died in the same period of life. From Dr. Condie's table (*Dis. of Children*, note, p. 89), it appears that during the ten years preceding 1845, there were 2583 deaths from cholera infantum, all of which occurred under five years of age. During the same period of years there were 2712 deaths from convulsions in children under five years of age, and 1452

from pneumonia. Cholera infantum, therefore, causes about as many deaths as convulsions during the first five years of life, and considerably more than pneumonia. Again, if we compare the respective mortality from the three diseases named, which appear by the above tables to be the most destructive during the period of childhood, or under fifteen years of age, we find the proportion not much altered; for, while there were 2583 deaths from cholera infantum, there were 2824 from convulsions, and 1592 from pneumonia.

Causes.—The most influential *predisposing causes* are the heats of summer, the impure air and want of ventilation of cities, dentition, improper diet, early age, and hereditary influence.

Heat.—That the heats of summer, constitute a powerful predisposing cause to the disease is proved by the evidence of almost all writers, and by the fact that the disease occurs in its most characteristic and peculiar form only during the warmest months of the year. Dr. Lindsly (*Am. Journ. Med. Sci.* vol. xxiv, 1839) gives a table showing the deaths from the disease in Washington city, in the five months of June, July, August, September, and October, of 1837 and 1838, from which it appears, that in the former year there were 4 deaths in June; 10 in July; 14 in August; 3 in September; and 2 in October: in the latter year there were 2 deaths in June; 15 in July; 22 in August; 14 in September; and 2 in October. I regret that the deaths per month from the disease are not given in the tables of Dr. Emerson, or in those of Dr. Condie. It is universally agreed, however, that the disease is most frequent and fatal in the months of July and August, that it is much less so in June and September, and that in May and October it is seldom met with. That it is not the heat of the season alone, however, is proved by the fact that the disease is less frequent and fatal in some of the southern cities of our continent than in New York and Philadelphia. It is proved also by the following table, the materials of which I obtained from the paper of Dr. Emerson (*Loc. cit.*)

Year.	Mean temperature of the three summer months for each year.	Total deaths from cholera in each year.
1815	76° F.	92
1819	"	246
1818	74°	196
1811	"	224
1817	"	130
1813	72°	173
1812	70°	154
1814	"	125
1816	"	87

The table is imperfect, because I have been obliged to take the whole number of deaths from cholera at all ages for each year, and compare them with the mean temperature of the three summer months of the same years. It is not, however, so imperfect as this would at first view make it appear, since the vast majority of the returns under the head of cholera in the table of Dr. Emerson, are in fact cases of cholera infantum. This is shown by the fact that of 3812 deaths from cholera in the twenty years from 1807 to 1827, (including the nine years in the above table,) only 236 were of persons over five years of age, and of course all the rest (3576) were of children, and therefore, cases of cholera infantum.

The table shows that the number of deaths is not in proportion to the mean heat of the season, since in 1815, when the temperature averaged 76°, there were only 92 deaths, being only five more than in 1816, when the mean heat was but 70°.

It would seem that in order for heat to produce the disease to a great extent, it must be combined with the close, impure air of cities. The disease prevails most in the low, thickly inhabited, dirty, and badly ventilated streets and lanes of cities, in which the atmosphere is loaded with exhalations and effluvia; while in the country, at the distance of but a few miles from a city in which it prevails extensively, it is comparatively very rare, except in children removed from the city.

Dentition.—I believe this to be a most powerful predisposing cause of the disease, and yet it would seem to be less influential than age, for the tables of Drs. Emerson and Condie show that the disease is about twice as fatal in the first year as in the second,

though the process of dentition is certainly more active and continuous in the second than in the first year. I have rarely observed the disease before the beginning of the process of dentition, and it is certainly very rare after its completion.

Age, as has just been stated, exerts a strong influence in the production of the disease. In the tables of Dr. Emerson, the cases of cholera infantum and cholera morbus, are included under the one head of cholera, but as all cases of the disease under five years of age are called cholera infantum, the want of the distinction does not make the statements less useful to us. From them it appears that there were 2122 deaths in the first year, 1186 in the second, and only 268 between the second and fifth. Between five and ten years, only 52 cases are noted, and these would of course be entitled cholera morbus. Dr. Condie reports 1706 deaths in the first year, 752 in the second, 125 between two and five years, and nine after that age.

Sex.—There are no means of ascertaining the exact proportion in which the disease occurs in the opposite sexes. Of 24 cases, however, of which I have kept a record, 14 occurred in males, and 10 in females.

Constitution.—The disease is most apt to occur in feeble, delicate children, and in those of nervous, irritable temperament.

Diet.—There can be no doubt that the deprivation of the breast, and the use of artificial diet often predisposes to the disease. Indeed, weaning in the summer, and the resort to artificial food, is often an exciting cause, the disease making its appearance not unfrequently very soon after the change has been made. M. Barrier states that the use of feculent substances, often ill cooked or sweetened with too much sugar, as diet, is one of the most frequent causes of the follicular diacrisis of young children. This agrees exactly with the opinion of M. Valleix as to the most evident cause of the enteritis and thrush, so fatal amongst the children of the Foundling's Hospital at Paris. He states it to be *improper alimentation*, and particularly one consisting of feculent materials. He adds that he has never known a child nourished exclusively at the breast during the early months to have the disease. (*Guide du Med. Prat.* t. iv, p. 60.) The use of too indiscriminate a diet

during the second year is another frequent cause of the disease. I have several times known it to follow the giving a child the smallest quantity of fruit. For a more detailed account of the influence of diet in the production of diseases of the intestines in children, the reader is referred to the article on entero-colitis.

Hereditary predisposition.—My own observation leads me to believe that the disease is apt to occur in certain families. It would seem probable that this peculiarity, if it exists, must depend on the fact that the constitutions of some families are particularly disposed to disorders of the digestive apparatus. I am acquainted with one family in this city, in which eight out of ten children, suffered more or less from the disease. Again, of these children, four have grown up, married, and have children. Two of these families have each lost a child from the disease; in a third, the two children of the family have been exceedingly ill with it; while in the fourth, some of the children have been sick, though not to the same degree. Again, I have attended this summer (1847), two children in a family, one not quite two years, and the other three months and a half old, who have both been very sick with the disease. The elder child was ill the summer before in the same way. The mother of these children was herself very ill with the disease on several occasions during her infancy, as was also her brother.

Anatomical lesions; nature of the disease.—The best accounts of the anatomical lesions observed after cholera infantum will be found in Stokes and Bell's *Practice* (2d edit. vol. i, p. 474-483); in Dr. William E. Horner's paper (*Am. Journ. Med. Sciences*, Feb. 1829); and particularly in Dr. E. Hallowell's article on *Endemic Gastro-follicular Enteritis*, in the same journal for July, 1847.

The nature of the lesions depends on the severity of the case, and the stage at which the fatal event took place. When death occurs early, the only lesions found are unusual development of the mucous follicles or glandular apparatus of the stomach and bowels, implicating chiefly the isolated glands, and in a smaller number of cases the agminated glands or plaques of Peyer. In severer cases, and those which have lasted longer, the lesions observed are more important, and consist in inflammation and soften-

ing of the mucous membrane, and ulceration of the follicles, sometimes to a great extent.

Having already described with considerable minuteness, in the article on entero-colitis, the morbid alterations of the follicular apparatus of the gastro-intestinal canal, I shall not repeat the description in the present place, but merely allude to the alterations by name, referring the reader for a more particular account to the former place. The description of the lesions of cholera infantum which follows, is derived from the analysis of seventeen autopsies of the disease, three of which were made by Professor Horner of this city, and fourteen by Dr. Hallowell, (*loc. cit.*)

Stomach.—The mucous membrane presented traces of inflammation, in the form of arborizations or injection in 6 cases, while in 10 the colour was noted as pale or natural. Softening to a greater or less extent was noted in 10 cases; in 4 the consistence was natural; in 3 it is not mentioned. The condition of the mucous crypts is given in 6: in one not apparent; in one scarcely visible; in one slightly developed; in 2 distinct, but not much developed; in one largely developed.

Small intestine.—Traces of inflammation of the mucous membrane were noted in 7 cases, confined generally either to the duodenum or ileum, and affecting only a small extent of the bowel; in 9 the membrane was noted as pale; and in one its appearance is not mentioned. Softening existed in 5 cases, slight in all; in 7 the consistence was natural, while in the remainder the consistence is not mentioned. The isolated crypts are noted as numerous and distinct in 2 cases, as slightly developed in 9, as distinct in the ileum, and not in other parts in 2, and in the duodenum in one; in 3 their condition is not mentioned; in 2 only they were slightly ulcerated. The *agminated* glands are stated to have been natural in 6; they were more developed than usual, and generally reddened, in 6; in 5 their condition is not given; they were not ulcerated in any of the cases.

Large intestine.—The condition of the mucous membrane as to inflammation is not mentioned in 2 cases; in 9 it is stated to have been more or less inflamed throughout; in 2 the inflammation was confined to the rectum or the lower part of the colon; in

4 the inflammation was slight, and in 2 of these existed only around the follicles. The consistence of the membrane is not mentioned in 6; it was found more or less softened in 9, thickened in one, and normal in one. The *muciparous crypts* are stated to have been developed, without any reference to the presence or absence of ulcerations in 3 cases; to have been developed with a few ulcerations in 3; much developed with many ulcerations in 7; and finally to have been developed and not ulcerated in 4. The character of the ulcerations is not mentioned in all the cases. In some it extended to the sub-mucous tissue, and in a few to the muscular. The ulcerations of the crypts are generally most marked in the rectum.

The stomach often contains a good deal of mucus adhering to the lining membrane; the small intestines contain orange-coloured mucus; while the large bowel generally contained mucus adhering to the inner coat, and a good deal of thin faecal matter of a grayish colour.

Dr. Hallowell (*Loc. cit.* p. 49) states that in patients who died during the second stage, that is, before the appearance of dangerous cerebral symptoms, the lungs presented nothing remarkable beyond a slight engorgement posteriorly, except in three cases in which the children had had measles or whooping-cough, and one in which pleurisy had followed exposure to the night air. "The peritoneum presented its usual healthy colour in all the cases observed; the liver was greatly enlarged in but a single instance, contrary to the statements of most authors, who affirm this to be uniformly the case; the gall bladder was more or less distended with dark-coloured bile, staining the finger a deep yellow; the mesenteric glands were not enlarged; the spleen and kidneys presented nothing remarkable." In regard to the brain he states that in most of the cases the veins of the pia mater were more or less distended, and the membrane injected also, but that the injection was generally confined to the larger ramifications; the substance of the brain presented injection of the central portion in one, and of the central and cortical portions both in another; there was softening in four cases, and little or no effusion in the ventricles. In patients dying in the third stage, with stupor, convulsive movements, rigidity or paralysis, there were found, in addition to the morbid

appearances already described, disorganization of the structure of the brain from softening of its tissue. The softening, sometimes general, was more frequently confined either to the cortical substance, or to the central portions of the brain and cerebellum. The softening may be such that the brain will readily give way on slight pressure, or its substance may be so diffuent as to resemble cream. The substance of the brain commonly presents numerous red spots from effusion of blood; the pia mater is more or less injected and its veins much distended; and there is in some cases, but not in all, serous effusion into the sub-arachnoid tissue, and lateral ventricles.

Nature of the disease.—It was for a long time supposed that cholera infantum was peculiar to this country, and widely different from any malady reigning amongst children in Europe. Its real nature was very imperfectly understood until within a few years, when the researches of Dr. Horner showed that it resembled very closely the follicular enteritis described by Billard in his work on children. Dr. Hallowell, in his recent and valuable paper, which I have so often quoted, gives it the title of endemic gastro-follicular enteritis, and regards it as a disease chiefly of the follicular apparatus of the digestive canal. After careful study of some of the most important European works upon the diseases of children, after close comparison of these descriptions with those given by our own authors, and with my own observations, I am led to the conclusion that cholera infantum or summer complaint is the same disease, with differences of frequency, severity, and fatality, as that described by Billard as follicular enteritis; by Barrier as follicular diacrisis, apyretic, febrile, and complicated; and by the authors of the *Bibliothèque du Médecin Praticien* under the title of "enteritis of children," including in that term inflammation, softening, diarrhœa, and diacrisis. Rilliet and Barthez also describe most of the symptoms and anatomical lesions of the disease in their chapter on inflammation and softening of the gastro-intestinal mucous membrane. Let me state, however, that though I believe cholera infantum to be the same disease as to its real nature as those just mentioned, it differs from them greatly in frequency, severity, fatality, and in the circumstance of a larger por-

tion of the gastro-intestinal mucous membrane being affected than is usual in the milder cases observed in Europe, in which smaller portions of that membrane are generally implicated.

From the description of the anatomical lesions already given, it appears that the most characteristic and constant morbid alterations are *development* and *ulceration* of the follicular apparatus of the stomach and bowels. The mucous crypts are stated to have been much developed in the stomach only in one instance, and slightly developed in three. They were not ulcerated in any. In the small intestine they were more frequently affected, having been found numerous and distinct in two cases; distinct only in the ileum in two, and only in the duodenum in one; and as slightly developed in nine. In two only were they slightly ulcerated. Of 14 cases, therefore, in which their condition in the small intestine is mentioned, they were much developed only in two, and ulcerated in the same number. In the remaining cases, the alterations were slight, or observed only over a small part of the bowel, generally in the ileum or duodenum. The agminated glands were natural in 6 cases, more developed than usual, and generally reddened in 6, and not ulcerated in any. Of 12 cases, therefore, in which their condition is described, they were developed in half, and natural in the remainder. In the large intestine the crypts are stated to have been developed in all the 17 cases. In 10 of these they were ulcerated, in 4 not ulcerated, while in the remaining 3 their condition as to ulceration is not mentioned. To recapitulate: the follicles are noted as having been developed in the stomach in three cases, as ulcerated in none; in the small intestine they were numerously developed in two cases, more slightly so in twelve others, and slightly ulcerated in two; in the large intestine, they were developed in all, and of 14 in which their condition as to ulceration is mentioned, that lesion was noted in 10. It is clear, therefore, that the follicular disease is most constant and extensive in the large intestine, less so in the small bowel, and but seldom present in the stomach.

As to *inflammation* of the mucous membrane, we found that of 16 cases in which the state of the membrane was noted in the stomach, that lesion was present to greater or less extent, gene-

rally very slight in 6, while in 10 the tissue was pale and natural ; of 16 cases in which its condition is noted in the small intestines, it was found inflamed, usually in the duodenum or ileum only, in 7, while in 9 it was noted as pale ; the condition of the mucous membrane of the large intestine as to inflammation is mentioned in 15 cases, in 9 of which it was more or less inflamed throughout, in 2 the inflammation was confined to the rectum, in 4 it was slight. Inflammation was observed much the most frequently and extensively therefore in the large intestine, only half as frequently in the small intestine, and to a much slighter extent, and in a rather smaller proportion of cases in the stomach.

Softening existed to a greater or less extent in the stomach, in 10 out of 14 cases in which the condition of the mucous membrane as to that lesion was noted ; of 12 cases in which it was sought for, in the small intestines, it was present in 5, slight in all, while the membrane was natural in the other 7 ; of 11 cases in which it was noted in the large intestine, it was present in 9, absent in 1, while thickening existed in the remaining case. Softening existed in the stomach and large intestine in about three-fourths of the cases, and in the small intestine in rather less than half the cases.

As to the other abdominal organs, it was ascertained that the liver, which has been thought by many authors to play so great a part in the pathology of the disease, was much enlarged only in one case ; and that the mesenteric glands, spleen, and kidneys were healthy. The brain, on the contrary, generally presented some injection of the membranes, and in most of the cases which proved fatal in the third stage, there was extensive disorganization of its substance from softening.

For my own part, I am disposed to believe that cholera infantum is a disease of the mucous membrane of the alimentary canal, which, beginning with morbid development of the mucous follicles or crypts, independent of *evident* inflammation, occasions first supersecretions from those organs, and after a time runs into inflammation and its results, ulceration, softening, and thickening. That it is not an inflammation in the beginning, is, it seems to me clear, from the nature of the anatomical lesions, and from the facts that the

early stage is often unaccompanied by any febrile movement whatever, and is not unfrequently attended with disposition to collapse, like that which occurs in the cholera of the adult; but that it becomes an inflammation, after the development of the follicular apparatus has lasted a short time, is also, I think, apparent, from the nature of the anatomical lesions and from the circumstance that there is always more or less violent febrile reaction after the first few days.

Symptoms.—The *invasion* of cholera infantum is extremely irregular in its mode of manifestation. It may be sudden or gradual. When sudden, the child is attacked with diarrhœa, while apparently in good health, and either simultaneously, or within a few hours, with more or less violent vomiting. I have known a child put to bed early in the evening, seemingly well, to wake at ten o'clock and have twelve large, fetid, fluid evacuations before morning, and then pass through a regular attack of the disease, lasting ten days. Much more frequently, however, the invasion is gradual, and the disease begins with slight diarrhœa, which makes its appearance after the child has shown unusual fretfulness, irritability, restless sleep, and some loss of appetite for one or two days. Most authors agree that the disease generally begins with diarrhœa, which after a few days or even longer time, is associated with vomiting. Of 20 cases that I have seen in which the mode of invasion was noted, it began with diarrhœa, and was associated with vomiting, in from two to five days after, in 11; in 3 the invasion was sudden, vomiting and purging coming on almost simultaneously; in 6 there was no vomiting, or the child merely rejected doses of medicine which disgusted it. In sudden and violent cases, the vomiting and purging are attended with the usual signs of exhaustion; quick, small pulse; coolness or coldness, with paleness of the surface; altered countenance; extreme languor, and all the signs of severe illness.

In slight cases there is no fever at first, and the child, though more peevish and irritable than usual, can be amused and diverted at times. In severer attacks there is often a febrile reaction from the beginning; while in very violent cases, the earliest symptoms are those of collapse, which is generally soon followed by intense

heat of the head and body, very frequent, tense pulse, which subside after some hours, to give place to a more or less complete remission, or to a return of the state of collapse.

As the *diarrhœa* is the most important symptom of the disease, it is necessary to trace its characters with as much accuracy as possible. The first change in the appearances of the stools is that they become more frequent, abundant, and fluid, than natural. They retain their homogeneous appearance, but change from the dark orange colour which they present in health, to a lighter yellow, like that of the yelk of egg, and begin to contain spots of a greenish colour. As the case goes on, the green tint generally increases, until the whole of the discharge is of that colour, so that it looks like chopped spinach. This is usually the predominant colour of the stools after the first few days. There is often mixed with the other materials constituting the discharge small whitish lumps, which are undigested portions of caseum. Sometimes they contain small quantities of fæcal matter also. Their *consistence* varies greatly, according to the stage, severity, and duration of the case. At first pasty and mush-like, they become after a time semi-fluid, with more consistent portions intermixed; the fluid parts running through the napkins and clothes of the child, and leaving merely yellowish and greenish, or whitish grumous particles upon the napkin; while in other cases they are completely serous and leave no solid portions whatever upon the napkin. The *odour* is very characteristic in severe cases. It is excessively fetid, so as to render it almost impossible to cleanse the child from it, and making it often absolutely necessary to open the windows in order to get rid of it. I have known it so bad as to produce sickness of stomach in a delicate person. It is impossible to describe it except by saying that it is putrefactive in character. This peculiar odour almost always coincides with copious watery stools, of a dark-brown colour. In other cases the odour is unpleasant, but much less strongly marked, or it may be acid, or again the discharges may be entirely inodorous. The *quantity* varies greatly. In severe cases it is much more abundant than usual, and is sometimes very large indeed, particularly in the early part of the attack. At a later period the quantity is generally less, and sometimes amounts to a slight stain upon the napkin only. In some of the

cases the stools assume a dysenteric character, containing mucus mixed with blood in greater or less proportion, in addition to the matters above described.

During the acute stage of the disease the child evidently suffers from *pain* in the bowels. This is shown by fretting, uneasiness, restlessness, and crying, for some time previous to a discharge, and by crying and sometimes violent screaming and tenesmic straining at the moment of the evacuation. This is particularly apt to be the case when the discharges contain blood or mucus, showing severe disease of the colon or rectum.

The *number* of stools is generally about six or ten in the day, though in bad cases they may be much more frequent. I have rarely met with more than twenty or twenty-five as the highest number.

The substances *vomited* consist of the contents of the stomach mixed with mucous and bilious matters. The frequency and violence of the vomiting differ greatly, according to the severity of the case. Sometimes it is very distressing and frequent, so that everything is rejected as soon as taken, and with great violence; at other times there is frequent retching and efforts to vomit, though there may be nothing upon the stomach; while in other instances again it occurs only two or three times a day. It seldom continues to a great extent more than two or three days, after which it ceases entirely, or recurs only at long intervals, and particularly after the child has been allowed to take too much food or drink at one time.

The disease is almost always accompanied by a *febrile movement*. The period at which this occurs, and its degree, depend on the severity of the attack. In bad cases, attended with much diarrhœa and occasional vomiting, it is almost always considerable, and sometimes violent; whilst in those which are milder it seldom appears until some days after the invasion, and is slight. It is almost always of the remittent type, the exacerbation occurring in the afternoon and evening. In very mild cases there may be none, or it may consist merely of slight quickness of pulse, a little heat of skin, and unusual restlessness at night. The pulse in mild cases retains its regularity, and its volume and tension continue

natural. In severe cases it is quickened from the first, and as the disease progresses, becomes very frequent, rising to 130, 140, 150, or more, and is at the same time small, quick, and tense. It becomes feeble, rapid, and sometimes intermittent, in cases threatening a fatal termination. The skin is generally dry and warmer than natural at all times, and becomes hot during the exacerbation. The heat is not usually equal over the whole surface. In very slight attacks it often affects only the hands and feet, while in most of the cases the head and abdomen, particularly the latter, are the hottest parts, whilst the extremities, especially the inferior, are natural, or cool. In sudden and severe cases, the temperature of the whole surface often falls below the natural standard, and the extremities are so cold as to require artificial means to keep them warm. Under these circumstances the surface is always pale, and there is usually some moisture upon it; the pulse is quick and feeble, the expression languid and exhausted, and there is indeed every sign of collapse. It not unfrequently happens that the state of collapse alternates with more or less violent febrile exacerbations, in which the surface regains its colour, the face becomes flushed, the skin hot, and the pulse fuller, stronger, and less frequent. The respiration varies according to the degree of the reaction. It rises to 40, 50, or 60. Dr. Hallowell states that when over 30, it is more or less interrupted.

The *countenance* is scarcely altered in slight cases or in the early stage of any. As the disease increases it becomes anxious and distressed, and is flushed during the exacerbations, and pale in the remissions. In sudden and severe attacks it is exceedingly languid and subdued, pale, and contracted; in protracted cases the features become thin and shrunken, the eyes are inanimate and sunken, the skin hangs in folds about the face, and the lips are thin, dry, and fixed. The *nervous system* reveals by various symptoms that it is more or less disturbed in its functions. At first the temper only is changed. The child becomes irritable, peevish, and cross, and cries or frets at the least contradiction or without cause. The sleep is restless and disturbed from the first, especially during the nights. The child wakes frequently, and almost always with crying; when asleep, its eyes are often

but half closed, the brow is contracted and frowning; it turns and twists, and moans or cries out as though in pain or distress. Towards the termination of fatal cases drowsiness or stupor are very apt to take the place of jactitation.

The *appetite* is diminished in mild, and entirely lost in severe cases, except in children at the breast, who sometimes nurse with avidity, probably from thirst. The *thirst* is generally intense, especially when the febrile reaction is considerable. In some few cases, however, it is not present. The *mouth* is usually warm, and the *tongue* moist at first, and coated with a whitish, yellowish, or brownish-yellow fur. Later in the disease the tip and edges become red, and in chronic cases the whole tongue often acquires a dry, red, smooth, or polished appearance. In those which tend to a fatal termination it often becomes dry and incrustated, and is sometimes covered with aphthæ.

The *abdomen* is rarely tumid or tender to the touch in the beginning, except when the disease is very severe, and the invasion sudden. At a more advanced stage it almost always becomes tympanitic and tense, and sometimes, though not always, when carefully examined, is found painful on pressure. It is evident in most cases of any severity, from the drawing up of the inferior extremities, the twisting and turning of the trunk, and the crying of the child, that the evacuations are attended with more or less pain.

Unless the attack be very slight and of short duration, there is always manifest *emaciation*. When the disease is grave the emaciation makes rapid progress in a very few days; and in slow, tedious cases, it is one of the most marked symptoms. The skin under these circumstances is dry and harsh; it assumes a wilted appearance, and hangs in folds about the neck, and especially over the internal surfaces of the thighs. The emaciation is sometimes excessive,—as great it seems to me, as in any other disease. About the time that the excessive emaciation described takes place, there often appears œdema of the feet, and sometimes a bloated condition of the face. Simultaneously with the emaciation and œdema, aphthæ often appear on the tongue, cheeks, gums, roof of the mouth and pharynx; the anus is excoriated by the acrid dis-

charges, and petechiæ sometimes make their appearance upon the skin, especially the parts on which the patient rests. The fatal event is almost always preceded by symptoms indicating violent disease of the brain. These are drowsiness, passing into stupor and coma; chewing motion of the under jaw, or, as I have several times witnessed, a disposition to rigid contraction of that part; rolling of the head from side to side; and convulsions, either general or local, which are followed by rigidity or paralysis of some of the limbs, or by irregular automatic movements of different parts of the body.

The *duration* of cholera infantum is exceedingly uncertain. Dr. Eberle (*Dis. of Children*, p. 285,) says it sometimes runs on to a fatal termination in five or six hours. The most rapidly fatal case that I have met with lasted nine days. It often continues for weeks or even months. It is not uncommon for a child to be seized with the disease in June, and continue more or less sick until the following October, or November, and in some few instances it continues to have diarrhœa, from functional derangement of the bowels, or entero-colitis, the greater part of the winter. The attack is very apt to last two or three weeks, until some change in the weather occurs, or the residence of the child is changed.

Diagnosis.—The diagnosis of cholera infantum requires no particular elucidation. The season at which it occurs, the age of the patient, the concomitance of vomiting and purging, the nature of the evacuations, and the course of the affection, render it easy of recognition. I have already stated that I believed the disease to be at first, a simple choleric irritation of the digestive tube which rapidly passed into inflammation or entero-colitis, if the attack continued a few days. What gives to the disorder its peculiar features in this country, in the summer season, is, in all probability, the severe and long-continued heat of the weather.

Prognosis.—It is evident from the remarks made upon the frequency of the disease, in which it was stated that, with the exception perhaps of convulsions, it was the most fatal of all the affections of childhood, that cholera infantum is a very serious malady. The prognosis in any particular case, however, must be determined by a reference to several different circumstances; of which the most

important are : the hygienic conditions in which the child is placed ; the age and period of dentition at which the disease occurs ; the present state of health ; and the existence or non-existence of hereditary predisposition.

Children whose parents are placed in circumstances of life such as to secure to the former favourable hygienic conditions ; who can leave the city for the country when such a change is deemed necessary ; who reside in large well-ventilated houses in a good quarter of the city ; who can afford the time and money necessary to procure whatever is deemed desirable (not to say necessary,) for the patient, have, doubtless, a vastly better chance of recovery than those in opposite conditions. One of the most unfavourable circumstances for the child, is the fact of its having been weaned at a very early age, or fed on artificial diet from birth. This, I believe, increases the danger to a very great extent, and yet, even here, much may be done by a wise system of dietetic management, together with the removal to a proper atmosphere, or change from place to place.

Cases occurring in very young infants, or early in the process of dentition, are more unfavourable than under opposite circumstances, because of the greater mobility of the nervous system early in life, and of the longer continuance in action of the predisposing cause, dentition, which will tend to keep up the disease. Children already in feeble and deteriorated health from any cause, are more likely to die than those who are strong and well. Lastly, those who belong to families in which the disease has frequently prevailed, and especially in which it has proved fatal to other children, are in greater danger than where the opposite obtains.

I have no statistics as to the proportional mortality, except the meagre statement that of 24 well-marked cases under two years of age that I have observed in private practice, two were fatal.

The prognosis may be stated in general terms to be unfavourable in proportion to the frequency and violence of the vomiting ; the number of the stools ; the severity of the fever ; and the more or less marked character of the collapse. When the discharges consist merely of serous fluid and are copious and frequent ; when

they consist of small quantities of deep green matter mixed with much mucus or with blood; when accompanied by straining; when they number from fifteen to twenty-five in the day; when they are very fetid; and when with these symptoms, the abdomen is tense and tympanitic, the countenance pinched, the expression languid, the extremities cool, the pulse rapid and small, and the child irritable and restless, or on the other hand very still and subdued, the prognosis is exceedingly bad. If, after the symptoms just enumerated, drowsiness or stupor, and then coma, convulsions, rigidity, or paralysis, make their appearance, there is scarcely a hope left.

The favourable symptoms in a case are: diminution of the fever; equal temperature of the whole surface; cessation of vomiting; decrease in the number of the stools, and a return to their natural colour, consistence, and odour; quiet, tranquil sleep; return of appetite; and lastly, a restoration of the natural temper and gaiety of the child.

Treatment.—Prophylactic treatment.—The danger to which teething children are exposed from residence in this city during the hot months of the year, is now so well understood, that nearly all parents who can afford and make it at all convenient, remove to the country during the warm season, and by this course very generally avoid the disease. It is undoubtedly the best plan that can be adopted, and very commonly succeeds. When it cannot be done, however, the prophylactic treatment consists in the most careful attention to diet, dress, and exposure to the open air. If possible the child should be kept at the breast until it has passed through its second summer, as there is but little danger from the disease after that period. If the weaning must take place prior to that age, it ought to be accomplished before hot weather begins, as a change from the breast to artificial food during the warm season is very apt to bring on the disease. If the child is weaned, the diet must be strictly attended to. Up to the age of ten months or a year, the food should consist almost wholly of milk containing arrow-root, rice, oatmeal, or some farinaceous substance in small quantity. A little plain chicken or mutton water, with rice boiled in it, or a piece of beef or chicken to suck, may be given occa-

sionally, but all vegetables and fruits should be strictly forbidden. After the age of ten months, some light soup and small portions of mutton, chicken, or very tender beef, minced very fine, may be given every day in addition to the milk food, which must still form the major part of the child's nutriment. Fruit of all kinds, all vegetables except rice and potatoes, and the latter are doubtful, ought to be carefully avoided until after the hot season has entirely passed away, or until the child has its full set of teeth. I have found the food prepared with gelatine, in the manner described at page 193, to answer better than anything else, for a large number of children to whom I have prescribed it.

The dress ought to be arranged according to the heat of the day. It is the fashion in this city to keep young children clothed all summer in thick flannel jackets and petticoats, and woollen socks. This is certainly too much for the hot days which so frequently occur in July, August, and early in September, and is often, I believe, very injurious. A light gauze flannel shirt is, it seems to me, the only woollen garment that need be worn during the warm season. On hot days a child should have only this, a muslin petticoat and frock, and the lightest possible socks, or none at all. If, as constantly happens in our climate, a cool day comes, there should be added to these a light flannel petticoat.

It is of the utmost importance that children should pass as large a portion of the day as possible in the open air. In the country this is easily managed, and parents almost always contrive to accomplish it; but in a city, many people seem to think it of less importance, or their servants are occupied with other things, and it is neglected. It is nevertheless a matter of the greatest consequence; the child ought to be kept in the air by the nurse a large portion of the day; either in the garden attached to the house, if there be one, at the front door, walking the streets, or, better still, making little excursions into the neighbouring country, taking care, however, to avoid the intense heat of the sun during the middle of the day.

I believe that with constant and wise attention to these points, diet, dress, exposure to the air, and exercise, much may be done

in the prevention of the disease even in families obliged to remain in the city during the summer.

Hygienic treatment.—As soon as a child, residing in a city, is attacked with cholera infantum during the hot season, it ought to be removed, if possible, to the country. If this cannot be done, arrangements should be made that will allow of its being carried into the air during the cooler parts of the day, either in the arms, in a carriage, or by making excursions into the neighbouring country. If there be extreme exhaustion or frequent vomiting, riding every day is too fatiguing, and we must rest satisfied with carrying the child through the house, or into the garden on a pillow, making it a rule in the former case to have the windows open as much as possible, to secure a good ventilation. If the patient surmounts the violence of the attack, but continues to suffer from diarrhœa, loss of appetite, and emaciation, and remedies fail, after a trial of some days, to have any effect, we ought to insist upon a removal to the country, pointing out to the parents the very great probability of a fatal event, if this step be not taken. I believe that the best air for children in this condition is that of the sea-side. I have frequently known the most surprising recoveries to take place after a removal to the sea-coast, and they often occur with wonderful rapidity. I may state, moreover, my belief that the sea-coast is by far the best place to which to take children to pass the summer, for the purpose of avoiding the disease. I have rarely known cases to originate there, though this happens occasionally in the country.

The diet must be strictly and attentively regulated day by day. If the child is still at the breast, it ought, if the nurse have enough, to be confined entirely to it. Nothing else should be given except cold water from time to time to slake thirst. If the child has been recently weaned, the wisest course to pursue is to procure a wet-nurse at once. When, on the contrary, it is fed wholly or in part upon artificial food, the regulation of the diet is decidedly the most important point in the treatment. The choice of food must depend in some measure upon previous habits. It may be stated, however, in general terms, that the food ought to consist at least in part of milk or cream; a wholly farinaceous diet, as I have so

often said, being, as a rule, unsuitable and injurious to the digestive organs. The diet that I prefer is the gelatine food already described, made with a small proportion of milk; for, though a child may be able to digest, when in good health, pure cow's milk, or milk weakened with a third or half water, it will often fail to do so when the digestive power of the stomach is diminished by disease. I would therefore recommend only a fourth, fifth, or even sixth part of milk, with a very small quantity of cream, to be added to the solution of gelatine. To this, arrow-root may be added in the proportion of a teaspoonful to a pint of the fluid. If, as sometimes happens, the child cannot digest milk, we may try cream one part, to water four, five, or six parts; or we may allow a little chicken, or mutton water, in which a small quantity of rice has been boiled, and afterwards strained out; or rennet whey may be given, and when the child is very weak, wine whey with the addition of arrow-root water. As the disease subsides, or when the appetite is very bad, the patient may be allowed, with advantage, a piece of ham, chicken, or under-done beef to suck. During the height of the attack it is important to regulate as well the quantity as the quality of the food. This ought to be much less than in health, even should there be a disposition to take as much, which is seldom the case. When vomiting is frequent, and especially when obstinate, I have often found it necessary and useful to restrict the quantity to a very small amount, for instance, a tablespoonful, or even a teaspoonful, to be given only every half hour or twenty minutes, until the sickness ceases, after which it may be gradually increased. In severe cases it is sometimes well to allow nothing but gum water, barley, or arrow-root water, given in the manner just mentioned, for one or two days, taking care always not to let the child become too much exhausted for want of nourishment.

Therapeutical treatment.—It is evident, I think, from the character of the anatomical lesions, and from the nature of the disease, that most cases begin as a simple irritation of the secretory apparatus of the gastro-intestinal mucous membrane, independent of evident inflammation. If this view be correct, the treatment in the early stage should be simple and calculated to avoid any in-

crease of the already existing irritation. When the symptoms are those of simple diarrhœa, in which the stools are merely a little more frequent, abundant, and fluid than natural; when there is little or no vomiting; and when the constitutional symptoms consist of slight heat of skin and restlessness at night, with some languor and unusual irritability; I have found that lancing the gums if they required it, careful regulation of the diet as to quality and quantity, the use of the tepid bath morning and evening, or sponging with tepid spirit and water, and the administration internally of half a teaspoonful or a teaspoonful of spiced syrup of rhubarb, with one or two drops of laudanum on the first day; to be followed by a similar dose, or the use of some astringent remedy on the second day, will often remove the disease without its becoming aggravated. When, however, the attack progresses, and vomiting, with signs of entero-colitis and fever, make their appearance, the case requires other treatment than that just mentioned.

Attention to the *state of the gums* is undoubtedly a most important point in the management of cholera infantum. It often happens that a child will have an attack of the disease whenever the gum over an advancing tooth becomes very much swelled and tense, which shows the intimate connexion that exists in many cases between the process of dentition and the disease. The gums, therefore, must always be examined, and if found to be prominent over any of the teeth, and at the same time hard, shining, and hot, they should be freely incised. I am convinced that this operation is often of great service in relieving irritability and insomnia, and also in rendering the disease more tractable to remedies, by removing a very important predisposing cause.

Baths.—The use of the warm and tepid bath, and of sponging with water and spirit, are important and beneficial elements in the treatment. In slight attacks, the tepid bath, used twice a day, has proved of great service in my hands. When there is severe fever with excessive jactitation, the warm bath should be resorted to twice or three times a day; or we may employ the affusion bath of water at 98°, containing vinegar, in the manner to be recommended in the treatment of scarlatina. It is a good plan, when

the skin is very dry and hot, to lift the child immediately from the bath into a blanket which has been moderately warmed, when, by wrapping it up, we may often obtain a perspiration, followed by calm sleep. If the child be weak and exhausted by a tedious or violent attack, a warm bath to which half a pint or a pint of whiskey has been added, will be found a very soothing and refreshing application. When the use of the bath alarms or annoys the child so much as to produce violent agitation, it is better to abandon it for a time, and substitute sponging with warm or tepid whiskey and water, two or three times a day. In cases of extreme exhaustion, also, sponging is to be preferred to baths.

Purgatives.—The careful employment of purgatives in the disease is recommended by many writers. The motives for their use are differently stated by different authorities; some prescribe them with the view of emptying the bowels of vicious secretions, others of accumulations, others to stimulate the liver to greater activity, and some, especially the French writers on diarrhœa, enteritis, and follicular diacrisis, to modify the mode of action of the secretory apparatus of the intestinal tube. M. Legendre (*Loc. cit.* p. 672) says: “We entirely agree, therefore, with M. Gendrin, who regards emetics and purgatives as the most efficacious remedies in the treatment of the intestinal diacrisis.” For my own part I have generally employed them with care at some period of the disease, but feel convinced that they are capable of doing great injury when too freely or incautiously used. I believe that the proper moment for their administration, is at the beginning of the attack, when we have reason to suppose that the bowels may contain the products of an imperfect digestion, an accumulation of vicious secretions, or, whenever, in the course of the disorder the stools are observed to be partially consistent, dark-coloured, and very offensive. I think that in the latter condition of things they are very useful, particularly when preceded by several minute doses of calomel repeated every hour. When, on the contrary, the stools are copious and watery, or of a deep-green colour, mixed with a great deal of mucus, and accompanied with tenesmus and crying, I believe that they tend to aggravate the symptoms. The only purgatives which I venture to employ are rhu-

barb, magnesia, castor oil, and calomel. Of these, I prefer in the majority of cases, rhubarb in the form of the spiced syrup, of which a teaspoonful, or if the dose is to be repeated the same day, half a teaspoonful, guarded with half a drop or a drop of laudanum, is a proper quantity. If it be desirable to give a more speedy and active laxative, castor oil is preferable. Of this a teaspoonful is as much, I think, as ought to be given in a single dose, and very often half the quantity is fully enough. When there are signs of acidity of the digestive organs, magnesia is the best purgative. From a quarter to half a teaspoonful is enough for a dose. Calomel is highly recommended both as a purgative and alterative by many different authors. The dose varies between a quarter or half-grain, and two or three grains repeated every two, three, or four hours, until its effect on the bowels becomes manifest. My own opinion is that such doses are too large for young children, except in acute inflammatory diseases, and that they are apt to aggravate the existing irritation of the digestive mucous membrane. Moreover, it seems to me that such doses of a remedy acknowledged to be a powerful sedative, cannot be proper in a disease which frequently occasions symptoms of great exhaustion, or even collapse. From personal experience, therefore, I am disposed to believe that it is better not to use calomel in purgative doses as a general rule, but to exhibit it in very small quantities, and follow it by some laxative, as for instance, syrup of rhubarb or castor oil. The manner in which I prescribe it is to give a tenth or sixth of a grain, with a quarter or sixth of a grain of Dover's powder, every hour or two hours, until half a grain or a grain has been taken, after which I prescribe a small quantity of rhubarb or castor oil, and pursue the same treatment the next day, or the day but one after. Employed in this way, I have seen it of great service in correcting the discharges when they have been of a dark brown colour and very offensive, and sometimes when green and mucous. Dewees (*Dis. of Children*, p. 421,) says he has never found "temporizing remedies, as the alkalies, the absorbents, or external irritants, of the smallest service, we, therefore, never employ them." As soon as the stomach is tranquillized, he resorts to minute doses of calomel, giving as the average quantity a quarter of a grain every hour,

until the bowels are decidedly operated upon, which "may be known, by the stools being more copious, less frequent, and of a dark green colour, with a tenacious slime of the same or nearly the same tint of colour." After this the doses are given less frequently; once in two, three, or four hours. A larger dose of calomel, two or three grains, may sometimes be exhibited with advantage when the constitutional symptoms are violent, and particularly when there are signs of severe cerebral irritation early in the attack. I have seldom found it useful to continue the calomel, in whatever dose employed, more than two or three days.

Antiphlogistics.—Dewees remarks that if there is "much fever, with great gastric distress, we have found the most decided advantage from bleeding, or the application of leeches over the region of the stomach; or if there be much cerebral determination, we bleed from the arm, or draw blood from the temples by leeches." He recommends caution however in the use of depletion, and says he never employs it during the decline of the disease. Eberle says that when the abdomen is tumid, tense, and tender to the touch, and the pulse frequent, contracted, and quick, depletion ought to be resorted to either by venesection or leeches to the epigastrium. He thinks this ought to be done promptly and efficiently when the above symptoms are present. Dr. Condie recommends leeches to the epigastrium when there is increased heat of skin, when the patient appears to suffer much pain, and when the abdomen is tumid and tender to the touch. Leeches to the epigastrium are recommended also by Dr. Wood, (*Pract. of Med.* vol. i, p. 677,) when there is much tenderness of the abdomen, and the patient is not much exhausted. The same author advises a resort to local and general depletion, carried as far as circumstances will permit, when symptoms of meningeal inflammation occur early in the disease. M. Bouchut (*Loc. cit.*) opposes the employment of antiphlogistics in entero-colitis, except in some rare cases attended with strong febrile reaction and turgescence of the general capillary system. The authors of the *Bibliothèque du Med. Prat.* (t. v, p. 674,) state that antiphlogistics are now almost entirely abandoned in the treatment of the enteritis and diacrisis of children. Dr. Hallowell (*Loc. cit.*) speaks strongly of the importance of the anti-

phlogistic treatment, "instead of the purgative plan usually pursued and with such fatal results." He recommends venesection, or when the state of the pulse contraindicates it, leeches or cups to the abdomen.

I have seldom made use of depletion in the treatment of the disease, having been deterred from it in severe cases by the disposition to exhaustion and collapse, and in mild cases, by the belief that it was unnecessary. The cerebral symptoms which occur in the early stage, and which seldom consist of more than great excitement, restlessness, and irritability, have usually subsided without difficulty under the use of warm or tepid baths, revulsives, or mild laxative doses; whilst those which occur towards the close of the fatal cases, and for which I have employed leeching on several occasions, have never been benefited by the remedy. In fact I am disposed to believe that the cerebral symptoms are of the same nature exactly as those described by M. Barrier, (*Loc. cit.* t. ii, p. 56-7,) as occurring in the follicular diacrisis, of which he says, after stating that they more or less simulate meningitis, "On the whole, we are of opinion, from our researches, that they rarely depend upon intracranial inflammation; that, under other circumstances, especially when a slow and chronic mucous fever has occasioned great general debility, the serous diathesis, or anasarca, they may be the result of serous effusion into the ventricles or cavity of the arachnoid, and that they then constitute true hydrocephalus, a malady in which inflammation plays but a minimum part in the production of the phenomena. The only condition in which hydrocephalic or phlegmasial irritation seem to us at all common, is that in which there exists difficult dentition capable of determining a true and active sanguine congestion towards the head, and this coincidence of difficult dentition with gastro-intestinal diacrisis is not rare, as is well known. But the cases are still more numerous in which the encephalic symptoms are of a purely nervous nature, not to be attributed to inflammation or active dropsy, and leaving no traces in the nervous centres when these are examined after death." If this view of the nature of the cerebral symptoms attendant upon the gastro-intestinal affections of children be correct, it would lead us to the opinion that antiphlogistics can seldom

be necessary in their treatment, and such, as I have already stated, is the conclusion at which I have arrived from experience. When, however, they are accompanied by hot and flushed skin, with strong and active pulse, it would no doubt be proper to direct the application of leeches to the temples or behind the ears, of cold to the head, of a blister to the nucha, of revulsives to the extremities, and to make use of laxatives.

Revulsives are recommended by Parrish, Dewees, and Eberle, when the temperature of the surface is unequal ; for the relief of troublesome vomiting ; and when there is decided determination of blood to the brain. Dewees and Eberle recommend the application of a blister over the epigastrium when there is troublesome vomiting, and upon the extremities when they are cold, and when the cerebral symptoms are threatening. Dewees remarks that they usually promote perspiration, and adds : "It is a fact not sufficiently known, that without vesication, in certain conditions of the skin, diaphoresis will not take place." Eberle recommends the application of a blister behind the ears, or to the back of the neck, in the treatment of the disease, and says he has been much more successful since the adoption of this plan, than previously. He was led to the employment of this method by the example of Dr. Parrish, who began it from observing that infants who have the eruption behind the ears, so common during dentition, generally enjoy "an exemption from those dangerous disorders incident to this critical period of life."

I have commonly resorted to revulsives under the circumstances above mentioned, and have almost always used mustard in the form of sinapisms, poultices, or pediluvia. When vomiting is very troublesome, a mustard plaster, or better still, a poultice made of two parts of Indian meal and one of mustard, applied over the abdomen for fifteen or thirty minutes, is a most excellent remedy. This may be repeated with great propriety in two hours, if necessary. Sometimes a spice plaster, made of different kinds of aromatics, as powdered cloves, cinnamon, and capsicum, half an ounce each, with enough flour and wine to make a poultice, and applied hot over the epigastrium ; or one made of cloves, nutmeg, ginger, and hot wine or water, and used in the same way,

answer an excellent purpose under the circumstances referred to. When the extremities are cold, and the child weak and exhausted, the use of sinapisms, hot pediluvia, or frictions with dry mustard, have proved very useful in my hands. I have never employed blisters except in cases attended with threatening cerebral symptoms, and then I have almost always directed a small one to be applied to the nucha, taking care not to leave it in place more than one and a half or two hours, lest it might produce sloughing. I have never, however, known them to prove of essential service, except in the early stages of the disease. When the cerebral symptoms come on late in the attack, and consist of convulsions, rigidity, or paralysis, I believe blisters rarely or never do any good.

Opiates.—Eberle, in speaking of opiates, says that the use of opium is, in general, highly improper in the early stage. With this I entirely agree, so long as there is severe fever and cerebral irritation; but when the stools are frequent, the child very uneasy and restless, and the discharges accompanied with pain, and especially when there is but little fever, while a disposition to coolness of the skin and exhaustion are manifest, from the violent onset of the disease, I believe that minute doses of opium, either in connexion with a laxative, with calomel, or by enema, prove a very useful and powerful curative means. I almost always resort to opium under these circumstances, making use of laudanum or paregoric, if it be given with syrup of rhubarb or castor oil; or Dover's powder, if with calomel; or of laudanum, if by injection. The dose of the opiate ought to be carefully graduated to the age of the child, and severity of the attack, being guided under the latter circumstances especially, by the degree of pain and restlessness. It ought to be such as to tranquillize, it seems to me, rather than produce deep or long-continued sleep.

After the febrile stage of the disease has passed away, and particularly when there are signs of sub-acute entero-colitis, or dysentery, opium is, in my opinion, one of the most important remedies at our command. It may be used either per orem, or by injection; and should be administered twice or three times a day. From one to three drops of laudanum may be given by injection, under the age of one year, or half a drop to two drops per orem; or

from two to six or eight drops of paregoric in the same manner. A very excellent form of opiate to employ, is the Dover's powder, alone or combined with chalk, or acetate of lead. Of this I generally give from a quarter to half a grain three or four times a day. M. Bouchut remarks (*Loc. cit.* p. 229) that opiates are very much depended upon by the Germans, and quotes Hufeland as asserting that opium is "of all remedies the one which promises the greatest certainty."

Astringents.—Both Dewees and Eberle oppose the use of this class of remedies in the early stage, as injurious. After the symptoms of reaction have somewhat subsided, and the remedies proper in the early stages have been made use of, nearly all writers coincide in recommending astringents, for the purpose of diminishing the action of the secretory apparatus of the bowel, and of controlling the inordinate peristaltic action which is one of the chief causes of the frequent discharges. M. Legendre, who, as we have already seen, prefers the employment of emetics and purgatives in the early stage of the follicular diacrisis, recommends, in cases in which these fail to give relief, the use of absorbents, astringents, and sedatives. M. Bouchut (*Loc. cit.*) also makes use of astringents and tonics in the treatment of the diarrhœas of young children. I am in the constant habit of resorting to them in acute and violent cases, so soon as I am convinced that the laxatives administered at the beginning have had some action upon the bowels, and after the use of calomel; whilst in sub-acute cases in which diarrhœa is the most important symptom, and in most of the chronic cases, they, with diet and carefully regulated hygiene, form the basis of the treatment I have been in the habit of employing.

The most important of those in general use are chalk, powdered crabs' eyes, kino, catechu, rhatany, and acetate of lead. The best are the chalk and crabs' eyes, in combination with astringent tinctures or opiates, and the aromatic syrup of galls. Their modes of preparation and doses are all given under the head of enterocolitis, to which place the reader is referred. The acetate of lead is recommended by Eberle, Chapman, and Condie. It may be given in doses of from a quarter of a grain to a grain every two

or three hours. Dr. Condie recommends it in doses of a grain, in combination with calomel, chalk, and ipecacuanha, to be repeated every three hours. I have used the sugar of lead in a very few cases, and am therefore unable to give an opinion as to its efficacy. We may also use with much benefit the nitrate of silver, both internally and by enema, or the sub-nitrate of bismuth, or injections of extract of rhatany or tannin. The doses and modes of administration of these preparations have already been fully detailed in the article on the treatment of chronic entero-colitis.

Tonics and stimulants.—It is often necessary to resort to these remedies in violent and in chronic cases of cholera infantum. When, for instance, in a sudden and severe attack, the patient falls into the state of collapse which so often accompanies the disease, the use of stimulants seems absolutely necessary. The one I prefer before all others is fine old brandy. Of this a teaspoonful may be put into a wineglassful or half a tumblerful of water, and the child made to drink of it from time to time; or, from ten to twenty drops may be given every hour or two hours. If brandy cannot be obtained, or if it be strong and bad, old rum may be substituted, or very fine wine, or wine whey, either alone or mixed with arrow-root water. In chronic cases also, when the child is weak and languid, inattentive, and without appetite from long illness; when the stomach seems to have lost in great part its digestive power, so that the patient not only refuses food, but often rejects by vomiting in an undigested state, what was taken hours before, stimulants and tonics will be found of the greatest service. In some such cases I have been obliged to use a certain quantity of brandy three or four times a day for several days or even weeks in succession. There need be no fear, it seems to me, of resorting to these remedies in cases marked by the above symptoms. I have never known them to do harm, and believe them to be often indispensable. Of the tonics, the best is probably quinine, in the dose of a quarter or half a grain three or four times a day, suspended in syrup.

A very excellent stimulant is aromatic spirits of hartshorn, which may be given in doses of five or six drops every two or three hours. Eberle recommends tincture of cinnamon, in doses of

fifteen or twenty drops in some mucilaginous fluid, every four hours.

One of the most troublesome symptoms of the disease is vomiting, which is sometimes so obstinate and frequent as to be extremely exhausting. It is very important to relieve it on account of the prostration by which it is accompanied, and to enable us to administer the remedies proper for the diarrhœa. Dewees says there is nothing so certain, or so prompt in allaying the sickness "as an injection of a gill of warm water, in which is dissolved a large teaspoonful of common salt; this is for a child of a year old and upward, proportionably less for younger." He says it must be given no matter how frequent may be the discharges. I have never resorted to this plan, having always succeeded with other remedies which seemed less likely to irritate the bowel, and which, therefore, appeared to me preferable. I have generally found a hot mush poultice, a mustard poultice, or a warm spice plaster applied upon the abdomen, and the administration internally of iced brandy and water by teaspoonfuls, of lime water and milk, of minute doses of calomel, or of very small doses of some opiate, with the direction that the drinks and food shall be given only by the teaspoonful or tablespoonful for twelve hours, successful in arresting the vomiting however violent it might be. Eberle recommends, under these circumstances, the application of a blister over the epigastrium; while Dr. Condie speaks very highly of the following formula: *R.*—*Aquæ puræ* ʒi; *Acetat. plumb. gr. v*; *Acid. acetat. impur. ℥v*; *Sacch. alb. pur. ʒiii.*—*M.* A teaspoonful to be given every hour or two, until the vomiting is suspended.

ARTICLE IV.

DYSENTERY.

It seems to me unnecessary, after the long article on enterocolitis, to make more than a very few remarks on dysentery, which almost always exists in children in combination with inflam-

mation of the small intestine, constituting the disease already treated of under the title of entero-colitis.

Dysentery is characterized by frequent evacuations, attended with more or less severe pain and straining, and consisting of mucoso-sanguinolent or sanguineous substances.

The *causes* of dysentery seem to be but little understood, beyond the mere facts that it occurs as an endemic in some regions of country, and as an epidemic over large districts. It is frequent, also, as a sporadic disease, and in this form seems to depend upon the same causes as those already cited as productive of entero-colitis. It may be either idiopathic or secondary. As a secondary affection it is most apt to follow measles and variola. I have known dysenteric stools to occur in the course of cholera infantum, and in a considerable number of cases such as I have described under the title of entero-colitis.

The *anatomical lesions* are confined chiefly to the large intestine, and are the same as those described under the head of entero-colitis, except that they are of a somewhat graver character. The mucous membrane is commonly found thickened, swelled, red, and softened; the sub-mucous tissue sometimes presents ecchymosed points; the follicles are often diseased, their orifices being enlarged, and ulcerated, as described under entero-colitis. In grave cases, particularly those occurring under epidemic influence, there are usually more or less extensive ulcerations, which may implicate only the mucous, or extend to the muscular or even peritoneal coat. In such instances, pseudo-membranes also are often formed, sometimes in large quantity, and often covering the ulcerations. The intestine contains sanguinolent mucus, sometimes a brownish or greenish material, evidently the result of a gangrenous condition of the mucous membrane, pus, and lastly false membranes. In some rare cases, perforation has been known to take place.

Symptoms.—The symptoms are much the same as those already described as existing in entero-colitis, excepting that the local symptoms are more severe, and the presence of blood in the stools nearly constant. The disease often begins as a *diarrhœa*. The *stools* at first contain feculent materials, but after a time become very thin, small in quantity, and consist chiefly of mucus mixed

with blood. The blood may be black and in considerable quantity, or of a dark rosy red colour, or like the washings of flesh; it is mixed with greenish or yellowish substances, whitish mucus, fragments of false membrane, or purulent fluid. In young children there is evidently *pain*, from the restlessness, moving of the limbs, and crying about the time of the evacuations, while in those who are older, there is true *tenesmus*, like that observed in adults, and severe pain in the anus. The number of stools varies according to the severity of the case. There may be only four, eight, or ten in the day, or many more; in one case of a girl six years of age, that came under my observation, there were between 40 and 50 in twenty-four hours.

The *abdomen* is generally distended, tympanitic, warmer than natural, and painful.

In mild cases there is usually no *fever*, or very little, while in severe attacks, there is high fever during the first few days, marked by frequent pulse, hot dry skin, followed, after a time, unless a favourable change take place, by coolness of the surface, contraction of the countenance, hollow, sunken expression of the eye, rapid emaciation, and death.

It is useless to give a longer detail of the symptoms, as they are the same as those already described in the article on entero-colitis.

The *diagnosis* presents no difficulties. The frequency of the discharges, the pain in the course of the colon and in the anus, the tenesmus, and the character of the evacuations, all make the disease easy of recognition.

The *prognosis* is favourable in mild cases, unattended with much fever, or very frequent discharges. When, on the contrary, there is violent fever in the beginning, followed by disposition to coolness and collapse; when the stools are exceedingly frequent, and attended with violent pain and almost constant straining; and when they consist of nothing but mucus, mixed with considerable quantities of blood, or with pus or false membranes, the prognosis is very unfavourable.

Treatment.—The treatment should be much the same as that proper for entero-colitis. The only exceptions are that *depletion* by leeching in the early stage is more important, and that a freer

use of *opiates* by injection, or internally in combination with calomel and Dover's powders, is necessary. *Baths* constitute an important part of the treatment, and should not be neglected. *Warm poultices* to the abdomen also are very useful. If opiates are given per orem in preference to by injection, the use occasionally of small *demulcent* injections will be found very soothing and beneficial.

Nitrate of silver, and *acetate of lead*, particularly the former, often prove of great service in controlling the progress of the disease. For their doses and modes of administration, the reader is referred to the article on entero-colitis.

The *hygienic management* should be precisely the same as that laid down in the remarks on entero-colitis.

CLASS III.

DISEASES OF THE NERVOUS SYSTEM.

GENERAL REMARKS.

It is a very common opinion both in and out of the medical profession, that this class of diseases occasions a much larger number of deaths in childhood than any other. Indeed, many persons suppose that, be the primary disease what it may, nearly all children who die, perish as it is said by the brain. It is clear, however, from the tables given by Dr. Condie, (*Loc. cit.* p. 86, 88, 89, 90,) that they are very little more frequent than affections of the digestive organs, for it appears that the mortality in Philadelphia under fifteen years of age, during the ten years preceding 1845, from the former class was 6186, while from the latter it was 6068, being a difference of only 118. These two classes of disease constituted each about a fourth of the whole mortality under the age mentioned, whilst that from diseases of the respiratory organs was nearly a seventh, and from measles and scarlatina combined rather more than a ninth. M. Barrier, whose observations were made at the Children's Hospital in Paris, says (*Loc. cit.* t. i, p. 35), that, setting aside cases in which the nervous symptoms were probably only sympathetic of some other coincident disease, the cerebro-spinal affections were few in number in comparison with those of the thorax, abdomen, and senses, including amongst the latter the eruptive fevers. He states (*Loc. cit.* p. 34,) that affections of the thorax constituted two-fifths of all the cases of disease, those of the abdomen and senses each one-fifth, and of the nervous centres only a tenth. M. Barrier, after combating the opinion so generally entertained, that disorders of the nervous system cause the death of the greater part of the subjects who perish

before puberty, says (*Loc. cit.* t. ii, p. 233) that there is only one circumstance which in part justifies this opinion, which he opposes "not as false, but as exaggerated," which is, that the affections alluded to are almost always of a dangerous character, that they are beyond the resources of art, and that they furnish a very considerable relative mortality. He says that according to his experience the mortality in diseases of the cerebro-spinal system has been as sixty-eight in a hundred, whilst in those of the thorax, senses, (including the skin), and abdomen, it was respectively as forty-eight, forty, and thirty-two in a hundred.

Before beginning the consideration of the particular diseases of this class, I am desirous of stating that I shall be compelled, on account of my limited space, to devote attention chiefly to those which are most important from their frequency or severity, avoiding or merely alluding to those which are of less consequence.

I shall divide the whole subject into two classes, the first of which will contain all the diseases attended with, and dependent upon, some appreciable alteration of the nervous centres, while the second will contain those in which no such alteration exists. Amongst those belonging to the first division, I shall treat of tubercular meningitis first as the most important, then of simple meningitis, of cerebral congestion and hemorrhage, and of acute hydrocephalus, by which I mean serous effusions in the brain independent of tubercular disease. Encephalitis or cerebritis, and induration and softening of the brain are of such rare occurrence in children as distinct and essential affections, that it is not necessary to treat of them separately. Amongst the diseases belonging to the second class I shall treat of several different convulsive affections, to wit, general convulsions or eclampsia, laryngismus stridulus or spasm of the glottis, idiopathic contraction with rigidity, and lastly, of chorea.

CHAPTER I.

DISEASES OF THE NERVOUS SYSTEM ATTENDED WITH APPRECIABLE ANATOMICAL ALTERATIONS.

ARTICLE I.

TUBERCULAR MENINGITIS.

Definition ; symptoms ; frequency.—This disease is characterized by violent cerebral symptoms dependent upon the existence of tubercular granulations in the pia mater, as the essential anatomical lesion ; and in the great majority of cases, by coincident inflammation of that membrane, by softening of the central parts of the brain, by effusions of serum into the ventricles, and in many instances by tubercular deposits in other organs. Until within a few years tubercular meningitis, simple acute meningitis independent of tuberculization, and simple dropsical effusion within the cavity of the cranium independent of inflammation, have been confounded together under the single term of hydrocephalus or water on the brain. It has been shown of late, it seems to me, by the researches of the French observers, that a great majority of the cases of acute hydrocephalus of authors are, in fact, cases of tubercular meningitis. I am well aware that many of the English writers have not adopted this view of the pathology of these diseases, but nevertheless, it seems to me, that the observations of Guersent, Gerhard and Ruz, Barrier, Rilliet and Barthez, Bouchut, and several others, have sufficiently proved that such is the fact.

The term hydrocephalus ought to be, and indeed is at present by many, restricted to the disease whose essential condition is the existence of serum in some part of the brain independently of acute inflammation. It is scarcely necessary to state that the popular

term "water on the brain," is applied to almost every acute case in children in which dangerous or fatal cerebral symptoms are present.

There can be no doubt that this disease is one of rather frequent occurrence, though I am acquainted with no statistics excepting those given by M. Barrier, (*Loc. cit.* t. i, p. 34, 36,) which will enable us to form anything like an accurate conception upon this point. That author states that, during the period in which his observations were carried on at the Children's Hospital in Paris, there occurred 576 medical cases of all kinds. In this number there were only ten cases of tubercular meningitis, whilst there were 83 of pneumonia, 48 of pleurisy, 24 of typhoid fever, 48 of measles, &c. &c., showing the first-named disease to be much less frequent than many other affections. We may also form some idea of its frequency in proportion to other diseases, by a reference to the work of Rilliet and Barthez, who report 33 cases of tubercular meningitis, against somewhat over 245 of pneumonia, 174 of bronchitis, 111 of typhoid fever, 167 of measles, and 87 of scarlet fever. I am of opinion that it is not of frequent occurrence amongst the easier classes of this city, since I have met with only ten cases in private practice, in the course of six years. From what I have been told by other practitioners, however, it seems probable that it is much more frequent amongst the destitute classes, and particularly the blacks, who crowd the southern parts of the city, and suffer to a great extent from tubercular and scrofulous diseases. It is impossible to obtain accurate information in regard to the frequency of the disease in this city, in comparison with other affections of the brain, from a reference to the bills of mortality, because of the fact that all or nearly all those affections are returned under the single title of dropsy of the brain. It may be stated, however, that it appears from the tables of mortality during the ten years preceding 1845, published by Dr. Condie (*Loc. cit.*), that there were 1906 deaths from dropsy of the brain under fifteen years of age, whilst there were 1592 from pneumonia, and 1172 from bronchitis. Some of the cases returned under the title of dropsy of the brain were no doubt pure hydrocephalus, acute or chronic, others simple meningitis, and others no doubt different diseases in which

cerebral symptoms occurred at the fatal termination ; but a large number must have been instances of tubercular meningitis.

Predisposing causes.—Rilliet and Barthez state that the disease is most frequent between the *ages* of 6 and 10 years, and then, in order of frequency, between 3 and 5, 11 and 15, and lastly 1 and 2 years. The influence of *sex* has not been determined. It is clearly shown, I think, that a feeble *constitution* and the lymphatic *temperament* act as predisposing causes, though on the other hand, it is also apparent, that it is not at all rare for children seemingly with every mark of robust and vigorous health, to be suddenly attacked with the disease. It is propagated also by *hereditary* influence. It is not uncommon for several children in a family to die of tubercular meningitis. Under these circumstances, it has generally been ascertained that the parents, or some of the immediate relations, have either died with or shown unequivocal signs of tuberculous or scrofulous diathesis. It may follow other diseases, and has been observed particularly after measles and other febrile diseases, and after the suppression of eruptions. It has been shown of late, it seems to me, by the researches of the French observers, that a great majority of the cases of acute hydrocephalus of authors are, in fact, cases of tubercular meningitis. I am well aware that many of the English writers have not adopted this view of the pathology of these diseases, but nevertheless, it seems to me, that the observations of Guersent, Gerhard and Ruz, Barrier, Rilliet and Barthez, Bouchut, and several others, have sufficiently proved that such is the fact.

M. Barrier (*Loc. cit.* t. ii, p. 379) explains, and I think with good show of reason, the causes of the disposition on the part of the tubercular diathesis in children to localize itself in the brain, and of the violence and extent of inflammatory action in proportion to the degree of the tubercular lesion, by the physiological conditions of the nervous system in early life, which are those of great functional energy, and nutritive activity.

As to the *exciting causes*, nothing positive is known. The disease has been supposed to be brought into action by falls and blows upon the head, by violent moral emotions, and by exposure to the sun. These causes, however, are all of doubtful influence.

Anatomical lesions.—The tubercles, which constitute the essential anatomical element of the disease, are very rarely found in the cavity of the arachnoid membrane, but almost invariably beneath that tissue, or in the pia mater. They generally exist either as yellow granulations or as miliary tubercles. Gray granulations are rare. They may exist separately or together in the same individual. The isolated yellow granulations are the most frequent of the forms of tubercle found in the meninges. They may commonly be seen scattered through the arachnoid, in the shape of small, yellow, flattened bodies, from two to four-fifths of a line in diameter, scarcely resisting under the finger. When the pia mater is torn off from the surface of the brain, other granulations which had been buried in the anfractuositities, come into view. These are rounded in shape, differing from those lying on the surface of the convolutions, which, as we have seen, are flattened from the pressure of the arachnoid. The size of the granulations varies very much. They are sometimes so small, and so closely resemble in colour the surrounding parts, that it requires a careful search to detect them. They vary greatly also in number, existing sometimes in the greatest quantity throughout the pia mater, whilst in other cases it is difficult to find more than one or two on each hemisphere. They are found on all parts of the surface of the brain, on the convex and internal surfaces of the hemispheres, on the lateral and middle portions of the base, in the fissures of Sylvius, and on the cerebellum. They are more numerous, according to Rilliet and Barthez, on the convex surface of the hemispheres, than at the base, but this is contrary to what has been asserted by most other authors; they are more frequently met with upon the hemispheres than on the cerebellum. Wherever found, they may be either isolated at some distance from each other, or collected together into groups of greater or less extent.

Miliary tubercles, which are not unfrequently met with, vary much in size, number, and arrangement. They vary in size from that of a hemp-seed to that of a pigeon's egg. Generally there are one, two, or three, about as large as a pea or small nut; if more numerous, there are seldom over fifteen or twenty, when

they are usually about the size of a hemp-seed. Generally isolated, they are sometimes united into irregular masses, containing portions of altered pia mater. They are more frequent on the convex surface than at the base of the hemispheres, and on the left than right hemisphere. They are rarely found in the fissures of Sylvius, or on the cerebellum. As the tubercle enlarges it becomes strongly united to the membranes, and these latter, owing to the presence of the tumour, become attached to the dura mater. Internally, the tubercle forms a depression in the substance of the brain, into which it sinks deeper and deeper, until it is almost surrounded, preserving, however, its connexion with the pia mater.

I shall next consider the lesions which coexist with tubercles of the meninges. The most important of these are inflammation of the membranes, and serous effusion into the ventricles. The chief seat of inflammation, as of the tubercular deposition, is the pia mater; the arachnoid membrane being, as a general rule, affected only to a slight extent. That membrane sometimes, however, contains a very small quantity of clear or turbid serum in its cavity. Its surface is often dry and viscid, and in some instances its whole tissue is opaque and thickened. But it is chiefly in the pia mater that are found the evidences of severe inflammation. In order to detect these changes, it is necessary to examine the membrane, not merely upon the surface of the brain, but to tear it off, so as to bring into view the portions which dip in between the convolutions, and which often exhibit the greatest amount of morbid alteration. The inflammatory lesions vary between mere vascular injection, infiltration with clear, turbid, or gelatinous liquid, and the most abundant suppuration. When the inflammation has gone beyond mere sanguine injection, it is marked by infiltration of the membrane with turbid, whitish, or sanguinolent serum, with pus, which may be liquid or concrete, or with whitish coagulated lymph. These products are most abundant at the base of the brain, about the peduncles of the cerebrum, and in the fissures of Sylvius; on the convexity of the hemisphere they are more abundant on a line with the anfractuositities than on the summits of the convolutions. The pia mater, which in a

healthy brain can be readily detached from the surface of that organ, becomes, in cases of meningitis, particularly those which are violent, more or less adherent, so that in tearing it off, portions of the cerebral substance come with it. The proper tissue of the membrane is thickened and indurated, the degree of thickening depending on the amount of infiltration.

After the changes in the pia mater, the most important anatomical feature is effusion within the ventricles. This was formerly thought to be the essential lesion of the disease, but recent researches have shown that it is absent in some instances which have followed in all respects the ordinary course of the malady. According to M. Barrier, effusion cannot be supposed to exist unless the ventricles contain from one and a half to two ounces of fluid, whilst Rilliet and Barthez assert that the normal quantity is a few grammes (about a drachm). The quantity is very variable; sometimes there are only a few drops or a teaspoonful, while in other instances it amounts to three ounces and a half, or much more. It may be so large as greatly to distend the ventricles, rupture the soft commissure of the thalami, and even the septum lucidum, diminish considerably the thickness of the hemispheres, and flatten the convolutions against each other. In such cases the effusion passes through the membrane of the ventricle, infiltrates into and softens the substance of the brain, so that the latter becomes almost of the consistence of thick cream. The characters of the fluid vary in different cases. It is white, perfectly limpid and transparent, or it may be turbid, either from being secreted in that condition, or from holding in suspension albuminous or purulent flocculi, or portions of the broken-down walls of the cavity. In some rare instances it is sero-sanguinolent. Barthez and Rilliet remark that the effusion which coincides with tubercular meningitis is different from that which accompanies tubercles of the brain. In the former it takes place rapidly, is turbid, and exists in smaller quantity, and constitutes acute hydrocephalus. In the latter it is secreted slowly and in considerable quantity, dilates the walls of the cranium, and constitutes chronic hydrocephalus.

The brain itself presents various morbid alterations. The whole

organ often seems enlarged, so that the dura mater appears distended, and when the latter is cut into, the cerebral substance protrudes in the form of a hernia. At the same time the convolutions are observed to be pressed against each other, and the anfractuosities seem to have disappeared. The compression of the brain depends either upon the distending action of the ventricular effusion, or upon sanguine turgescence of the organ. In most cases, but not in all, there is evident congestion of the cerebral substance, shown by more or less abundant dotted redness, and sometimes by general rosy tint of the medullary, and vivid redness of the cortical portion. Softening of the substance of the brain is of common occurrence in connexion with the other lesions. I have already spoken of the softening of the walls of the ventricles when there is much effusion, and which appears to result from the macerating influence of the fluid. I have also referred, very cursorily, to the softening which exists under the inflamed portions of the membranes, and which occasions adhesion of the pia mater to the brain beneath. In the latter cases the softening may be either red or white, and does not penetrate more than a line, and often less, in depth.

In addition to the changes already described, it is quite common to meet with tubercles of the brain itself, having no connexion with the meninges. They are found in various parts of the organ, and differ greatly in size, varying generally between that of a millet-seed and hazel-nut, but reaching sometimes the volume of a pigeon or hen's egg, or even that of half the fist.

I have a few words to say in regard to the lesions of other organs. It is undoubtedly true that in the vast majority of cases tubercles are found in other parts of the body. Of all the cases of tubercular disease observed by Rilliet and Barthez, amounting to 312, in only one was the deposit confined to the meninges. (*Loc. cit.*, t. iii, note, page 49.) M. Valleix (*Guide du Med. Prat.* t. ix, p. 196, 197,) states that in all the cases, without exception, of tuberculization of the meninges in adults, tubercles exist also in the lungs, and that the same is true, in the vast majority of cases, in regard to children. The organs in which the deposit is most

apt to exist are the bronchial ganglions, lungs, mesenteric glands, pleura, and peritoneum.

Another very frequent lesion is softening of the stomach. This may affect only the mucous or all the coats, so that a slight degree of force will suffice to tear the organ. Dr. Gerhard (*Am. Journ. Med. Sci.* vol. xiv, 1834), states that lesions of the stomach existed in six of the ten cases detailed by him, and in four-fifths of others not detailed.

Before quitting this subject, I would call the attention of the reader to the fact mentioned by M. Valleix (*Loc. cit.* t. ix, p. 214), that all the symptoms about to be described as constituting the disease under consideration, with the exception of paralysis, may depend on simple tuberculosis of the meninges. Several cases have been cited, in fact, in which the only lesion found after death consisted of granulations in the pia mater. No traces of inflammation were observed. It is clear, therefore, that the evidences of the disease, or symptoms, depend not merely on inflammation caused by the tubercular deposits, but on the presence of that morbid production. The paralysis, which is one of the important symptoms, is thought to depend chiefly on softening of the substance of the brain. The author referred to states that it occupies the side opposite that in which the change exists.

On the other hand, it also happens, that children die with all the symptoms of the disease, and after death, very few or no granulations are found to account for the inflammatory changes existing in the head, but the tuberculous product is found in other organs of the body, thus establishing, I think, the true nature of the case.

Symptoms ; course ; duration.—The disease has been divided by authors into different stages, founded on the predominance of certain symptoms at particular periods of its course.

These divisions are all imperfect and unsatisfactory, because the disease is in fact a continuous one, and for this reason some writers have avoided attempting any classification of the symptoms. It seems to me, however, that we can obtain a more faithful picture of the disorder by adopting the division made by M. Valleix, which, though arbitrary and imperfect, because of the want of a natural

line of demarcation seems warranted by the very great difference in the character of the symptoms at an early and late period of the affection. I shall therefore describe first the invasion of the malady, and then two stages or periods of the symptoms after the disease is confirmed.

The *invasion* may be slow and tedious, or very sudden. In the majority of cases it is sudden, the child being attacked while apparently in good health; while in a smaller number it occurs during the course of tubercular disease of other parts of the body, or after various symptoms of disordered health have existed for a considerable length of time. Whether slow or rapid it is marked by three important symptoms, *headache*, *vomiting*, and *constipation*, to which is added in the great majority of cases slight *acceleration* of the circulation. At the same time the *intelligence* of the child remains perfect, *strength* is not greatly diminished, *appetite* is not entirely lost, and *thirst* is moderate. These symptoms usually last but two or three days before others make their appearance, showing that the attack is confirmed. In some few instances, however, they last, with irregular intermissions, for several weeks. In one case, in a girl six years of age, that came under my notice, the invasion was preceded during three months by occasional cough, and irregular attacks of fever, by progressive emaciation, paleness, languor alternating with extreme irritability, disinclination to take exercise, and during the latter part of the time by partial lameness, and in fact by all the signs of general tubercular disease. In another, which occurred in a boy eight years of age, it was preceded for several months by frequent complaints of intense headache, especially after taking active exercise, and by unusual languor, but no other symptoms. The boy was sent to boarding-school apparently well and was suddenly attacked there. In another case the meningeal symptoms were developed in the course of phthisis, whilst in the remaining seven that I have seen the invasion was sudden.

First stage.—The headache, vomiting, and constipation persist and become more marked. *Headache* is a nearly invariable symptom in children old enough to describe their sensations, and is therefore very important. In infants its presence is to be in-

ferred when the child frequently carries its hands to various parts of the head and presses strongly against it, and when the head is constantly rolled from side to side. It is generally frontal, and is usually referred to a point just over one or both brows. In other cases it extends over the whole head. It is commonly severe, so that the child when old enough complains of it spontaneously. In the case of a girl seven years old whom I saw, it was so severe that she cried frequently and bitterly, begged to have the doctor sent for, and submitted willingly to any remedy suggested with a view to its relief. It is thought that the acute, shrill cry of the disease, to which the term *hydrencephalic* has been applied, depends on the acuteness of this pain. It usually lasts throughout the first stage, and ceases only as the delirium and coma of the second stage come on. *Vomiting* is also a nearly constant symptom. Of 80 cases, collected from different sources by M. Barrier, it was absent only in 15, or less than a fifth. This symptom generally makes its appearance on the first day, rarely later than the second or third, and lasts two or three days, and sometimes longer. In one case that I saw, it lasted eleven days, though it was but slight on the tenth and eleventh. The matters ejected from the stomach consist of the ingesta, and of mucus and bile in various proportions. It is commonly repeated two or three times a day. *Constipation* is even more important as a symptom than the one last named. Of 87 cases it was absent only in 7, according to Barrier. Rilliet and Barthez state, however, that it exists at the beginning only in about three-fourths of the cases. Where there is diarrhœa, instead of constipation, at the invasion, as sometimes happens, the former symptom almost always depends on tubercular disease of the intestine. Even under these circumstances, however, the diarrhœa is sometimes arrested and constipation substituted under the influence of the cerebral disease. The constipation generally persists obstinately for several days, and then gives way under the influence of purgative medication, or is replaced spontaneously by diarrhœa with involuntary stools towards the termination of the case.

In connexion with the three important symptoms just described, there are others, which though less characteristic, are of much as-

sistance in forming the diagnosis. The child is *dull* and *sad*, or *excited* and *irritable* by turns; he shuns the *light*, or closes the eyelids and contracts the brows when it is thrown upon the face; the *sleep* is restless and disturbed, and accompanied by grinding of the teeth; and he utters from time to time, both sleeping and waking, the peculiar, shrill, sharp, and sudden scream, which seems to depend upon internal pain, probably headache, and which has been called by Coindet the *hydrencephalic cry*. The *intellectual faculties* remain undisturbed in the majority of the cases during the first few days, and this fact, which is so contrary to what might be expected, is one of the utmost importance in the judgment of the case. I remember being asked by the little girl seven years old, to whom I have already referred, "why it was that she saw double, why she saw two mothers and two doctors?" At the time when she first asked the question there was no perceptible strabismus, but on the following day, I thought I could detect a deviation of one of the eyes from its proper axis, and on the third day, the deviation was very marked; though the poor child still wondered why she saw two objects instead of one. In another case, in a boy five years old, there was no disorder of the intelligence until the eleventh day, when there was slight delirium alternating with somnolence; yet it was clear from the first that the attack would prove one of tubercular meningitis, from the co-existence of violent frontal headache, obstinate vomiting, constipation, slow and irregular pulse, and the absence of other local or general symptoms. In only a fifth of the cases observed by Rilliet and Barthez was there perversion of the intellectual faculties at the invasion. Let us observe, moreover, that even when children present some of these disorders early in the attack, they generally consist only of slight delirium, dulness of the intelligence, slowness and hesitation in answering questions, disposition to somnolence, excessive irritability and peevishness of temper, and what is more important and characteristic than any of these, perhaps, of a certain expression of the countenance, and particularly of the look, which is expressive of astonishment or of the utmost indifference. The look is in fact fixed or staring, like that of one in a mild ecstasy. Even when these

symptoms exist, however, at an early period, they not unfrequently alternate with the most perfect clearness of the faculties, so that the physician in private practice, who sees his patient only at long intervals, and for a few moments at a time, should never venture to disbelieve without due consideration, the account of the mother or nurse as to their occasional presence during his absence, even though never observable during his visit. I knew this to happen in regard to a boy eight years old, whose mother constantly insisted to the physician in attendance, that during his absence the child occasionally presented slight delirium, and a wild uncertain expression of the countenance, which made her fear that his brain might be affected. As the child's intelligence was perfect, however, whenever the doctor saw him, he determined that the mother was fanciful through over-anxiety, and ascribed the sickness to a bilious disorder of the stomach. After a few days the case developed itself, and the boy died with every symptom of tubercular disease of the brain.

When disorders of intelligence do not occur in the early days of the attack, they usually make their appearance about or soon after the fifth day.

During the first stage the *coloration* of the face ought to be noticed. It is generally paler than natural, though from time to time a sudden flush of redness may be seen to pass over it. The condition of the *senses* is natural, except that the acuteness of the eye, ear, and sometimes that of touch, are exalted, so that the child avoids the light, starts at sudden or loud sounds, and cries when it is touched or moved. The *respiration* becomes unequal and irregular, and is interrupted by sighing or yawning.

Convulsions rarely occur in the first stage. Rilliet and Barthez conclude that meningitis without complication of tuberculous disease of the cerebral substance, never begins with convulsions, and that, on the other hand, whenever they appear at the invasion, or occur frequently and with violence, they almost always coincide with tubercles of the substance of the brain.

The *tongue* remains moist; the *appetite* is not entirely lost; *thirst* is moderate; the *constipation* continues, unless removed by treatment; the abdomen becomes *retracted*, so that its walls ap-

proach very closely to the spinal column, and allow us to feel the pulsations of the aorta without using more than very slight pressure. The latter symptom comes on gradually and is generally well marked by the sixth day or a little later. Rilliet and Barthez regard it as a very important sign, and state that they have observed it almost exclusively in cerebral affections. They think it depends not upon contraction of the abdominal muscles, but upon retraction of the intestines. I can add my feeble support to the evidence of the above authorities as to the value of this symptom. It has been very marked in the cases that I have seen.

The state of the *circulation* is of the utmost importance in forming the diagnosis. So true indeed is this, that Dr. Whytt of Edinburgh, whose description of acute hydrocephalus, published in 1768, has been most highly commended by all recent writers as a singular instance of accurate observation, makes three stages of the disease, each of which is characterized by the state of the pulse. In the early part of the attack the pulse is accelerated, rising to 110, 120, or, according to Whytt, in a few cases to 130 or even 140. At the same time it is neither full nor tense as a general rule, but rather soft and compressible. This condition of the pulse changes, as we shall find, in the middle period of the disease, and again shortly before the fatal termination. The *heat* of skin is usually moderate at this time, as might be supposed from the state of the circulation.

Second stage.—This stage begins about the time that the more marked nervous symptoms show themselves. The headache generally subsides or ceases at the beginning of this period and gives place to delirium. This occurs usually somewhere between the sixth and twelfth days. The delirium which occurs has been generally supposed to be always mild and calm. Rilliet and Barthez state, however, that in one third of their cases it was intense, and accompanied with cries, agitation, and frequent changes of position. In most of the cases it is mild, and is manifested in older children by their muttering unintelligible words, by inattention to what is going on around them, by an expression of wildness and astonishment, and by hesitating answers to questions. In children under two years of age there is no proper delirium.

There is, however, an analogous condition which is characterized by disorder of the two faculties of attention and perception. This symptom seldom lasts more than two or three days, and generally alternates with somnolence, so that the child is either dozing and sleeping, talking in its sleep, or frequently waking with loud cries and restlessness. It has often been asserted that general and special sensibility were very much exaggerated at some period of the disease. Rilliet and Barthez state, however, that in only four of their patients was the general sensibility exalted. Much more generally it is diminished in the early part of the second stage, or about the seventh day, and completely abolished towards the end. The face in the second stage is almost always pale, or pale and flushed alternately. Occasionally contractions pass over the features, giving rise to grimaces, after which the countenance resumes its expression of indifference and stupor. The eyelids are generally only partially closed, and between them the globes of the eyes can be seen to oscillate and move in various directions, as though by some automatic force.

As the case progresses the nervous symptoms become more and more marked; somnolence gradually deepens into coma; the delirium becomes less and less frequent; and the child no longer observes what is going on, nor answers questions. As the somnolence and coma increase, various lesions of motility make their appearance, consisting, in order of frequency, of paralysis which is generally partial, contraction with rigidity of the limbs, stiffness of the trunk, spasmodic closure of the jaws, carphologia, subsultus tendinum, and convulsions. The paralysis is almost always partial and of very limited extent, affecting for instance, the jaw, the orbicularis muscles of the eyelids, the levator of the upper eyelid, the tongue or one side of the face. It is very rare to see one of the limbs paralysed. Contraction with rigidity of the muscles is an important symptom, but is not always present. When it exists it generally appears at an advanced period of the attack, commonly between the seventh and thirteenth days, and is usually partial. It may affect either the extremities, trunk, or inferior maxilla. It is seldom permanent, but after lasting one or two days, disappears, to reappear at a later period. The carphologia, subsultus, and

chewing motion of the under jaw generally occur only a few days before death, and last but one or two days. Rilliet and Barthez state that convulsions never occur at the commencement of meningitis, unless there be a complication of tubercular affection of the cerebral substance, and that they are rarely frequent or violent during the course of the case, except under the same circumstances. When they do occur in tubercular meningitis, they may be limited to the extremities, upper lip, eye-balls, or they may be general. Sometimes the child perishes in a convulsion. They are generally much less important as a symptom, according to M. Valleix, than in simple acute meningitis.

The *decubitus* in the early part of the second stage is generally lateral, with the thighs flexed upon the pelvis, the legs upon the thighs, the arms applied against the thorax, the elbows bent, and the hands placed in front. At this time the child will still occasionally move its position with facility, showing that strength is not by any means entirely lost. At a still later period the *decubitus* is dorsal. In the latter part of the first, and early part of the second stage, the *pulse*, which we have ascertained to be accelerated at the invasion, falls to the natural standard, or becomes slow, and at the same time irregular. From 110 or 120, as it was, it now sinks to 90, 80, 60, or, as happened in one instance to M. Guersent, to 48 in the minute. Coincidentally with this change it almost always becomes irregular. The irregularity affects both its force and quickness, so that a strong pulsation may be followed by a feeble one, or the rhythm may be regularly or irregularly intermittent. The irregularity varies greatly at different periods of the day, or within short spaces of time, so that the pulse is found to be very slow at one moment and much more frequent the next. On this account it is necessary to examine it on different occasions. Slowness and irregularity of the circulation are important as a means of diagnosis, since it has very rarely been met with as a permanent condition, except in the tuberculo-inflammatory affections of the brain and its dependencies. Towards the termination of the disease, generally speaking two or three days before death, the pulse rises again in frequency, so that it counts at first 112 or 120, and gradually increases to 140, 160,

or even 200, the day before, or that on which death takes place. Simultaneously with this change it also becomes extremely feeble and small, and often ceases to be perceptible at the wrist on the last day. The *heat* of skin increases with the acceleration of the pulse. During the last few days the surface is often covered with an abundant perspiration; the tongue becomes dry; the teeth and gums are fuliginous; the exhaustion increases; the respiration becomes stertorous, unequal, difficult and anxious, and at the very last attended with great dyspnœa; and the urine and stools are discharged involuntarily. Death finally occurs in this condition, or is hastened by an attack of convulsions. In some cases it is most lingering. In one instance I expected the death of a young child in this disease every day for eight in succession.

The *duration* of tubercular meningitis is exceedingly variable in different cases. As a general rule it lasts between eleven and twenty days, though it may continue a considerably longer time. Rilliet and Barthez have never known death to occur before the seventh day.

Diagnosis.—The diseases with which tuberculosis of the meninges is most likely to be confounded, are simple meningitis, and typhoid fever. It might also be confounded, though this is much less probable, with the cerebral symptoms which complicate the exanthemata and some local diseases, and to which as a group, M. Barrier has applied the term pseudo-meningitis.

The diagnosis between tubercular and simple meningitis will be best understood from the following synoptical table extracted from the work of M. Valleix, and from a paper by M. Rilliet (*Arch. Gen. de Med.* t. xii, 1846).

SIMPLE ACUTE MENINGITIS.

No antecedent symptoms.

Symptoms of the invasion more violent, more distinct, more characteristic, especially in idiopathic cases.

Violent delirium, very suddenly established; (phrenitic form of M. Rilliet.)

TUBERCULOSIS OF THE MENINGES.

Antecedent symptoms of tubercles.

Symptoms of invasion ordinarily less violent, occurring slowly, often insidiously.

Delirium less violent, often tranquil, appearing later, and arriving less rapidly at its summum.

In a certain proportion of cases, frightful convulsions at the commencement; (convulsive form of M. Rilliet.)

Very severe headache; suffusion of the face, photophobia, etc.; these symptoms strongly marked.

Vomiting more frequent, and more abundant. Constipation moderate. Pulse often slower than natural at the commencement; more irregular.

Progress continuous, without perceptible remissions.

Duration shorter; from one to six days, rarely longer.

No convulsions at the commencement.

These symptoms sometimes absent, especially at the commencement; they are almost always less strongly marked.

Vomiting less frequent, and less abundant. Constipation very obstinate. Pulse more frequent, stronger, less irregular.

Progress continuous, but ordinarily with very perceptible remissions.

Duration much longer.

Before quitting the subject of the diagnosis of these two affections, it is desirable to state for the information of the reader, that some of the highest authorities acknowledge it to be sometimes nearly or quite impossible to distinguish between them. This is the expressed opinion of MM. Guersent, Ruzz, Barrier, and Valleix.

From typhoid fever tubercular meningitis is to be distinguished by the antecedent history of the patient, which often reveals the existence of a tubercular diathesis in the latter affection; by the symptoms of the invasion, which in meningitis consist of severe and persistent headache, frequent vomiting, and constipation, whilst in typhoid fever the headache is less severe and less persistent, the vomiting much less frequent, and the constipation replaced by diarrhœa; by the different characters of the febrile movement, which, in typhoid fever, is more marked, and attended with a frequent, full, and regular pulse, while in meningitis it is less marked and is accompanied after a few days by slowness and irregularity of the pulse; lastly, in meningitis, the constipation is obstinate, the abdomen retracted, and there are various important and characteristic lesions of motility, sensibility, and the senses; in typhoid fever, there is diarrhœa, the abdomen is distended and meteoric, there are characteristic rose-coloured spots, whilst there are no considerable lesions either of motility, sensibility, or of the senses.

It is unnecessary to do more than allude to the possibility of

confounding the disease with the exanthemata, or with local diseases accompanied by cerebral symptoms, and particularly with pneumonia in very young children. The diagnosis must be made by careful consideration of the symptoms peculiar to each, and in the case of a local disease, by accurate physical examination of all the important organs of the body.

Prognosis.—M. Barrier, in speaking of the prognosis of this affection says: "The gravity of tubercular meningitis is not surpassed by that of any other disease. Thoracic and abdominal phthisis, though almost constantly fatal, pursue a slower course, and last a longer time. We may even allow as proved, that in a small number of cases, they are susceptible of cure, or may remain stationary for months or years. Unfortunately it is not so in regard to tubercular meningitis." Rilliet and Barthez remark: "For our part we have not seen a single case of tubercular meningitis terminate in recovery, and our experience confirms that of MM. Ruz, Piet, Gerhard, Green, etc." They add that they have not been able to find any *authentic* cases of cure in the French journals. M. Valleix is of opinion that after having acquired the conviction that a case is really one of tuberculosis of the meninges, we should regard the patient as lost; "for the exception which I have mentioned, (a case belonging to M. Rilliet, then unpublished), even did no doubt as to the exactness of the diagnosis remain, ought not, standing by itself, to impart to us any real security." M. Guersent (*Dict. de Med.* t. xix, p. 403,) seems to think it possible that the disease may sometimes terminate favourably in the very early stage, but adds that "such cases are always more or less doubtful, and seem to us to belong rather, for the most part, to simple meningitis." During the second period, (slowness and irregularity of the pulse,) he has scarcely seen one child in a hundred survive, and even then they perished at a later period of the disease, or of phthisis pulmonalis. Of those arrived at the third stage, (marked by renewed frequency of the pulse, coma, and lesions of motility and sensibility,) he has never seen any recover, even momentarily. Dr. Geo. B. Wood, (*Pract. of Med.* vol. ii, p. 635,) states that he has "never seen a well-marked case of tuberculous meningitis end favourably." My own experience coincides with

the mass of evidence given above as to the hopeless fatality of the disease. The ten cases that I have seen all perished. I have seen but one which gave me the least reason for hope, after I had once supposed the child attacked with the disease. This occurred in a boy eight years old, who had been suffering for two weeks before I saw him with violent frontal headache, frequent vomiting, constipation, slight fever, and somnolence. I fully expected that this would prove to be an attack of tubercular meningitis. A large dose of calomel followed by castor oil, and free leeching to the temples, relieved him in two days perfectly, and he has remained well ever since, though this was nearly three years ago. With one more authority as to the prognosis of the disease, I shall conclude. Dr. Robt. Whytt, (*Works of Robert Whytt published by his son*, quarto, Edinburgh, 1768, p. 745,) says: "I freely own, that I have never been so lucky as to cure one patient who had those symptoms which with certainty denote this disease; and I suspect that those who imagine they have been more successful have mistaken another distemper for this."

Are we then to abandon utterly all hope of deriving good from medicine in the disease under consideration? To this momentous question we ought, it seems to me, to respond in the negative. What then are the grounds for entertaining hope where, from the quotations given above, all that has as yet been done seems to have failed so completely? They are first, the evidence of M. Guersent that he has seen cases which appeared to be tubercular meningitis recover in the first stage. Granted that they were cases of simple inflammation. But they were undistinguishable from the tubercular disease by one of the most celebrated of modern physicians. Surely, therefore, it may happen to men of inferior skill to meet with the same difficulty, or if I may so speak, to make the same mistake. It is said by M. Valleix, that M. Rufz, after determining at the autopsy, that a case which he had witnessed was one of simple meningitis, asserted that it would have been impossible to distinguish it from the tubercular disease during life. Again, M. Rilliet has, according to M. Valleix, seen one case of recovery from what he believed to be the tubercular affection. I know of the occurrence of a case in this city, under the charge

of one of my friends, than whom I believe no one can be more competent to make a correct diagnosis, in which, after the child had presented in regular order all the early symptoms of the disease, and had arrived at the last and most hopeless stage, perfect recovery, to his utter amazement, gradually took place. This child, when my friend last heard of it, three months afterwards, was in all respects strong and hearty. No doubt the probabilities are that the case was one of simple meningitis, but who could have known this at the time; and should it not deter us from abandoning all hope, and, as a consequence, all active treatment, when we seem to have under our hands a case of this dreadful malady.

It is important, in tubercular meningitis, to avoid making a positive prognosis as to the period at which death will occur, notwithstanding that the patient may present every mark of an immediately fatal termination. I have already adverted slightly to this subject. On one occasion I expected the death of a patient with this malady for three days in succession, and on another, I visited a child for a week, during every day of which it seemed as though existence could not endure until the next. It had during this time profound coma, subsultus tendinum, and enlarged pupils; the eyelids were half open, the eyes constantly oscillating, or else rigidly distorted, and both corneas dimmed and slightly eroded, from constant exposure to air and light. Convulsions occurred from time to time, the pulse was variable and at times exceedingly frequent, and indeed everything threatened a speedy termination. Rilliet and Barthez say "often have we inscribed upon our notes *death imminent*, and been astonished the next day to find still alive, children to whom we had allowed scarcely two hours of life."

The symptoms which most positively indicate the near approach of death are: livid colour of the face, sweats occurring about the face, glassy expression of the eye, dry and incrustated nostrils, very rapid pulse, and still more strongly, the various nervous symptoms mentioned, as carphologia, subsultus tendinum, and particularly general convulsions.

Treatment.—The methods of treatment which have been proposed at different times having all failed, it becomes very difficult and embarrassing to determine what ought to be recommended.

As, however, there can be no doubt that simple meningitis has sometimes been mistaken for this affection, and as the state of the diseased organ after death proves the existence of an inflammatory element in the disease, it would seem most reasonable to employ the antiphlogistic plan, until more extended observation and greater experience shall either discover another and better method, or show the entire futility of this. By this method we at the same time do what is most proper should the attack chance to prove one of simple inflammation, and employ the means most likely to remove the inflammation of the meninges which accompanies and is the consequence of the tubercular deposit. Moreover, from all that I have read and seen, it seems to me that whenever cases have been reported as cured or even only ameliorated, it has been under the influence of antiphlogistic remedies, including calomel, and more or less powerful counter-irritants.

In the first stage, the treatment ought to begin with *bloodletting*. It is preferable always to employ venesection, unless there be some positive contra-indicating circumstance. This is the expressed opinion of most writers. Some recommend opening the jugular vein as the most direct means of acting upon the cerebral circulation, while others propose that the operation be performed in some of the veins of the inferior extremities, as effecting an useful derivation at the same time that it yields the requisite amount of blood. For my own part I have been satisfied to bleed at the usual place, unless there was some difficulty in finding a vein, in which event I have had recourse to the vessel running over the inner malleolus. The quantity of blood to be taken must depend on the age, constitution, and previous health of the patient. When the child is over two or three years old, with the appearances of good health, the quantity may vary between four and eight ounces; in younger children it should rarely exceed four. The bleeding may be repeated if the pulse continues tense and the flushing of the face fails to subside after the first operation, or we may resort to leeches or cups. Rilliet and Barthéz prefer local to general bleeding, and recommend that the leeches be applied to the anus or inferior extremities, in order to obtain a derivative as well as depletory effect. Where all remedies

are of so little avail as they seem to be in the disease under consideration, it is difficult to decide on the most proper course, not only as to the selection of means, but as to the extent to which they are to be employed. It seems to me, however, that the advice given by the authors-just quoted, to employ bloodletting only at the invasion of the disease, is the most prudent. They state that "employed in the second and particularly in the third stages, their inevitable effect is to increase the nervous symptoms; the delirium becomes more violent, and the coma, if it existed, augments; we have several times observed this." Dr. Gerhard, whose opinions on this subject are deserving of great weight, advises that local bleeding be directed "so long as the patient can bear it, that is to say, until he becomes pale, and the flush is gone, whether the other symptoms abate or not" (*Clinical Lect. by Graves and Gerhard*, Phil. 1842, p. 473).

After bleeding it is proper to employ some kind of *counter-irritation*, which may consist of blisters applied to the nape of the neck, or behind the ears, to be kept discharging for several days, of sinapisms to the extremities, and of mustard pediluvia. To be of any probable service these remedies ought to be perseveringly and patiently employed for several days, or during the whole of the second stage.

The head ought to be kept cool by means of *cold applications*, consisting of cloths wet with cold water, of affusions with cold water, or, as has been proposed by M. Guersent by the use of irrigation as employed in surgery. M. Guersent prefers this mode of applying cold to any other, believing it to be the most convenient and comfortable to the child, and from its continuous action, the most efficacious. To make use of it the hair ought to be shaved or closely cut; the child is to be placed upon a mattress without a pillow, and with the head near the edge of the bed. The head is then covered with compresses of soft rag, or better still, patent lint, while under it is placed a piece of oiled silk or india-rubber cloth, so arranged as to keep the thorax from being wet, and doubled into a gutter above to convey the water off into a vessel placed on the floor. A bucket or basin filled with fresh, cool water is placed near the head of the bed, and from this a syphon made of lint or lamp-wick is so arranged as to convey a stream of water upon the

compresses covering the head. If the heat of the whole body falls so much as to threaten collapse, after the irrigation has been continued for some time, the stream of water should be stopped, and compresses merely, wet with water not quite so cool, kept on the head. The latter precaution is necessary in order to prevent injurious reaction from the sudden and total removal of so powerful a sedative as irrigation proves to be.

Some practitioners prefer the use of ice in a bladder. This seems to me, however, too severe a remedy to be long continued, and I would therefore rather use only cloths wet with iced water, or irrigation. Dr. Abercrombie is of opinion that the application of cold is by far the most powerful local remedy that we have. M. Gendrin recommends cool or cold affusions over the whole surface, the temperature to be proportioned to the heat of the skin. When there is but little heat of head, only a slight febrile movement, and the headache is not relieved by cold applications, Guersent recommends the substitution of warm poultices to the scalp, in the place of irrigation or cold applications.

Purgatives ought to be employed so as to secure a moderately free state of the bowels. To use them to such an extent as to procure very frequent and watery stools, with the view of obtaining a strong derivative action upon the intestinal mucous membrane, can only, it seems to me, be injurious, by increasing the febrile reaction and nervous disorder already existing. Dr. Abercrombie, it should be stated, however, regards purging as the most efficient treatment that can be employed. He says, "In all forms of the disease, active purging appears to be the remedy from which we find the most satisfactory results." He recommends the use of croton oil. Calomel, on account of its powerful antiphlogistic and sedative action, is the best purgative to be given at an early period of the disease. From two to eight grains, according to the age of the child, may be exhibited in a single dose, to be followed in several hours by some other purgative. This may be castor oil, jalap, magnesia, rhubarb, extract of senna, or salts. Remedies of this class should be repeated from time to time throughout the case, according to the condition of the bowels.

Besides antiphlogistics, counter-irritants and evacuants, which

have just been considered, there are two other remedies which have obtained some reputation in the treatment of the disease. These are *calomel*, given as an alterative, and *iodine*. Calomel is highly recommended by most of the English writers on acute hydrocephalus, and is asserted to have effected cures when it has been pushed to such an extent as to produce salivation. But little dependence, however, can be placed on these assertions, as in all probability, the reported recoveries occurred in cases of simple meningitis. The French writers, whose correctness of diagnosis is probably more to be depended upon, speak of having used it in very large quantities without any success. It was given to many of the patients of Rilliet and Barthez, in the quantity of from six to ten, increased to twenty grains, in twenty-four hours, in connexion with frictions with mercurial ointment, of which two drachms and a half were used at first, and the quantity afterwards doubled and trebled. They state that salivation did not occur in any of the cases, though fetor of the breath and inflammation of the gums were of frequent occurrence. It has already been stated that all the cases of these gentlemen proved fatal. Calomel may be given, as has been remarked, in purgative doses, at the beginning, and for the purpose of procuring its specific effects. With the latter view the dose may be from a quarter of a grain to a grain, every hour or two hours. Mercurial inunction in conjunction with the internal administration of the remedy, has been highly recommended by several writers as an efficient means of procuring the full effect of the drug upon the constitution. About a drachm of the ointment is to be rubbed into the insides of the arms and thighs morning and evening, and the quantity gradually increased if no effect is produced. For my own part, I will merely state that I have never known calomel given in large quantities, in order to procure salivation, of the least benefit in the disease. On the contrary, I cannot but think that the violent irritation of the digestive mucous membrane which it has determined, whenever I have used it largely, and the inflamed, irritated condition of the mouth which it caused in one case, must have been a serious aggravation of the state of disease under which the constitution was labouring. Mercury is well known to be an injurious and dangerous remedy in

the tubercular diseases of adults, having for effect to increase the dyscrasia of the constitution, which always exists, and thereby hasten the progress of the malady. Why it should have a different effect in children is difficult to understand. It may be said, to be sure, that in the disease we are considering, it is given to overcome the inflammatory element of the malady, which, for the time, constitutes the danger of the case, and also to allow the patient the chance of its beneficial operation should the disease happen to be one of simple meningitis. But we are of those who deem it against morals to risk a wrong that good may perchance arise. I would therefore, in a case which I believed after mature and careful consideration, to be one of tuberculous meningitis, use mercury merely for its temporary sedative action, and not in the large quantities recommended with a view of obtaining its peculiar action, at least not until further evidence of its utility is brought forward. In support of the view just expressed, I will quote the following opinions of Dr. John Abercrombie, (*Diseases of the Brain and Spinal Cord*, Philad. ed. 1831, p. 173-6): "Mercury has been strongly recommended in that class of cases which terminates by hydrocephalus, but its reputation seems to stand upon very doubtful grounds. In many cases, especially during the first or more active stage, the indiscriminate employment of mercury must be injurious. In the preceding observations, I shall perhaps be considered as having attached too little importance to mercury in the treatment of this class of diseases, particularly in the treatment of hydrocephalus; but in doing so, I have stated simply what is the result of an extensive observation, and I confess, the result of my own observations is, that when mercury is useful in affections of the brain, it is chiefly as a purgative."

It has been recommended within a few years, by Sir B. Brodie, to employ mercurial inunction as especially applicable in giving mercury to children. He advises that a drachm or more of the ointment be spread upon one end of a flannel roller, which is to be applied, not very tight, around the knee; repeating the application daily. "The motions of the child produce the necessary friction; and the cuticle being thin, the mercury easily enters the system."

The editors of the journal in which this communication is made

(*Braithw. Retrospect. of Med.* vol. xiv, 1846, p. 147, from *Quart. Med. Rev.*, July, 1846, p. 169) state that they tried this plan in a case of acute hydrocephalus, in which some of the most urgent and fatal symptoms were present; "such as very dilated pupils, constant convulsions, hemiplegia, and more or less stertorous breathing; in short, so violent were the symptoms, that we considered the case perfectly hopeless; but on reflecting on Sir Benjamin's method, we ordered the strong mercurial ointment to be smeared on each leg, every 12 hours, and covered with a stocking made to tie tightly above the knees. The symptoms soon began to abate, and by following this up with small doses of iodide of potass, frequently repeated (gr. i, every three or four hours), the head symptoms vanished.

In a second case, the same set of symptoms were approaching, but were stopped by the same mode of treatment."

It has been proposed to employ iodine because of its good effects in different scrofulous and tuberculous diseases. I am not aware of its having been tried in any considerable number of cases. M. Rilliet, however, (*Loc. cit.* t. iii, 1847, p. 308,) states that it has entirely failed in his hands in the tubercular form of the disease; the only influence which it seemed to exert was to cause the immediate suspension of the coma. This was its effect also in a case in which I employed it, that of a girl seven years old, to whom I gave two drops of Lugol's solution three times a day, from the thirteenth to the twentieth day, when she died. The day before her death she seemed to improve somewhat, and I was in hopes that it had been of some service. The amelioration did not continue, however, and I am now disposed to believe that the change was one of those which often take place naturally in the disease. In another case of a boy five years old, I gave it in the form of the iodide of potassium, a grain four times a day, from the tenth to the eighteenth day, when he died. I could not perceive that it exerted the least influence on the progress of the disease. It is, nevertheless, a remedy which ought to be tried. I would recommend the use of iodide of potassium in doses of a grain every three or four hours for children two years of age. It ought to be begun with as soon as the acute symptoms have been sufficiently reduced

by bloodletting and purging, and continued in connexion with counter-irritants and cold to the head.

When the convulsive symptoms are violent and distressing, they may often be moderated by the use of a warm bath, which must be carefully given, and by the administration of some of the *anti-spasmodics*. I prefer for this purpose the fluid extract of valerian, of which from three to five drops may be exhibited every two or three hours to young children, and a larger dose to those who are older.

As a general rule, *narcotics* of all kinds are to be avoided, from their effect of increasing the constipation, and exciting more or less the cerebral circulation. When, however, neither antiphlogistics, evacuants, nor cold or warm applications relieve the sufferings of the child, it would be proper to employ small laudanum poultices or opium plasters upon the forehead or temples, or we may use morphia by the endermic method.

The treatment described in the preceding pages, is that which is proper for cases of the disease occurring in subjects previously in good health, or evincing but few signs of the tubercular cachexia. When, on the contrary, it occurs in children with extensive tubercular affections of other organs, by which they are already weakened and exhausted, the treatment must of course be modified to meet the circumstances of the case. It ought to consist chiefly of local bleedings used with great moderation, of purging when constipation is present, of counter-irritants, of cold applications, and of an early use of iodine or of the iodide of iron. We should recollect that experience has long since shown the weakness of our art in such cases, and for that reason avoid such a degree of interference as might possibly abridge the little span of life allowed the patient by this relentless malady.

Prophylactic treatment.—It must be evident that the prophylactic treatment is of especial importance in a disease so little amenable to curative means as the one under consideration. When therefore there is reason to suspect a tendency to tubercular meningitis in a child, either from the fact that other children in the family have perished with it, or from a bad state of the general health and frequent complaints of headache, it becomes proper and

necessary to regulate both the moral and physical education with a view to its prevention. For this end the hygienic management of the child ought to be such as is best calculated to prevent the formation or development of tubercles in the constitution. During infancy, such a child should be nursed, if this be possible, by a strong, hearty woman, with an abundant flow of milk. If the mother is not herself possessed of these qualities, if there be the least doubt upon the point, she ought without hesitation to give up the pleasure of nursing the child herself, and procure for it a wet-nurse of the kind described. This alone will, in all probability, often make the difference between a vigorous and fragile constitution. When the time for weaning arrives, that change ought to be made with the greatest care and circumspection. During and for some time after weaning, the diet must consist principally of milk preparations and bread, and of small quantities of light broths, or of meat very finely cut up. As the child grows older, the meals ought be arranged at regular hours, and should consist of four in the day. The principal food must be bread and milk well chosen, well-cooked meats, and rice and potatoes as almost the only vegetables. After the first dentition is completed, a moderate use of ripe and wholesome fruits may be allowed, but always with care, in order to avoid injury to the digestive organs, and also so as not to mar the appetite for more wholesome and nutritious food. Coffee and tea ought to be forbidden at all times. It is best that the child should not even taste them, so that it may not be tormented with the desire of having what is improper.

After diet the most important points in the treatment are air and clothing. The child should inhabit if possible a large, dry, well-ventilated room, which ought to be kept as cool as possible in summer, and moderately warm in winter. Not a day should be allowed to pass, unless the weather is totally unfit, without the child's being sent for several hours into the open air, and I believe, that it is much better for it to walk than ride, unless the weather be very hot. The clothing ought to be suitable to the season, cool in summer, and warm in winter. In our country there is a great inclination to *harden* children by dressing them very slightly in cold weather; so that they frequently suffer from catarrh, pneu-

monia, and spasmodic croup, brought on by improper exposure. This cannot but be wrong in a child who shows the least evidence of a tendency to tubercular affections.

For my own part I am fully convinced from what experience I have had of the diseases of children, that by far the most certain and effectual means of preventing the development of a tubercular, or indeed any other cachexia in a child, is to have it brought up in the open country, or in some healthy village, until the epoch of puberty has passed by safely. A very good plan for parents whose occupations compel them to live in cities or large towns, is to have their residence a few miles in the country and to come to town every day. Children brought up in this way have a far better chance of obtaining strong and vigorous constitutions than those reared entirely in the close and confined dwellings and streets of crowded cities.

As to the particular means likely to be of service in preventing a direction of tubercular cachexia towards the brain, so as to produce tuberculosis of that organ, we have only to propose the course recommended by different writers, to keep the head cool, by not allowing it to be very warmly covered, and by keeping the hair short ; to keep the extremities warm ; to avoid stimulating the intellectual faculties to any considerable extent by education, until after eight or ten years of age ; and to use every means to preserve the general health in a sound and pure condition. Some recommend the long-continued employment of a powerful derivative from the brain, as a small blister on the arm, or a seton in the neck. It seems to me, however, that such remedies ought not to be used unless there are positive symptoms of a tendency to cerebral disorder. The caution not to interfere much with eruptions which nature may have thrown out upon the scalp is, I believe, wise and prudent.

ARTICLE II.

SIMPLE MENINGITIS.

Definition ; synonymes ; frequency.—By this term is understood inflammation of the membranes of the brain, independent

of tuberculosis of those tissues, or of other organs of the economy.

The disease was for a long time confounded with tubercular meningitis under the titles of water on the brain, dropsy of the brain, and acute hydrocephalus. It has also been called arachnitis; and more rarely phrenitis.

Its frequency is much less than that of tubercular meningitis. It appears that Rilliet and Barthez, during their researches, met with only five cases of this disease, while they report thirty-three of tubercular meningitis. Bouchut states that he has met with two cases of simple meningitis to six of the tubercular disease, whilst Barrier reports only four of the former in nearly thirty autopsies of meningitis. He states, however, that he has met with three cases of recovery, all of which he believes to have been instances of the simple form. Fabre and Constant met with nine cases of simple to twenty-seven of tubercular meningitis in a period of two years, at the Children's Hospital of Paris. (*Bibliothèque du Méd. Prat.* t. vi, p. 166.)

Causes.—The causes of simple meningitis are not very clearly ascertained. It would appear, however, that the disease is more common in infants than older children. M. Rilliet, who has recently published a very valuable paper on this affection (*Arch. Gen. de Méd.* t. xii, 1846), divides it into two forms, the convulsive and phrenitic, the former of which he believes to be most common under two, and the latter between five and fifteen years of age. This author is disposed to think, from the fact that the disease is most frequent in the first and ninth years of life, that the process of dentition has something to do in its production. It appears also to be more frequent in boys than girls, and in robust than in weak constitutions. Guersent has known it to follow long-continued exposure to the sun in several instances, particularly in young infants; Rilliet and Barthez report a case of the same kind, and Rilliet (*Loc. cit.*) another; other causes cited by authors are injuries upon the head, such as blows, falls, and wounds. One other cause I will mention, which ought to be known to every practitioner. That is the attempt to cure chronic eruptions of the head, especially by too active a treatment. A

case of this kind is given by Rilliet and Barthez ; another by Rilliet, and I am acquainted with one myself.

The disease sometimes occurs in an epidemic form.

Anatomical lesions.—The dura mater is generally much injected, and its sinuses, together with the large cerebral veins, contain coagulated or semi-coagulated blood, sometimes in large quantities. On opening the dura mater, the whole, or nearly the whole of the convex surface of both hemispheres, or in some cases only one, are found to be covered with a yellowish or greenish-yellow layer, which consists of fluid or concrete pus, or of false membranes. These deposits exist also on the internal surfaces of the hemispheres, on the upper surfaces of the cerebellum, and often also at the base of the brain, though, in some cases the latter presents none whatever. These inflammatory products are always seated in the pia mater, and sometimes in the cavity of the arachnoid membrane, but in much smaller quantity than in the tissue beneath that membrane.

The *arachnoid* membrane which covers the brain seldom participates in the inflammation, but remains smooth and transparent. Its cavity, however, often contains inflammatory products, which, when death occurs early in the attack, consist of a small quantity of pure pus, or of larger quantities of a turbid, yellowish serosity, consisting of serum and pus mixed together. When death has occurred later in the disease,—after five, six, or seven days,—the pus is found converted, by the absorption of its fluid particles, into a solid substance, or else true false membranes are found. The *pia mater* is observed to contain fluid or semi-fluid pus, when death occurs before the fourth or fifth day, while at a later period the pus has become hardened, so as to form a layer, which sometimes dips into the anfractuositities, and gives to the membrane under consideration a swelled and thickened appearance. These appearances are more marked on the superior and lateral, than on the inferior surface of the brain. Where the deposits exist the membrane presents a vivid injection, which is more marked in proportion as death has taken place earlier in the disease. The pia mater is generally easily detached from the cerebral substance, particularly when the fatal termination has occurred early. The

substance of the brain is firm, and but slightly coloured, in rapid cases. When the course of the disease has been slower the cineritious portion is generally of a bright rose colour, and the medullary substance abundantly dotted with red. In the latter class of cases the surface of the convolutions is sometimes softened, and the pia mater adherent. In very young children, the whole brain is sometimes soft.

The *ventricles* do not, as a general rule, contain transparent serum, except at a very early age, when serous effusion takes place with great facility. They often, however, contain one or two teaspoonfuls, and rarely more than one or two tablespoonfuls, of pus or purulent serum. The serous membrane of the ventricles and the plexus choroides exhibit signs of inflammation in some instances. They are of a bright red colour, uneven, rough, and very much softened, in children who die early; and pale, opaque, slightly thickened and rough, in those who die at a later period.

The central parts of the brain often retain their firmness, but are sometimes softer than natural, or even diffuent. This softening is particularly apt to exist in very young children, in connexion with large effusion into the ventricles; though it also occurs in those who are older, and in whom there is only slight effusion of pus or purulent serum. In the former case it is probably due to the macerating effect of the effusion, while in the latter it is more likely to be owing to inflammation.

The *spinal marrow* was examined in one case by M. Legendre, and its membranes found to present the same inflammatory appearances which existed in those of the brain.

The other organs are healthy except in secondary cases. Tubercles, which so constantly exist in various other organs in tuberculosis of the meninges, are never found, according to M. Rilliet, in this form of meningitis. This author believes himself entitled from his researches to formulate the following law of pathological anatomy: "That general meningitis and meningitis of the convexity of the brain occur only in non-tuberculous children, whilst meningitis of the base of the brain, without inflammation of the lining membrane of the ventricles, belongs exclusively to tuberculous children." (*Loc. cit.* t. iii, 1846, p. 408.)

Symptoms.—The following account of the symptoms of the

disease is taken chiefly from the paper of M. Rilliet. That author describes two forms of the affection, the *convulsive* and *phrenitic*; the former of which is characterized by a predominance of convulsive phenomena, and the latter by that of disorders of the intelligence.

The disease may also be idiopathic or secondary, simple or complicated, sporadic or epidemic.

The *convulsive form* generally occurs in children under two years of age. The disease usually begins suddenly or after a restless night, with a violent and prolonged attack of *convulsions*, oftener general than partial, and is accompanied by violent *fever*, and sometimes by considerable quickness of *respiration*. The existence of *headache* cannot be ascertained at this early age. *Vomiting* is often absent, and the *bowels* generally continue regular in this form, though they are sometimes constipated. After a while the convulsions cease, and the child remains for a time in a state of quiet, somnolence, or coma, when they return with renewed violence. The returns of the convulsions generally take place at intervals of one or two hours or longer. In the intervals between the crises the child is restless or drowsy, or in a state of partial *stupor*, attended with tremulous movements of the extremities; there is *strabismus*, *contraction of the pupils*, *trismus*, and sometimes *hemiplegia*. The skin retains its warmth, the pulse is accelerated, irregular, and unequal; the face is pale; the stools are spontaneous or easily procured by remedies. It is unusual to see the child regain its consciousness so as to recognise objects, in the intervals between the convulsions, or after the appearance of coma and other cerebral symptoms. Death occurs during coma or in a violent attack of convulsions. This form seldom lasts more than four days.

M. Rilliet states that this form sometimes begins in a different manner. The convulsions, though they still predominate, do not occur until later in the disease, and the whole course of the affection is slower. Such cases begin with a violent febrile movement, lasting several days, and accompanied by acceleration or unevenness of the respiration, or by almost constant drowsiness, preceded or followed by agitation, screaming, staring expression of the eyes, and dilatation of the pupils; vomiting and constipation are some-

times present, at others absent. After a time, however, convulsions make their appearance, and the case follows the course already described. The duration of this form may be the same as that of the first, or it may last about two weeks.

The *phrenitic form* of simple meningitis generally begins suddenly with fever, which is sometimes preceded by a chill; the skin is warm and dry, and the pulse, in idiopathic cases, full and accelerated. In secondary cases the pulse has been found slow and irregular; in all it becomes irregular, small, and very rapid, the day before death. Simultaneously with the fever there is frontal headache, which is often so violent as to draw cries from the child, and, according to M. Rilliet, is more severe than either in tubercular meningitis or typhoid fever. It is also more constant, and lasts generally one, two, or three days, until the appearance of restlessness, delirium, or coma. At the same time there is great sensibility to light and noise, and abundant vomiting of bilious matter. The latter symptom is one of the earliest; it generally ceases after a few days, but sometimes continues to the very end. Constipation exists in some cases, but is much less constant and more easily overcome than in the tubercular disease. The appetite is lost, and the thirst very acute. The abdomen is flattened and retracted, especially towards the termination, while in secondary cases of this form, and in very young children, it retains its usual shape.

About the end of the first day, generally, or in rare instances, after two or three days, appear various disorders of the intelligence. The first symptom of this kind is observable in the expression of the face, which becomes a little wild or wandering, and sometimes grimacing. Soon afterwards occur restlessness, which is sometimes extreme, and, in succession, delirium, somnolence, and later in the attack, coma. The restlessness and somnolence often alternate early in the case, though the former generally predominates and soon passes into delirium, which is usually violent. When in this condition the child seldom recognises any one, and either refuses to answer questions, or answers incoherently. In connexion with the disorders of intelligence there exist also trismus, grinding of the teeth, subsultus tendinum, partial convulsive move-

ments, stiffening of the extremities or trunk, retraction of the head, strabismus, contraction first and then dilatation of the pupils, and in some cases violent convulsions, followed by deep coma. Death sometimes occurs at this period. In other instances the disease continues longer, and other symptoms declare themselves. Vomiting generally ceases; constipation increases; the abdomen is retracted; headache is no longer complained of; the fever continues, but the pulse becomes irregular; the respiration is uneven and irregular, being sometimes more and at others less frequent than natural; the face is distorted and extremely pale, or there may be a purple flush on the cheeks; the restlessness is excessive, and accompanied by subsultus, carphologia or partial convulsive movements; the delirium, at first so violent as to make it necessary sometimes to hold the child in bed, subsides into a state of coma and collapse, in which general sensibility is obtunded, and special sensibility extinguished; the respiration becomes stertorous, and at length asphyxia, coma, or a severe attack of convulsions terminate the scene.

The course of the disease is generally continuous. In very rare cases, however, occasional remissions occur, so that the child recovers its intelligence for a short time, and recognises persons around. The duration has varied between a day and a half and nine days.

Diagnosis.—The convulsive form may be confounded with essential or symptomatic, and with the sympathetic convulsions of children. The mistake may generally be avoided by attention to the following points. In essential convulsions, the attacks are usually less violent, seldom last more than a few moments, occur from some evident cause, and do not recur often. When they have ceased, the child generally soon regains its consciousness and health, or exhibits slight drowsiness or derangement of movement for a short time only. In such cases the respiration is not permanently accelerated, as in convulsive meningitis; the pulse, if it had been increased in frequency, soon falls to the natural standard, and special sensibility remains undisturbed.

It is to be distinguished from sympathetic convulsions by the characters just described, aided by a reference to the disease which

may have caused the attack of eclampsia, and which may be one of the eruptive fevers, enteritis, indigestion, pneumonia, or any other acute affection. In some instances, however, the distinction cannot be made except by attention to the progress of the attack.

The phrenitic form may be confounded with tubercular meningitis, with congestion of the brain, or with the early stage of the eruptive fevers. The distinction between it and tubercular meningitis has already been considered under the head of the latter disease.

M. Rilliet is of opinion that it is sometimes impossible, in the present state of knowledge upon these points, to distinguish with certainty between simple meningitis and cerebral congestion or hemorrhage, and encephalitis. In regard to congestion of the brain, he proposes the very important question, "Whether we ought to class as meningitis the dangerous cerebral symptoms resembling exactly those which mark the commencement of meningeal inflammation, and terminating rapidly by death or recovery?" He states that examination after death in these cases reveals neither pus nor false membranes in the arachnoid or pia mater, but simple congestion of the brain and its membranes. He deems the solution of the question to be difficult, but is himself of opinion that they ought not to be classed together. He gives the following table, which he thinks may assist in making the diagnosis.

CONGESTION OF THE BRAIN.—MODE OF
INVASION.

There occurs instantaneously profound stupor, absolute immobility and insensibility, with dilatation of the pupils, or else acute delirium, with difficulty of breathing, acceleration and smallness of the pulse, or in yet another class of cases tremors or slight convulsive movements of one side of the body. Stuttering, loss of speech, stertorous respiration or pains in the arms and corresponding side of the face exist; the fingers do not retain objects which the child attempts to grasp.

MENINGITIS.

In the phrenitic form the first symptom is generally headache, which is not noted in any of the cases of M. Bland (of congestion). The alterations of intelligence and movements occur early, but not before the beginning of the first or second day; whilst in congestion, the appearance of delirium or coma, of subsultus tendinum, or partial paralysis, is instantaneous, frightful, truly apoplectic, and, so far as we can ascertain, not accompanied by vomiting,—a symptom rarely absent in meningitis.

From the invasion of variola, it is to be distinguished by attention to the contagious and epidemic nature of that malady, by the absence of vaccination or of a prior attack of the disease, by the absence of pains in the loins, and by a consideration of the period at which the delirium makes its appearance, which, in variola, rarely occurs before the third day. To make the diagnosis between meningitis and malignant scarlatina, we must attend chiefly to the epidemic and contagious character, to the thick coating upon the tongue, redness of the throat, elevated temperature, and strong nasal respiration, which exist in the latter.

Prognosis.—The prognosis of simple meningitis is very grave. M. Valleix is disposed to think that most of the recoveries reported by M. Guersent were cases of sanguine congestion or effusion. M. Rilliet (*Loc. cit.*), who has studied the subject more carefully than any other observer, cites several instances of recovery, but states that death is much the most frequent termination. The diagnosis of the disease from other cerebral affections, is so difficult and uncertain, at present, however, as to render it impossible to determine with any certainty, its degree of curability.

Treatment.—It must be evident it seems to me, that but little dependence can or ought to be placed on any but the most powerful *antiphlogistic* treatment. *Bloodletting* therefore, *mercury*, *cold* applications to the head, *purgatives*, *counter-irritants*, and the most rigid diet ought to be employed from as early a period as possible, and in the most energetic manner.

Venesection ought always to be preferred to local bleeding, even in the youngest children, unless it is impossible to find a vein, or unless this is evidently too small to bleed well. If we cannot succeed in performing the operation at the bend of the arm, we may resort to the vein running over the inner ankle, or to the external jugular. When venesection cannot, from any reason, be employed, blood should be freely drawn by means of leeches or cups. It is customary to apply the leeches to the temples or behind the ears. I may remark that MM. Rilliet and Barthez object to the application of leeches to the head, and propose that they should be placed rather about the anus, or on the inferior extremities. The quantity of blood to be drawn must depend upon

the age and constitution of the child, and violence of the attack, in some measure. It should always, however, be large, as much, or more, I think, than what is necessary in any of the acute affections of childhood. In a child two years old, of good constitution, from four to six ounces would not be too much at first, and should the symptoms not be moderated in six or eight hours, as much more may be taken. Should these detractions of blood fail to produce any good effect on the dangerous symptoms, I would, unless there were evident and unmistakable signs of exhaustion, take still more, either locally or generally. I am disposed to believe that in such a disease as this, bleeding is by far the most powerful remedy, that it is perhaps the only one which offers us any real chance of success, at least in rapid cases, in which extensive layers of fluid or partially concrete pus and false membranes are found on the surface of the brain, in the pia mater, or in the sub-arachnoid tissue, in two days and a half, in three, or in four days after the commencement of the disease. I once took four ounces of blood from a child five weeks old, who was labouring under convulsions and insensibility, occurring in the course of lobular pneumonia, and the child recovered. In another of the same age, with convulsions from congestion of the brain, or possibly from the very disease we are now considering, I removed four ounces in twelve hours by venesection and leeching; in another of seven months, with repeated convulsions, lasting with slight intervals for ten hours, and followed by nearly complete paralysis of the left arm, I took seven ounces in that time; both recovered and were not permanently injured by the loss of blood. I have taken between fourteen and fifteen ounces of blood by venesection from a child two years old, attacked with pseudomembranous laryngitis, in two days, and fourteen from another four years old in the same time, for the same disease, and have seen them both recover without any injury to their constitutions. I mention these amounts in order to show that children labouring under acute and dangerous inflammations of important organs, bear large detractions of blood without injury, and because I know that there is a strong feeling amongst many members of the pro-

fession in this city, against copious bleedings in childhood under any circumstances.

While the bleeding is being performed we should direct the preparation of means for the application of *cold* to the head, which constitutes, according to all writers, a most efficient remedy in inflammations of the brain and its membranes. These may consist of a bladder containing water and pounded ice, which is perhaps the most convenient and powerful, of cloths wrung out in iced or very cold water, to be constantly renewed, of cold affusions upon the head, or, lastly, of irrigation as recommended by M. Guersent, and described in the article on tubercular meningitis. *Purgatives* ought to be employed so as to empty the bowels thoroughly, and produce a decided revulsion upon the intestinal mucous membrane, but not in such quantity as to occasion inflammation of that tissue, which would be very apt to prove the case, were the drastic substances and large doses recommended by some writers, used. The remedy usually given and most highly recommended is *calomel*, which is chosen for its sedative and alterative properties. About four grains may be exhibited alone, and followed in one, two, or three hours by castor oil, jalap, or infusion of senna and manna, sweetened with syrup of rhubarb. These doses ought to be given until the bowels are freely moved. It is always useful to employ a strong purgative enema immediately after the bleeding, without waiting for the operation of the internal remedies. After the purgative doses have been given, it is important to continue the mercury in smaller doses, with the view of obtaining its specific influence upon the inflammation. These doses may consist of from a quarter of a grain to a grain every hour or two hours. Some writers also recommend very highly the use of mercurial inunction.

Counter-irritants are useful as adjuvants to the more powerful remedies already indicated. During the first day or two they should consist chiefly of sinapisms and mustard poultices applied from time to time to the trunk and extremities. Authorities differ somewhat as to the effects of blisters, and the time at which they ought to be applied. M. Valleix (*Loc. cit.* t. ix, p. 187,) opposes their employment in this affection as often injurious and

still more frequently useless. I believe that the advice given by Dr. Abercrombie as to their employment is probably the most prudent. This is not to apply them in the early stage, but to wait until the active symptoms of the disease have been subdued. They may be applied to the head itself, to the nucha, or to the extremities. I believe that I have seen them most useful when applied to the neck and insides of the calves of the legs. Nevertheless, there is high authority in favour of their good effects when applied upon the head itself.

M. Rilliet (*Loc. cit.*) recommends a vigorous revulsion upon the scalp when the disease has followed the suppression of an eruption. He proposes with this view the employment of pustulation by croton oil, and relates a case of recovery which followed this treatment under a most unfavourable train of symptoms. To make use of it the head must be first shaved; from fifteen to twenty drops of the oil are then to be rubbed over the scalp with a glove, four or six times a day. Before making the friction, the eyes of the patient must be covered with a band to prevent the introduction of any of the oil into them, as this would be apt to occasion severe ophthalmia. In the case reported by him a considerable number of pustules were produced in twenty-four hours, and in a few more the eruption was general, so that the head was covered with a kind of cap of a fine yellow colour.

ARTICLE III.

ACUTE HYDROCEPHALUS.

Under the term hydrocephalus were formerly included all the cases of disease of the brain attended with effusion of serum into the ventricles, cavity of the arachnoid or pia mater, or with infiltration of the cerebral substance. Recent observations have shown, however, as has already been stated in the two previous articles, that in the immense majority of cases the serous effusion within the cranium depends upon tuberculization of the membranes of the brain; and that of the remaining cases the greater part are the

result of simple meningitis, or of some other disease of the brain. In some few instances, however, effusion undoubtedly takes place independently of inflammatory action, and it is to these that the title of acute hydrocephalus is now generally applied. It ought to be observed, however, that the disease is almost always secondary, and that some writers, and amongst them MM. Guersent and Blache, Valleix, and Rilliet and Barthez, without denying the possibility of the occurrence of idiopathic cases, are evidently of opinion that they are *extremely* rare, and even that their existence may be doubted.

Definition ; synonymes ; frequency.—By acute hydrocephalus is now generally understood, at least by the French writers, a disease in which a rapid but non-inflammatory effusion of serum takes place into the ventricles of the brain, and less frequently within the cavity of the arachnoid membrane, or through the substance of the brain.

It has already been stated that under the title of acute hydrocephalus were formerly, and are yet by some persons, confounded, tubercular and simple meningitis, and indeed all acute lesions of the brain attended with serous effusion.

It is an affection rarely met with in comparison either with tubercular or simple meningitis. It is denied by several high authorities to exist at all as an idiopathic disease, while all acknowledge it to be infrequent even in the secondary form.

Causes.—As even the existence of idiopathic acute hydrocephalus is doubted by many, and denied by not a few observers, its causes are of course but little understood. The cases of the disease met with, therefore, are secondary. These may occur in the course of any disease liable to be complicated with anasarca, and particularly scarlet fever, measles, nephritis, gangrene, and entero-colitis. It is said to occur generally under six years of age, and equally in both sexes.

Anatomical lesions.—Rilliet and Barthez state that they have rarely found more than from two to four ounces of serum in the ventricles, which are more or less dilated, and about the same quantity in the cavity of the arachnoid. The internal and external cerebral membranes, generally pale or of their natural colour,

sometimes present a bright injection, thus showing the transition from simple dropsy to that which is the result of inflammation. The same authors describe the cerebral substance as healthy and natural, or as presenting more or less considerable punctuation or congestion. In some instances it participates in the dropsy, and the parts adjoining the effusion are softened and of a creamy consistence. This is particularly observable in the walls of the ventricles when the serum has been effused into those cavities.

Symptoms.—The symptoms of acute hydrocephalus, like the rest of the history of the disease, are very imperfectly understood. Rilliet and Barthez, with Guersent and Blache, are of opinion that it is difficult and even impossible to establish any characters which indicate the presence of acute hydrocephalus. The only symptoms they have been able to refer to it are excessive agitation, cries or constant moaning, replaced a short time before death by extreme prostration with somnolence, loss of consciousness and coma, or even general insensibility, dilatation of the pupils, and fixity of the look.

M. Barrier states that the disease appears under two different forms. In the first, the effusion taking place gradually, the symptoms are very analogous to those of the invasion of meningitis, and are characterized by phenomena of excitation, such as headache, delirium, restlessness, screaming, and convulsive movements. This period lasts from a few hours to several days, but very rarely so long as the first and second stages of acute meningitis united. In the second period of the first form of hydrocephalus now under consideration, the preceding symptoms give place to abolition of the intelligence and senses, to coma, amaurosis, deafness, insensibility of the skin, and cessation of all voluntary movements. The latter symptom, however, is not constant; for it often happens that violent convulsions occur in the midst of the state of collapse.

In the second form of hydrocephalus, the first period above described is wanting, and the phenomena of the second period appear from the first. This form might with some propriety be called serous apoplexy. It is particularly apt to occur in the course of the anasarca of scarlet fever.

The *diagnosis* of acute hydrocephalus is, as might be supposed

from the uncertainty of the symptoms, enveloped in much obscurity. I will merely quote the statement by M. Valleix, that if, in the course of a dangerous disease, and particularly in the anasarca which follows scarlet fever, severe cerebral symptoms without paralysis are observed to occur, we may suspect the existence of acute hydrocephalus; the presumption would be still stronger and amount almost to certainty were a more or less rapid loss of consciousness observed to follow the disappearance of a serous effusion situated in some part of the body more or less distant from the head.

The *prognosis* is exceedingly unfavourable, as the disease rarely occurs except in the course of, or at the termination of other affections which are themselves very dangerous to life.

Treatment.—The treatment of acute hydrocephalus is rendered very uncertain in consequence of the obscurity of the diagnosis. Bloodletting, however, has been employed in several cases, and apparently with good effects in some which occurred in the course of diseases of a manifestly dropsical character. Such was the case reported by Dr. M. Hall (*Dis. and Derange. Nerv. Syst.* p. 152,) which occurred in a boy twelve years old on the sixteenth day after the invasion of scarlet fever, and came on simultaneously with œdema of the face, by a sudden attack of collapse, followed by convulsions and coma. Dr. Hall bled the child to the amount of twenty ounces from the jugular vein, when the convulsions ceased, but the coma did not disappear. He then took seven ounces more from the arm, and in less than an hour the child knew his parents. The case terminated favourably. A case is reported by M. Barrier (*Loc. cit.* t. ii, p. 359,) from a memoir on acute hydrocephalus by M. Piet, of a girl nine years old, who, on the fifteenth day of a very mild attack of scarlet fever, took cold in the evening from exposure at an open window, and was attacked the next day with tonsillitis, œdema of the face, and then with amaurosis, complete immobility of the pupils, violent convulsions of the right side, palpitations, and stupor. She was treated by leeches to the head, tartar emetic, powdered digitalis, and diuretic infusions. After five days the œdema and nervous system began to moderate, and in a short time she was restored to health.

M. Barrier relates another case published by M. Lecointe, of a boy thirteen years old, who, about two weeks after an attack of some eruptive disease, which was almost certainly scarlet fever, was seized with œdema of the feet, legs, scrotum, and abdomen, and with headache. After a short time he was attacked with violent epileptiform convulsions, intense headache, and soon after with loss of sight and hearing, and stupor. The convulsions were frequent, and while they lasted the face became purple, and the mouth filled with bloody spume; the contortions were terrible. On the first day he was freely leeches along the jugular veins, a camphorated blister was applied upon each thigh, and an emollient cataplasm upon the abdomen. He took internally a mucilaginous drink containing nitre, and ten drops of sulphuric ether in water every hour. On the second day the condition remained the same; pupil excessively dilated, pulse hard and accelerated: venesection to about sixteen ounces. An hour later, as the convulsions returned, about twelve ounces more of blood were taken in the same way. In the course of the day, the bandage around the arm got displaced; this was not discovered for several hours, so that a considerable hemorrhage took place, but the convulsions did not return afterwards. From that moment the patient gradually recovered under the use of sinapisms to the extremities, a potion composed of the tinctures of castor and amber, and sulphuric ether, and a drink made of infusion of cherry-laurel and orange flowers. On the third day he recovered his sight and entire consciousness, and on the eighth day was able to walk.

That bleeding does not always produce such good effects, however, is shown by the result of the following case which occurred to myself. A very stout and hearty girl, 12 years old, was seized with malignant scarlet fever, of which she was extremely ill from the 3d to the 9th day. She then improved somewhat, but on the 12th day was attacked with general anasarca, unaccompanied, however, with severe nervous symptoms, and which nearly disappeared on the 16th. From the 21st to the 25th day, she did very well. There was merely slight œdema of the face, and she sat up the greater part of the day in good spirits. At eight o'clock, on the evening of the 25th day, as she sat in an armchair, taking her tea,

she said suddenly to her sister, "there is some one sitting on my arm," and her sister saw that on endeavouring to take hold of a teaspoon, the hand no longer obeyed the will. Her speech then became mumbling, and she fell back in a slight convulsion. I saw her within half an hour from the beginning of the attack, and found her unable to speak, almost insensible, and slightly convulsed. I bled her immediately to the amount of twenty ounces from the arm, applied cold to the head, gave a purgative enema, and ordered a cathartic dose of calomel and jalap. In a few moments after the bleeding she was attacked with terrific general convulsions. The bleeding was repeated in half an hour to the amount of at least sixteen ounces more, but without any effect. The convulsions continued with very slight intermissions for ten hours, when they ceased, and were followed by profound coma, and death in twenty-three hours from the onset of the nervous symptoms. No autopsy was made.

I have only to add, in regard to the treatment of acute hydrocephalus, the advice of M. Barrier, which is to employ, when the apoplectic nature of the disease, its coincidence with dropsical affections of other parts of the body, the state of the urine, and the antecedent history of the case, make the diagnosis clear, the treatment generally required by scarlatinous dropsy, that is to say, diaphoretics, diuretics, and hydragogue cathartics. He adds that as experience has seemed to show that bloodletting is useful, though hydrocephalus is not probably an inflammatory disease at first, we should be blamable not to resort to it.

ARTICLE IV.

CEREBRAL CONGESTION.

It appears to me from the evidence of several of the highest authorities on the diseases of children, that cerebral congestion is of rare occurrence as an idiopathic and distinct affection in early life. To prove the truth of this statement, I have only to quote the opinions of some of the writers referred to. MM. Rilliet and

Barthez assert (t. i, p. 649) that they have found in children dying of different diseases, and who had presented no cerebral symptoms, congestion precisely similar to what they found in others, who had exhibited more or less dangerous idiopathic or secondary nervous symptoms. "Some patients," they remark (*Loc. cit.* p. 650), "it is true, who presented us with examples of cerebral hyperæmia, had had well-marked nervous symptoms. Thus we have met with the anatomical characters of congestion in young subjects who had perished with convulsions, in those whose sickness had been accompanied by violent delirium, and in others who, in the course of scarlet fever, for instance, had been seized with nervous symptoms. But, on the other hand, we have met with a nearly equal number of patients who had died under the same circumstances, but in whom the cineritious and medullary substances preserved their usual colour, and the pia mater was not injected. What are we to conclude from these facts? Most assuredly that we ought not to attribute to cerebral hyperæmia any considerable part in the production of the symptoms." At page 651 they say: "The most important practical point is, in fact, to determine whether it is possible to recognise cerebral congestion in a child by special and characteristic symptoms, and whether we ought as a consequence to prescribe a particular form of treatment. We acknowledge, on our part, that we find it impossible to describe any symptoms peculiar to that condition, and consequently to formulate a treatment." In the article on convulsions (t. ii, p. 281) they state that in some of their patients they found no traces of congestion, and add that eclampsia is sometimes (a well-known fact) connected with an anæmic state of the brain. "What are we to conclude from these opposite facts, if it be not that congestion plays but a secondary part in convulsions?" They coincide in opinion with the authors of the *Compendium*, who suppose that the congestion found in patients who have died with convulsive symptoms, is generally the effect and not the cause of the convulsions. They do not deny, however, that a sudden congestion of the brain may produce a convulsive attack, and quote cases from other writers.

I believe it to be a very common opinion in this country that

most of the nervous symptoms (delirium, somnolence, coma, convulsions, etc.) which occur in the course of many of the diseases of childhood, depend chiefly upon a congested condition of the nervous centres, and also that many practitioners refer most of the cases of eclampsia of children to the same cause. I am glad, therefore, to call the attention of the profession to this point, and to place before it the opinions of some of the recent distinguished authorities in regard to it.

The authors of the *Bibliothèque du Méd. Prat.* are of opinion that it is very rare to meet with true pathological and idiopathic congestion of the brain, either in the first or second infancy (t. vi, p. 118). M. Barrier states that primary or secondary hyperæmias are sometimes a cause of convulsions, and that such cases are the most dangerous of their kind. He also states that in rare instances congestion assumes a more menacing character, similar to that which is more frequently met with at an advanced age, meaning the apoplectic form. M. Valleix asserts (*Loc. cit.* t. ix, p. 259) that "cerebral congestion is a disease almost unknown in infancy."

M. Rilliet, in the paper on simple meningitis quoted in the article on that disease, states as his opinion that the cases attended with dangerous cerebral symptoms, which resemble exactly those occurring at the commencement of meningeal inflammation, which terminate rapidly in death or recovery, and in which the only lesions found after death are congestion of the brain and its membranes, ought to be regarded as dependent upon congestion, though he thinks it difficult to determine positively whether they are in fact the result of that condition, or whether they are not merely the forming stage of meningitis.

Dr. Chas. West, of London, whose recent publications upon the diseases of children are the most valuable, it seems to me, that the English press has afforded us, treats of congestion of the brain in children as a very important and frequent condition of disease. (*Lect. on the Dis. of Inf. and Childhood. Lond. Med. Gaz.* June 4th, 1847.) I shall chiefly follow Dr. West in my remarks upon this subject, for though there can be no doubt, from the researches of the French observers above quoted, that its importance has been

much exaggerated, and that its real influence in the production of the symptoms generally ascribed to it is very imperfectly understood, yet a considerable number of cases occur in practice, especially favourable ones, which it is very difficult to understand or to know how to treat except upon the time-honoured supposition of congestion.

Dr. West treats of congestion of the brain under two heads, as *active* or *passive*. By the former is meant the kind of congestion occurring under the influence of a cause which greatly increases the flow of blood to the head, and to this class belong, for instance, the head symptoms which often usher in the eruptive fevers; by the latter is understood the kind depending on an impediment to the reflux of blood from the brain, to which belong, for example, the convulsions which occur in a fit of whooping-cough.

Active congestion may occur during the process of dentition, or may result from exposure to the sun, or from blows upon the head; passive congestion may be the result of a mechanical impediment to the return of blood from the brain, as the pressure of an enlarged thymus, or of enlarged and tuberculous bronchial glands upon the jugular veins, or of languid circulation depending upon want of pure air, or of nourishing and sufficient food. Dr. West states that intense cerebral congestion is not a very unusual consequence of the disturbance of the circulation at the outset of the eruptive fevers. He says that convulsions and apoplectic symptoms sometimes come on suddenly in these cases, and may terminate fatally in less than twenty-four hours: after death "the brain is found loaded with blood, but all the other organs of the body are quite healthy." I would merely remark here, that it seems to me very doubtful whether the nervous symptoms just alluded to, ought not to be regarded as the result of the presence in the nervous centres of a diseased and vitiated blood, rather than of congestion. That congestion does not always produce them is shown by the statement of Rilliet and Barthez, (*Loc. cit.* t. ii, p. 620,) in regard to the cerebral symptoms of scarlet fever, "that a more or less marked sanguine congestion (of the cerebro-spinal apparatus) is the only alteration *generally but not always* found; and sometimes the congestion is not more marked than in other

diseases in which there had been no cerebral symptoms." With these remarks I shall pass on to the consideration of the symptoms generally ascribed to congestion occurring under other circumstances, as those taking place in the course of the eruptive fevers will be treated of under the head of those affections.

Dr. West states that cerebral congestion may come on suddenly with very alarming symptoms, or it may be preceded for a few days by general uneasiness, by a disordered state of the bowels, generally but not always consisting of constipation, and by peevishness. "The head by degrees becomes hot, the child grows restless and fretful, and seems distressed by light, or noise, or sudden motion, and children who are old enough sometimes complain of their head." Vomiting generally occurs repeatedly, sometimes before any other symptoms, and is a very important one. The fever varies greatly as to its violence, though the pulse is usually much and permanently quickened, and if the skull be still unossified, the anterior fontanelle is either tense and prominent, or the brain is felt and seen to pulsate forcibly through it. The sleep is disturbed, the child often waking with a start, and there is often occasional twitching of the muscles of the face or the tendons of the wrist.

The child, Dr. W. remarks, may recover from these symptoms without any medical interference, or the case may become aggravated and terminate in acute hydrocephalus, or again, the congestion may increase and cause the following symptoms. Under the latter condition, "the countenance becomes heavy and anxious, the indifference to surrounding objects increases, and the child lies in a state of torpor or drowsiness, from which, however, it can at first be roused to complete consciousness." The bowels generally continue constipated, and the vomiting seldom ceases, though it may be less frequent. The pulse is usually smaller than before, and often irregular in its frequency, though not intermittent. "An attack of convulsion sometimes marks the transition from the first to the second stage; or the child passes, without any apparent cause, from its previous torpor into a state of convulsion, which subsiding, leaves the torpor deeper than before. The fits return, and death may take place in one of them, or the torpor

growing more profound after each convulsive seizure, the child at length dies comatose."

This second stage is usually of short duration, as death generally occurs, unless relief be afforded by appropriate treatment, within forty-eight hours from the first fit, "though no graver lesion may be discovered afterwards than a gorged state of the vessels of the brain and its membranes, and perhaps a little clear fluid in the ventricles and below the arachnoid." Occasionally, however, recovery takes place contrary to all expectation, after these symptoms have continued but slightly modified, for days or even weeks.

Acute congestion is to be *treated* like simple meningitis, with bloodletting, cathartics, calomel, cold applications to the head, baths, revulsives, low diet, and confinement to a cool, dark chamber. It is useless to repeat here, what has already been said in our remarks upon the treatment of meningitis.

In passive congestion the treatment should consist, according to Dr. West, of careful local depletion, if the case will bear it, and in strict attention to the diet and state of the bowels. He recommends mercury and chalk to correct the bowels when they are out of order. If the case be associated with diarrhœa and bad nutrition, he recommends that extract of bark, with a few drops of sal volatile, or of the compound tincture of bark be given two or three times a day. Farinaceous food, he remarks, is not usually well digested when nutrition is much impaired, and he recommends milk and water, or milk and water with isinglass, or veal tea.

ARTICLE V.

CEREBRAL HEMORRHAGE.

I shall consider hemorrhage of the brain under two heads, that of the substance, and of the membranes, the former of which is usually designated as cerebral, and the latter as meningeal apoplexy. Both these forms of hemorrhage are of rare occurrence in childhood compared with other diseases of the brain, and with their frequency during adult life and old age. Of the two kinds, that of

the meninges is the most common. I desire to state, before beginning the consideration of this subject, that I do not expect to be able to give an accurate account of it, since this is impossible in the present state of knowledge in regard to diseases of children. I shall endeavour, however, by careful examination of recent authorities, to present as faithful a picture as is possible under existing circumstances.

Definition ; frequency ; forms.—By cerebral apoplexy or hemorrhage is understood an effusion of blood into the substance of the brain. By meningeal apoplexy or hemorrhage is understood an effusion of blood between the dura mater and cranium, into the cavity of the arachnoid membrane, beneath the arachnoid, or in the meshes of the pia mater. Cerebral hemorrhage is a very rare affection in childhood. This is proved to be the case by the facts that Rilliet and Barthez met with only eight cases in their extensive experience, and that M. Barrier saw but one in 576 cases of disease of all kinds. Meningeal apoplexy is of more frequent occurrence, since Rilliet and Barthez report eighteen cases. M. Barrier met with one case of this form in the 576 cases referred to. Dr. West (*Lond. Med. Gaz.* June 18th, 1847, p. 1062,) says he has only twice met with distinct extravasation of blood into the substance of the brain in children.

Hemorrhage into the substance of the brain occurs in two different forms ; one in which the effused blood is contained in a cavity caused by a laceration of the tissue of the organ, and designated apoplexy in a cavity ; and the other in which the blood is effused in a multitude of little points of different sizes, and designated capillary apoplexy.

In meningeal hemorrhage the blood may, as we have stated, be effused between the dura mater and the bone. This form, however, is very rare, so rare indeed, that several writers deny its existence. It is proved, however, to have occurred, by a case reported by Rilliet and Barthez, which is the only one they have met with. In by far the most common form of the disease, the blood escapes into the cavity of the arachnoid membrane. Of this form the authors just quoted report 17 cases, while, according to the authors of the *Bibliothèque du Méd. Prat.*, (t. vi, p. 193,) the

effusion always occurs in this situation. That this is not invariably correct, however, is proved by the case of effusion exterior to the dura mater already referred to, and by the fact that it does sometimes take place beneath or in the meshes of the pia mater. The latter class is very rare however in proportion to the cases in which the hemorrhage occurs within the cavity of the arachnoid. Rilliet and Barthez did not themselves meet with a single instance of that kind, but they quote two from other writers; and M. Valleix refers to a memoir by M. Prus, in which others are given. It appears, therefore, that in the great majority of instances, the exhalation takes place within the cavity of the arachnoid membrane.

Causes.—The causes of cerebral hemorrhage are very obscure, so much so indeed, that some writers have not attempted to ascertain them. They appear to be the same in both forms of the affection. Amongst the ascribed causes are the sudden disappearance of eruptions of the scalp, observed in two cases by Rilliet and Barthez, in one of which this effect is stated to have been produced suddenly by medical treatment, while in the other it followed the application of poultices to a favous eruption upon the same part. The disease is stated by M. Legendre to have followed in one case a violent fit of anger. It is said also to have been produced by various causes which acted as impediments to the circulation. The obstacle may be situated within or exterior to the cranium. To the first class belong cases in which the sinuses and large venous trunks of the head have been found obstructed by coagula of blood, or by the pressure of tumours, generally of a tubercular nature; to the latter, those in which there is compression of the superior vena cava by enlarged and tubercular bronchial ganglions, or obstruction of the abdominal circulation by the pressure of hypertrophied organs, and chiefly of the spleen or liver. Another cause is thought to be the existence of confirmed cachexia and general debility from any diseased condition whatever, in which the blood having become thin and lost its plasticity escapes from the vessels with great facility. This last condition is one which almost always exists in connexion with the causes cited as acting through the agency of obstruction to the circulation, and tends of course to augment their dangerous effects.

In some instances the hemorrhage occurs in the healthiest and most vigorous constitutions, and cannot be accounted for in any way.

It appears that meningeal apoplexy is most frequently met with in very young children, according to Rilliet and Barthez between the ages of one and two and a half years, whilst M. Legendre did not meet with a single case after three years of age in 248 autopsies. Cerebral and ventricular hemorrhage, on the contrary, are much more common after three years of age than before, which is just the reverse of the law in regard to meningeal effusion.

Anatomical lesions.—The description of the lesions of hemorrhage into the substance of the brain, need not detain us long, as they are much the same as those observed in the adult. When the blood is effused into cavities, (apoplexy in cavities,) the latter are usually small in size, seldom exceeding from one to two thirds of an inch in diameter, though in rare cases they have been found much larger. The cavity is formed by a laceration of the substance of the brain, and is filled with soft, dark coagula, or sometimes with fluid blood; the walls of the cavity consist sometimes of the substance of the brain, which may be of a rosy colour and natural consistence, or yellowish and softened, while in other instances they are formed of more or less numerous points of capillary apoplexy. The capillary form of effusion occurs in the shape of a number of points scarcely so large as the head of a small pin, and of a dark or brownish colour, which contrasts strongly with that of the cerebral tissue. These points evidently consist of true coagula, which are sometimes surrounded by small yellowish areolæ. The substance of the brain around the effusion is either white, firm, and perfectly healthy, or softened and of a whitish, reddish, or yellowish colour. The capillary effusions are generally limited within a space of from a third of an inch to an inch and a half in size, but have been found scattered over a large portion of the hemispheres.

Both forms of hemorrhage are much more common in the cerebrum than cerebellum, and occur more frequently on the left than right side. In addition to the sanguine effusion there is generally

considerable congestion of the pia mater, of the venous sinuses, or of the substance of the brain itself.

In describing the lesions of meningeal apoplexy, I shall confine my remarks to the effusion which occurs into the cavity of the arachnoid, which is, as we have already remarked, by far the most frequent form of the disease.

The appearances presented by the cavity of the arachnoid into which the effusion has taken place vary greatly in different cases, according to the age of the child, quantity of the exhalation, and period of time which may have elapsed between the accident and death of the patient. It is very uncommon to find pure, liquid blood, though it has been met with. In most instances there is a bloody serum mixed with thin, reddish coagula, contained in a soft and very delicate membrane lining the internal surface of the arachnoid. Sometimes the effusion is thin, limpid, and more or less yellowish in colour, while at other times it is thick and brownish or chocolate coloured. In some rare cases it is perfectly transparent and colourless. The fluid, in whatever state it exists, appears to be the result of transformations undergone by the effused blood. The solid portion of the blood or clot, is found either in the condition of more or less recent coagula, or changed into false membranes, which sometimes resemble very closely the arachnoid itself, and sometimes a true fibrous membrane. The coagula are found in the form of thin membranes, varying between one or two lines, and an inch and a half or two inches in size. They are thickest generally in the centre, where they measure between a fifth of a line and two lines, and are brownish or greenish in colour, and of variable consistence according to their age. These coagula may exist upon any portion of the brain, but according to Rilliet and Barthez are most frequently met with upon its convex surface.

The coagula just referred to undergo, in some instances, a curious change, of which I shall give a short description. In the course of time the fibrinous portions of the blood are deposited upon the internal surfaces of the cavity of the arachnoid, in the form of a new membrane. When death occurs soon after the onset of the attack, the parietal layer of the arachnoid is found to be completely

lined with this membraniform production, whilst the visceral or cerebral layer is covered by it only in certain points. When the case has lasted a longer time, on the contrary, the visceral as well as parietal layer of the arachnoid may be covered with the new production, and when this happens there is formed a true sac or cyst, destitute of opening, which lines the whole interior of the arachnoid and contains within it bloody serum and coagula. At first this new membrane is reddish in colour, elastic, and of a stronger texture than might be supposed from its apparent thinness and softness. Its thickness is generally about a tenth of a line. At a later period the walls of the cyst become so thin and transparent, that they have been mistaken for the arachnoid itself. They differ, however, from the latter, in being rather less transparent and thin, and particularly in the circumstance of presenting numerous arborizations. When death occurs at this stage, which M. Legendre (whose description I chiefly follow) calls the second period, or that of complete organization of the cyst, the external surface of the latter is found to adhere intimately to the parietal portion of the arachnoid membrane, by very delicate cellular tissue, though not with so much force but that it may be detached by traction. The internal portion of the new membrane, on the contrary, which is lubricated by the serosity of the arachnoid tissue, is very slightly adherent to the layer of that membrane covering the brain.

So long as the cyst formed by the new membrane, or as it is called by Rilliet and Barthez, the *pseudo-arachnoid* membrane, contains an amount of fluid sufficient to keep its surfaces separated, its cavity is single. When, on the contrary, the walls of the cyst have come into contact, either because of the partial absorption of the contained fluid, or because the fluid has accumulated at the lowest points, or wherever there is the least resistance, the cavity becomes multilocular in consequence of the cohesion of its walls at certain points.

The size of the cyst varies exceedingly. Sometimes it covers the greater part of the convex surface of one hemisphere, sometimes the whole, and in other instances extends to the base, forming in that case a nearly complete shell for the whole brain. The

quantity of fluid varies in different cases. Sometimes it amounts only to a few large spoonfuls; in others to one or two, or eight or nine ounces, and in one case observed by Rilliet and Barthez to upwards of a pint on each side, or more than a quart in all. In most instances the hemorrhage occurs into both halves of the arachnoid membrane, so that there is a cyst for each hemisphere. More rarely it occurs only on one side.

In the second stage, and when the effusion is very large, which rarely happens except in very young children and prior to ossification of the fontanelles or sutures, the symptoms resemble those of chronic hydrocephalus. The vault of the cranium is enlarged by the unnatural prominence of the frontal and parietal bones; the sutures are more open than usual, and the anterior fontanelle is distended and protuberant. When the effusion occurs thus early in life, before complete ossification of the skull, the brain does not appear compressed or flattened, as it does when the disease occurs at a later period.

The visceral portion of the arachnoid is often thickened, opaque, and more resisting than natural. The pia mater is frequently infiltrated with a good deal of serosity, which sometimes has a gelatinous appearance. When death has occurred in the first stage of the disease, the brain usually presents signs of hyperæmia. The veins on the surface of the hemispheres are enlarged, the cortical substance is of a bright rose-gray colour, and the medullary portion dotted over with drops of blood. Sometimes the cellular substance beneath the arachnoid is slightly infiltrated with serosity, at other times not. The ventricles contain a very small quantity of fluid.

It seems pretty clearly established that the effusion is the result of exhalations from the membrane, caused by frequently repeated determination of blood to the head, independent of rupture of vessels. In some rare instances, however, as in one witnessed by M. Legendre, the effusion is the result of rupture. In the case observed by him, death took place in twelve hours from the attack, and the left hemisphere was found covered with a layer of coagulated blood, which had escaped from a ruptured vein. (*Biblioth. du Méd. Prat.* t. vi, p. 192.)

Symptoms; duration.—The symptoms of hemorrhage into the

substance of the brain in the child are, as a general rule, extremely obscure and uncertain, though in some few cases that have been observed, they were as characteristic as those which occur in adults. In obscure cases the chief symptoms that have been noticed were restlessness, delirium, headache, violent fever, grinding of the teeth, and after a time complete abolition of the intelligence, fixity of the eyes, invariable dilatation of the pupils, stertorous respiration, and general insensibility. Of three cases reported by M. Valleix (*Clinique des Mal. des Enf.*) the nature of the disorder was easily diagnosticated in one by the existence of complete hemiplegia, while in the two others, the only marked symptom was complete immobility. The only certain symptoms of the disease, therefore, would be a sudden attack of hemiplegia, either as the primary symptom, or following coma or convulsions, and lasting for at least several days. An attack of general paralysis would not be by any means so certain, as this may exist in several other diseases of childhood.

In a case which came under my charge, I believe the attack to have been one of apoplexy of this kind. A girl, two years and a half old, apparently in the enjoyment of excellent health, was suddenly, and without ascertainable cause, attacked with violent general convulsions and entire insensibility, which lasted with very slight remissions of the convulsive movements, but without any return of consciousness, for twelve hours. At the end of that time the convulsions ceased entirely, and she very soon regained her consciousness, remaining merely peevish and languid. She was, however, completely hemiplegic on the left side, so that she could neither rise in bed, nor turn towards the right side. The paralysis diminished rapidly, but gradually, so that at the end of three days she could sit up in bed, and in a few weeks, was perfectly well. This child remained well, with the exception of rather unusual excitability, and some peevishness of temper, for three years, when she died of scarlet fever. No autopsy could be made.

The obscurity which exists in these cases will be clearly understood by any one who will read two examples of this kind given by Dr. West. (*Loc. cit.* p. 1062.)

With a short quotation from the work of Rilliet and Barthez, I

shall pass on to the subject of meningeal apoplexy. These authors remark, (t. ii, p. 54,) in speaking of this affection, that "cerebral symptoms have been observed to exist, but of so unusual a character, and so different from what have been assigned by writers to apoplexy, that they could not lead to a diagnosis of the disease."

I shall describe the symptoms of the meningeal form of hemorrhage under two heads; first, as they present themselves in the acute, and, second, as they occur in the chronic, or second stage of the affection.

Unfortunately, the symptoms of the acute or first stage are not much more certain and distinct than those of cerebral hemorrhage. The disease may begin with fever, and some convulsive movements, or as happened in a case reported by M. Valleix, with violent general convulsions. Vomiting sometimes occurs at the beginning, but is usually very slight. It is difficult to know whether headache exists at the early age at which this disease commonly occurs. The convulsive movements generally affect particularly the eyes, and are followed by some degree of strabismus. The appetite is lost from the first; the thirst is moderate; there is no constipation. Soon after the symptoms described, appear permanent contractions of the hands and feet, which are followed by attacks of tonic or clonic convulsions, during which sensibility and intelligence are abolished. Between the attacks of convulsions there is somnolence, which, though slight at first, becomes more marked as the case goes on. The attacks of convulsions become more and more frequent as the case progresses, until at the last they are nearly constant. The tonic convulsions affect the limbs and trunk both, but particularly the former, whilst the clonic spasms occupy sometimes one side of the body, sometimes the upper extremity alone, and at other times the whole body, but even then are usually stronger on one side than on the other. Paralysis is rarely noticed in the disease; it occurred only in one out of nine cases observed by M. Legendre, and in one out of seventeen observed by Rilliet and Barthez.

Dr. West remarks (p. 1061): "The absence of paralytic symptoms, however, is not the sole cause of the obscurity of these cases, but the indications of cerebral disturbance, by which they are at-

tended vary greatly in kind as in degree. The sudden occurrence of violent convulsions, and their frequent return, alternating with spasmodic contraction of the fingers and toes in the intervals, appear to be the most frequent indications of the effusion of blood upon the surface of the brain. I need not say, however, that such symptoms, taken alone, would by no means justify you in inferring that its effusion had taken place." Dr. West adverts particularly to the fact that apoplexy in the child is particularly apt to occur in those who are weakly and feeble, and gives to this form of the disease the appellation of cachectic form of cerebral hemorrhage.

The chronic form presents most of the symptoms which exist in acquired chronic hydrocephalus from serous effusion into the ventricles. The cranium is very large in proportion to the face; the sutures are not ossified; there is strabismus, with dilatation of the pupils; the sense of sight is generally but not always retained; the face loses its expression; if the child was old enough at the moment of the attack to have shown signs of intelligence, the latter is found to diminish, rather than increase, and sometimes to be lost entirely, as the size of the head augments; and the child is apt to utter loud cries, particularly during the night. The cutaneous sensibility is in general neither lost nor diminished. The power of motion usually remains, though it was entirely lost in one case. The appetite and thirst persist.

The *duration* of cerebral apoplexy is very irregular. In one case quoted by Rilliet and Barthez, it was a quarter of an hour; in another an hour; in a third forty-eight days; and in one reported by M. Valleix, in a very young infant, recovery was nearly perfect in a little less than two months, when the child was seized with pneumonia and died.

The duration of meningeal apoplexy is also irregular. According to M. Legendre, all the recent cases seen by him in the Children's Hospital died in from eight to twelve days, apparently rather from intercurrent diseases than from the primary affection itself, whilst cases occurring in subjects placed in better hygienic conditions, and not attacked with intercurrent affections, passed into the second or hydrocephalic stage of the disease. The second stage lasted, according to the same author, in the four cases which

he witnessed, from eight to thirty months, and then death was the result, not of cerebral symptoms, but of complications affecting the thoracic organs.

Diagnosis.—The diagnosis of cerebral hemorrhage is, as I have already stated, very difficult, unless hemiplegia exist. When the case commences, as it often does, with convulsions, or with inflammatory symptoms, it is often impossible to distinguish it from acute or tubercular disease of the brain.

The diagnosis of meningeal hemorrhage is also very often extremely difficult. Not unfrequently it occurs in the course of other diseases, and is then entirely latent. In acute, primary cases, the most important and distinctive symptoms are the early age of the subjects, between one and three years generally; the violent fever from the commencement, marked by full, frequent, and *regular* pulse; the absence of constipation; the frequency of the convulsive attacks, and particularly the permanent contraction with rigidity of the feet and hands.

The diagnosis between the form of hydrocephalus which follows meningeal apoplexy, and ventricular serous hydrocephalus, is exceedingly obscure. The only circumstance which seems to have any real value, is age. MM. Rilliet and Barthez state that they have never known a child of two years old, or younger, to die of ventricular serous hydrocephalus from tumours whether tubercular or not of the brain; in all such cases the effusion has been the result of a sanguine exhalation.

Prognosis.—The prognosis of both forms of the disease is very grave. It is impossible, however, to ascertain the prognosis with any certainty, so long as the symptomatology of the two affections is as obscure as we have found it to be. That cerebral hemorrhage is susceptible of cure, however, is proved by the case reported by M. Valleix, already referred to, in which the child had nearly recovered, when it was seized with another disease which destroyed it. I have not been able to find any well-authenticated case of recovery from the meningeal form, though I cannot imagine why it may not be susceptible of cure, as any other sanguine effusion.

Treatment.—The treatment must depend on the diagnosis of the case. In a sudden and severe attack, occurring in a strong and

hearty child, and in which the symptoms of sudden pressure on the brain are clearly marked, or even highly probable, it should be the same as that employed in the apoplexy of the adult, that is to say, antiphlogistic. The child ought to be bled from the arm, ankle, or external jugular as soon as possible after the invasion, and this can be done generally in private practice within an hour. I believe that general bleeding is a much more powerful remedy in itself than local depletion, and moreover, it has the immense advantage of being applicable instantly upon the arrival of the physician, who can perform, or ought to be able to perform, the operation of venesection himself, instead of sending to a greater or less distance for a bleeder, leecher, or cupper, to do what the interest of the patient requires should be done at once. When, however, it is impossible from any cause to employ venesection, we may substitute leeching or cupping. It is impossible to lay down positive rules as to the amount of blood to be taken, as this must depend on the age and strength of the child, and the impression made upon the symptoms by the detraction. In the case of the girl two years and a half old, already referred to, who was attacked suddenly while in good health with general convulsions and entire insensibility, I took three ounces from the ankles, and applied leeches twice, within twelve hours from the onset, taking about nine ounces of blood in all. At the end of twelve hours, and after the second leeching, she regained her consciousness perfectly, but was hemiplegic on the left side. She recovered.

As soon as bloodletting has been practised, or, if leeches are employed, while they are being used, cold applications should be made to the head, either by cloths, the ice bladder, or by pouring water from a height from a pitcher or kettle. At the same time, or as early as possible after the invasion, a dose of some purgative medicine must be given. The best is probably calomel, either alone or combined with jalap or rhubarb. If given alone, it ought to be followed in an hour or two by castor oil, infusion of senna and manna, salts, magnesia, or some active cathartic. If the symptoms be very urgent, it is well to open the bowels still more speedily by a purgative enema.

Counter-irritants are always useful adjuvants to the remedies

already mentioned. They should consist at first of mustard plasters applied to the extremities, and shifted from place to place. If the symptoms do not yield after proper depletion and the use of sinapisms for some hours, it is well to apply blisters to the calves of the legs, and to the nape of the neck.

The diet must be very strict, and should consist only of barley or arrow-root water, for a few days.

It ought to be remarked, however, that bleeding is not always proper in cases supposed to depend either upon cerebral or meningeal apoplexy, for, as has already been stated, the effusion of blood occurs more frequently perhaps in feeble and weakly children, as a consequence of previous diseases, which have exhausted the forces of the constitution and occasioned a state of diffuence and dyscrasia of the blood, than in those of robust and plethoric health. In the former class of cases, depletion would of course be altogether inadmissible. Such was the character of two cases of meningeal apoplexy in children of five weeks and three years old, reported (*Loc. cit.*) by Dr. West. Again, of eight cases of cerebral apoplexy observed by Rilliet and Barthez, four coincided with more or less general tubercular disease. In such cases as these, we must depend upon local depletion to a very moderate extent, if at all, and upon the use of purgatives, cold applications, and counter-irritants.

For the paralysis which follows apoplexy in children, I believe that the most important, and indeed the only treatment necessary, is attention to the general health of the patient, in order to give to nature time and opportunity to effect the absorption of the clot, which has been thrown out into the substance of the brain, or the exhalation which has taken place into the cavity of the arachnoid membrane. When the disease assumes the chronic form, occasioning the kind of hydrocephalus we have described, there is little more to be done than to attend to the general health of the child, and to promote absorption of the fluid by the internal administration of diuretics, and the preparations of iodine. It has been proposed also to get rid of the fluid by tapping, as has been done in congenital hydrocephalus, and in some cases of acquired chronic hydrocephalus.

CHAPTER II.

NEUROSES, OR DISEASES OF THE NERVOUS SYSTEM, UNATTENDED WITH APPRECIABLE ANATOMICAL ALTERATIONS.

ARTICLE I.

GENERAL CONVULSIONS, OR ECLAMPSIA.

General remarks.—The word convulsions is a generic term applied to different forms of spasmodic disease, very dissimilar from each other in many of their characters.

Writers make different classifications of convulsions according to their peculiar notions in regard to the nature and causes of those disorders. The best division is, it seems to me, that adopted by most French writers, who arrange them by their supposed causes, making three classes, *idiopathic* or *essential*, *sympathetic*, and *symptomatic* convulsions. The first two classes are unaccompanied by appreciable lesions of the nervous centres, while the third is called symptomatic, because it includes cases of convulsions which are the sign or symptom of an appreciable lesion of the cerebro-spinal axis, as for instance, those which occur in the course of meningitis, tubercular disease, hydrocephalus, apoplexy, etc. In idiopathic or essential convulsions, the cause of the attack acts directly upon the nervous centres, while in those to which the term sympathetic is applied the cause lies in the influence or effect upon the brain or spinal marrow, of disease of some other organ; to the latter class belong the convulsions which occur in the course of pneumonia, bronchitis, the eruptive fevers, etc.

I shall not pretend to give an accurate account of symptomatic convulsions in this article, as they have already been treated of

under the head of the different organic diseases of the brain in the course of which they occur. I shall refer to them in the present article only so far as may be necessary to elucidate the pathology, diagnosis, prognosis, and treatment of idiopathic and sympathetic convulsions.

There is a form of eclampsia occurring in children, which I shall describe separately, as it differs in many of its characters from ordinary convulsions. This is the disease known by the names of spasm of the glottis, thymic or Kopp's asthma, laryngismus stridulus, and eclampsia with suffocation.

Definition ; synonymes ; frequency.—By convulsions is meant a condition of disease in which the muscular or locomotive innervation is deranged and perverted, so that the movements become irregular and automatic, and are no longer controlled by the will.

The only synonymes which it is necessary to mention are *epilepsia puerilis*, *insultus epilepticus*, and *eclampsia*. The latter term, eclampsia, is, I believe, preferable to any other, and I would gladly introduce it instead of convulsions, which is too general a term to express the form of disease under consideration.

The frequency of eclampsia is very great. It appears from Dr. Condie's tables that during the ten years preceding 1845, 2824 children under fifteen years of age died, in this city, of convulsions ; whilst, during the same time, 2583 died of infantile cholera, 2154 of scarlatina, and 1592 of pneumonia, showing that according to the bills of mortality, eclampsia was the cause of a larger number of deaths than any other single malady. It must be recollected, however, that a large number of these cases ought, in all probability, to have been returned under other titles, as many of them, no doubt, depended upon organic disease of the cerebro-spinal axis, and other acute local or general diseases.

Predisposing causes.—Essential and sympathetic convulsions are much the most frequent before the age of seven years, which is the case also in regard to symptomatic convulsions, though the latter often occur after the age mentioned. Of 43 cases of convulsions that I have met with, in which the age was noted, 12 occurred in the first year, 11 in the second, 9 in the third and fourth, and 11 between the fourth and ninth years of life. Dr. West (*Lond. Med. Gaz.* vol. iv, 1847, p. 884) states that according to

the fifth report of the registrar-general, the deaths from diseases of the nervous system in the metropolis, under one year of age, bore a proportion of 33 per cent. to the deaths from all causes; from the first to the third year, the proportion was 20·9 per cent.; from the third to the fifth year, it was 20 per cent.; whilst from the tenth to the fifteenth year, it was only 9·3 per cent. Again, to show the very great influence of age upon the predisposition to convulsions, Dr. West states, that within the first year, the deaths from convulsions constituted 74·2 per cent. of the total mortality from diseases of the nervous system; between the first and third years, the proportional mortality from convulsions, in the total mortality from affections of the nervous system, was 27·1 per cent.; between the third and fifth, it was 18·1 per cent.; while between the tenth and fifteenth years, it had fallen to 2·7 per cent.

Dr. West ascribes the great frequency of convulsions in early life to the predominance of the spinal over the cerebral system, and to the imperfect development of the brain.

It is generally stated that convulsions are more common in girls than boys. Rilliet and Barthez, on the contrary, observed them most frequently in boys, and such has been my own experience, since of 44 cases that I have seen, 23 occurred in boys, and 21 in girls.

It has been generally supposed that a delicate and nervous constitution, is a powerful predisposing cause to convulsive attacks. This has been denied, however, by several recent writers, whose observations are very careful and accurate. I am disposed to believe that it is not so much a feeble or delicate constitution that predisposes to convulsions, as it is one characterized by a highly susceptible, irritable, and nervous temperament, which often exists, in my opinion, in connexion with an apparently healthy and vigorous physical organization. Of 48 children in whom I have seen convulsive attacks, these occurred more than once in 5. Of the 5, 4 presented every appearance of strong and vigorous health, with the exception that when labouring under any kind of sickness, as dentition, indigestion, the fever accompanying simple angina, and in two the invasion of measles, they immediately became extremely restless and irritable, or heavy and drowsy, and at a very early period, and sometimes with very little warning, were seized

with convulsions. The fifth child was puny and feeble until after the completion of the first dentition, when it grew strong and hearty. The number of convulsions varied in the different subjects. In 1 there were five different attacks, in another four, in 2 there were three, and in 1, two. They all recovered and are still living: 2 at the age of seven, 2 at that of six, and 1 four years old. They are all free, at present, from anything like epileptic disease.

It is generally believed that the predisposition to convulsions is sometimes hereditary. I have remarked in regard to this point, that several children in the same family sometimes suffer from the disease, and that the nervous temperament to which I alluded above, appeared in some instances to have been inherited by the child from its parents.

The *exciting causes* of convulsions are exceedingly numerous and dissimilar. Amongst the causes of essential convulsions are cited vivid moral emotions, violent pain, high temperature, exposure with the head uncovered to the sun, and sudden exposure to cold. In many cases, however, the exciting cause cannot be detected. The exciting causes of sympathetic convulsions may be almost any of the diseases incident to childhood. Amongst them I will cite as probably the most frequent, hooping-cough, pneumonia, scarlatina, measles, violent fever from any cause, dentition, and indigestion.

Of 48 cases of convulsions that have come under my notice, I have regarded only 3 as essential, whilst 32 were sympathetic, and 13 symptomatic. Of the 3 essential cases, I could not detect the exciting cause in any. Of the 32 sympathetic cases it was scarlet fever in five; pertussis and indigestion each four; pneumonia and simple angina each three; cholera infantum, dysentery, measles, bronchitis, and dentition, each two; enteritis one; an over-dose of castor oil (3vi) given to a young child with a slight cholera, one; and lastly, fæcal accumulations in the large intestine in one.

Symptoms.—Prodromic symptoms.—It has been asserted by some writers that most attacks of convulsions in children are preceded by prodromic symptoms, which indicate to the experienced eye their approach. This does not agree exactly with my

own experience, at least in regard to the essential and sympathetic forms, since of the cases of the former variety, well-marked prodromes did not occur in any, and of 32 of the latter, they were observed only in four. It is proper to state, however, that I have frequently observed symptoms in children suffering from various ailments that seemed to me to threaten an attack of eclampsia, and which have been dissipated by proper preventive treatment.

The precursory symptoms of idiopathic and sympathetic convulsions are difficult to describe because of their variable nature. They consist in general, however, of whatever indicates a highly disordered condition of the nervous system. The most marked symptoms are unusual drowsiness, excessive irritability, a peculiar physiognomical expression, general tremors, and the drawing of the thumbs into the palms of the hands, or rigid flexion of the toes. The drowsiness which precedes an attack of eclampsia, is almost always accompanied with some restlessness. The sleep is light and easily disturbed; the child moves and turns, or starts and moans; often it seems to have frightful dreams, and will scream out or wake suddenly, bewildered and terrified, and when roused is generally exceedingly irritable, crying violently or fretting at the slightest contrariety, or without cause. The face, and particularly the eye, often exhibit a peculiar expression altogether different from their usual appearance. The expression which has most struck me, and which I have seen on several occasions, is a fixed and staring look, lasting but for an instant, as though the child were looking intently at some object, while in fact it is gazing at vacancy; at the same time the expression is entirely without meaning. The child seems in fact, for a moment, to be in a state of extasis. In some instances a sardonic smile is seen to pass over the countenance just before the attack. The tremors or tremblings alluded to above, occur both in the sleeping and waking state, but particularly in the former. Flexion of the thumbs and toes has been noticed by different observers, but is, I believe, a sign rather of the approach of symptomatic, than of essential or sympathetic convulsions.

The precursory symptoms of symptomatic convulsions will depend on the nature of the disease in the course of which they occur. Not unfrequently the convulsions occur at the very outset of the

disease of the brain or spinal marrow, when of course there will be no prodromic symptoms whatever. According to Dr. Marshall Hall, (*Diseases of the Nervous System*, p. 149,) the first and most frequent sign showing that the excito-motory system is becoming complicated in diseases of the brain is vomiting, after which come strabismus, a contracted state of the muscles of the thumbs or fingers, or some unequivocal spasmodic or convulsive affection of the respiratory muscles, or of the muscles of the limbs.

Symptoms of the attack.—With or without the precursory symptoms just described, the convulsive movements generally begin in the eyes; which, for a moment, are fixed and staring, and then drawn obliquely upwards under the upper lid, so that the white portions of the balls alone are visible for an instant between the partially open lids. During the attack the eyes are rarely fixed in one position, but are constantly agitated in various directions, from side to side, or upwards and downwards; very often there is the most violent strabismus; the eyelids are sometimes open, at others shut; the pupils may be contracted or dilated. The muscles of the face next enter into contraction, and occasion the most hideous contortions of the features. The mouth is distorted into various shapes, the lips often covered with a whitish or sanguinolent froth, and the jaws tightly clinched together by tonic spasms, or agitated by convulsive movements, so as to produce grinding of the teeth. The trunk of the body generally becomes rigid and stiff from tonic contractions of its muscles, though it also is sometimes variously contorted by clonic convulsions. The head is usually strongly retracted upon the trunk, but in other instances is drawn to one side, or violently rotated. The muscles about the front of the neck enter into action, and alternately elevate and depress the larynx; the tongue, when it can be seen, is observed to be moved in different directions, and is sometimes caught between the teeth and severely bitten. The extremities, particularly the superior, are more violently convulsed than any other parts. The fingers are drawn into the palms of the hands, the fore-arms are flexed and extended upon the arms by short, rapid and generally rhythmic movements, the hand is quickly pronated and supinated upon the arm, or finally the whole upper extremity is twisted and distorted into various positions, which it is impossible to describe.

The inferior extremities undergo similar movements, but almost always in a less degree than the upper. The respiration during the attack is irregular, sometimes suspended by rigid spasm of the respiratory muscles, and sometimes accelerated. A spasmodic contraction of the larynx, producing noisy inspirations, has been noticed by several writers. We shall find when we come to consider the nature of the disease, that Dr. Hall is of opinion that more or less complete closure of the larynx is the most important feature of the convulsive crisis. The face is often livid and deeply congested, especially when the respiration is embarrassed; the head is hot, whilst the extremities are cold; the pulse becomes large and full, or frequent and small, and sometimes cannot be counted in consequence of contraction of the muscles of the fore-arm. The face is not always however congested. I have sometimes seen it perfectly white, while the convulsions were severe, and the child profoundly insensible. The action of the heart is tumultuous, and sometimes irregular or intermittent. When the attack is very violent, the urine and fæces are occasionally discharged involuntarily, but these are rare symptoms. Deglutition is seldom impossible even in the severest fit. In severe, and especially long-continued attacks, intellectual consciousness, and general and special sensibility are all abolished. In milder cases, though consciousness is destroyed, some of the special senses still respond to irritants, whilst in still slighter cases, the intelligence also is more or less preserved.

Convulsions are not always as we have just described them, general. They may be circumscribed or partial, affecting one side of the body more than the other, or one side alone, or a single arm. Sometimes they attack the eyes only. The inferior extremities are rarely affected alone. Of the partial convulsions the most frequent is that in which some part of the face and upper extremities are attacked. In this form of the disease, the disorders of the circulation and respiration, the congested tint of the face, froth upon the lips, and derangements of intelligence and sensibility, are much less strongly marked than in general attacks.

The *duration* of an attack of eclampsia concerns both the length of the convulsive crisis, and the continuance of the disposition to

renewals of the crisis. Both of these are very uncertain. I have known the attack to last in all its violence eight hours and a half in one case, and twelve in another, and it is said to have lasted much longer in some instances. When the spasmodic movements continue during a long period, they are almost always interrupted by remissions. As a general rule, the duration is much shorter than the periods above mentioned,—from a few minutes to half an hour. When the attacks cease and recur as they often do several times in a day, they leave the patient during the interval in a state of more or less perfect consciousness or somnolence, restlessness or delirium, or finally of coma. The period during which the disposition to recurrence continues, depends principally upon the cause of the convulsions. If this continues in action, they will be apt to return until it is removed.

Idiopathic and sympathetic convulsions generally consist of a single attack, though there are sometimes several, which occur at intervals of several hours, or one or two days. Sympathetic convulsions usually occur either at the beginning or termination of the disease which they complicate, and much less frequently during its middle period. Of 23 cases of this form observed by myself, complicating measles, scarlet fever, pneumonia, cholera infantum, simple angina and dysentery, in which the period was carefully ascertained, they occurred at the invasion alone in 9, at the termination alone in 9, at the middle period alone in 3, and at the invasion and termination both in 2. It is curious to remark, that all the cases in which they occurred at the invasion or in the middle period, recovered; whilst all those in which they occurred only at the termination, or at the invasion and termination both, proved fatal.

Rilliet and Barthez state that half the cases of symptomatic convulsions observed by them, occurred at the commencement of the encephalic disease. This form seldom consists of a single crisis; the attacks on the contrary, are repeated from time to time. The authors just quoted state that whenever the convulsive attacks have recurred repeatedly within an interval of a few days, they have proved symptomatic of disease of the brain.

Nature of the disease.—It seems to me that the only plausible and satisfactory explanation of the pathology of convulsions in children, is that afforded us by the physiological doctrines in regard

to the nervous system, set forth by Dr. Marshall Hall in his writings. Dr. Hall says (*Diseases and Derangements of the Nervous System*, p. 145), "That the whole *class* of convulsive diseases consists of affections of the true spinal system, there is no longer any doubt. But these diseases do not all *originate* in this system." All convulsive disorders are, according to this doctrine, affections of the true spinal or excito-motory system. The causes of these disorders may be of incident origin, acting upon excitor nerves; of centric origin, seated in the brain or spinal marrow; or of reflex origin, acting upon reflex or motor nerves. They are called, therefore, according to their causes, central or centric, when they depend on disease of the nervous centres; centripetal, when they are excited through excitor nerves; and centrifugal when they depend on disease of the motor nerves. Dr. Hall ascribes great importance to the condition of the glottis in convulsions. He says (p. 323), in speaking of epilepsy, "The second symptom is a forcible closure of the *larynx*, and *expiratory efforts*, which suffuse the countenance, and probably congest the brain with venous blood." At page 327, he says, "A spasmodic affection of the larynx has obviously much to do in this disease (epilepsy), as well as in the crowing inspiration or croup-like convulsion of infants; so much, indeed, that I doubt whether *convulsion* would occur without closure of this organ." In describing the croup-like convulsion or laryngismus stridulus (p. 180), he says: "I must repeat the observation that the respiration is actually arrested by the closure of the larynx; and that there are forcible expiratory efforts only, or principally, in the actual convulsion."

In a recent publication Dr. Hall says: "without closure of the larynx, extreme laryngismus, and the consequent congestion of the nervous centres, there could, I believe, be no convulsion! This closure of the larynx must be complete, in the affection under consideration, (laryngismus stridulus,) as in all others, before convulsion *can* take place." (*Braith. Ret. from Lancet*, June 12, 1847, p. 609.)

It is easy to comprehend the mode of production of sympathetic convulsions by reference to these doctrines. They evidently depend upon morbid impressions conveyed to the true spinal system

through the excitor nerves, which have their origin in the diseased organs. Thus it is easy to understand why inflammation of the parenchyma of the lung in pneumonia, of the bronchial mucous membrane in bronchitis, of the mucous membrane of the bowel in entero-colitis or dysentery, or of the pharynx in angina; why the pressure of a tooth upon an inflamed gum during dentition, the presence of a foreign body, as newspaper, or crude food, or fecal accumulations in the stomach or intestines, should produce a degree of irritation in excitor nerves, sufficient, when transmitted to the spinal centre, to occasion the convulsions we have been considering.

It is more difficult to explain the mode in which continued fevers, measles, scarlatina, &c., give rise to convulsions. To me, however, it seems readily explained by the morbid effect produced upon the nervous centres by the blood, which is known to be more or less changed, in these affections, from its healthful condition.

The explanation of the production of idiopathic or essential convulsions is not always so easy, because we are sometimes unable to detect any cause, either centric, centripetal, or centrifugal, to account for the excitation of the spinal system. It seems probable, however, that they must depend, like those of the sympathetic form, upon some unhealthful, and therefore irritating condition, acting upon the excito-motory system of nerves. The cause may be so slight as to escape the notice of the physician, and yet sufficient to produce a convulsive crisis in a child predisposed to eclampsia. It may be an unnoticed dentition, some undigested food in contact with the stomach or intestines, or accumulations of unhealthy fecal substances in the intestines. When convulsions have followed a vivid mental emotion, as passion or vexation, they are evidently a result of the influence of that condition upon the nervous centres. Acute pain, which is said to have occasioned essential eclampsia, as well as exposure to violent heat or severe cold, must produce their effects through their action upon incident excitor nerves.

All symptomatic convulsions belong, of course, to the class of centric diseases. These need no further remarks.

Diagnosis.—There are two important points to be considered

in treating of the diagnosis of eclampsia: the diseases with which it may be confounded, and the causes which may have produced the convulsions, or, in other words, their distinction into essential, sympathetic, and symptomatic.

The only disease with which eclampsia is likely to be confounded, is epilepsy; the mistake could only be made when the former is violent, and accompanied and followed by unconsciousness. In epilepsy, however, the invasion is more sudden, the convulsions are accompanied with greater rigidity, there is always frothing at the mouth, the duration of the crisis is shorter, and it is generally followed by more marked stupor. If the convulsive attack have occurred under the influence of an appreciable cause, if the parents are not epileptic, and if the child is very impressionable, it is probably eclampsia. Again, the younger the patient, the more likely is the case to be one of eclampsia; whilst if the child is approaching towards puberty, if the attacks are frequently repeated, and yet followed by complete restorations to health in the interval, the disease is much more likely to prove to be epilepsy.

The diagnosis of the form of the attack, whether idiopathic, sympathetic, or symptomatic, is exceedingly important, as upon this must depend in great measure the prognosis and treatment. It is often very difficult, and sometimes impossible, to determine at the moment, to which class the convulsions belong. The most difficult points in the diagnosis are the following: first, when a child previously in good health, is suddenly seized with the disease, to determine whether it is essential; whether it is sympathetic and occasioned by disease which, up to this instant, has been latent, or by the invasion of some one of the acute local diseases, or of one of the continued fevers; or lastly, whether it is symptomatic, marking the invasion of a disease of the cerebro-spinal axis: second, when the convulsion occurs in the course of a disease not implicating the nervous centres, to determine whether it is merely sympathetic of that disease, or whether it is symptomatic of the invasion of an intercurrent affection of the brain or spinal marrow.

It is impossible, for want of space, to treat of all these points in

detail. The enumeration of them, however, will be useful in calling the attention of the reader to their importance.

An essential convulsion is only to be distinguished by careful study of the antecedent history and present condition of the patient. If, after a thorough examination of all the organs, no diseased point can be detected, and if the child recover perfectly from the convulsion, we must conclude that the case has been an idiopathic one, in which the cause is beyond our reach. I am disposed to believe, however, as has already been stated, that in most such cases there has been a source of irritation in some of the organs of the body, which has acted as the excitant to the excitomotor system, and which, if we could but detect it, would warrant us in classing the case amongst sympathetic convulsions.

The sympathetic and symptomatic forms of eclampsia are to be diagnosticated by the same careful attention to the antecedent history and present condition of the child. If the latter be teething at the time of the fit, and there be no other cause to explain the attack, and nothing in the consecutive symptoms to render such an explanation inadmissible, we may refer it to that condition. I may remark merely, that, as a general rule, eclampsia depending entirely upon the irritation of dentition, is seldom either violent or long-continued, and the return to consciousness and health is speedy. The probable dependence of the attack upon indigestion is to be ascertained by the absence of other causes, and by our learning upon inquiry that the child had eaten of some indigestible substance within a few hours or a day before the attack. Its dependence on intestinal accumulations is to be arrived at by the same negative or exclusive method, and by learning that the patient is usually, or has been of late, of a constipated habit.

When the attack occurs in the course of some other disease, as pneumonia, enteritis, pertussis, scarlatina, or measles, it is almost certainly sympathetic. It may possibly, however, be indicative of an intercurrent attack of cerebral disease. This can be determined only by attention to the consecutive phenomena. If the attack be short, and soon followed by complete restoration to consciousness, it is in all probability sympathetic. If, on the contrary, the convulsive crisis be long and severe, if the recovery from it be slow

and imperfect, if it be followed by violent agitation, somnolence or coma, or by some persistent lesion of motility, there is every reason to fear an attack of disease of the brain.

Sympathetic convulsions occurring at the invasion of different local or general diseases, are to be distinguished only by observation of the symptoms that follow the crisis, which will be those belonging to the particular malady whose approach has caused the attack of eclampsia.

Symptomatic eclampsia is characterized by various signs of encephalic disorder, which rapidly succeed the convulsive attack. The most important of these are severe and continued headache; diminution or exaltation of general or special sensibility; dilatation or contraction of the pupils; irregular movements of the eyes; flexion or stiffness of some of the limbs, or of the fingers or thumbs; disordered intelligence; or the symptoms which have already been described in the articles upon the diseases of the brain.

Prognosis.—The prognosis of essential convulsions must depend on the nature of the cause, and violence of the attack. When the cause has been slight, or one which soon ceases to act, or can be readily removed, the prognosis is much more favourable than under opposite conditions. If the convulsive crisis is short and of moderate severity, if the pulse and respiration are but slightly disturbed, if there be but little congestion of the face, and no stertor, there is every reason to hope a successful issue in the case. Of the three cases of this class that I have seen, two recovered and one died.

Sympathetic is more dangerous than essential eclampsia, but much less so than symptomatic. The prognosis will depend chiefly on the nature of the disease which it complicates, and on the stage of that disease at which it occurs. Thus, in scarlatina convulsions are almost always fatal, in measles much less so, and in other diseases in various proportions. They are much more apt to terminate unfavourably where they occur after the malady which they complicate has been in progress several days. This is a remark made by various authors, and I have already stated that of 23 cases of this form, in which I carefully ascertained the period of their occurrence, there were 9 at the invasion, all of

which ended favourably; 3 at the middle period which also recovered; two both at the invasion and at a later period, both of which were fatal; and 9 after the cases had been progressing for a considerable time, all of which proved fatal. In addition to these important elements for making the prognosis, we must consider, also, the duration and degree of violence of the paroxysm, the state of the patient after the fit as to his cerebro-spinal functions, and lastly the age and constitution of the child.

The prognosis of symptomatic convulsions must depend very much upon that of the disease of which they are the symptom. It may be stated as a general rule, that, like those of the sympathetic class, they are less dangerous when they occur at the beginning, than a later period of the disease. They are always, however, very dangerous. Of 13 cases that I have seen, 11 were fatal.

Treatment.—I shall confine my remarks upon the treatment of eclampsia to the essential and sympathetic forms of the disease, having already treated of that of the symptomatic form in the articles upon the cerebral diseases which give rise to them.

It seems to me that the treatment of eclampsia in children may be simplified by attention to two distinct conditions of disorder, which appear to exist in every case. These are the condition of morbid irritation or derangement of the excito-motory system of nerves, and the cause which occasions that derangement. The condition of irritation or disease of the true spinal system exists in all cases, and is always the same, differing only in degree and extent; whilst the morbid cause of that irritation differs in each case, being in one dentition, in another pain, in another constipation, in others pneumonia or indigestion, pleurisy or angina, scarlet fever, or measles, fright, or other violent emotions. If this view of the subject be correct, it is clear that in treating a case of convulsions, we have to attend to the two morbid conditions referred to, and I shall be careful, therefore, in the course of my remarks, to treat of the remedies most proper for the removal of the cause, whatever it may be, which acts as the irritant to the spinal system; and of those proper to subdue or allay the deranged condition of the spinal system and the effects of that derangement.

There are some general rules to be followed in the treatment

of convulsions which apply to all cases, and of these I shall first speak. They are, to place the child in a large, *well-ventilated* room, if such can be procured; if it have been seized in a little close room, where the atmosphere is dense and impure, removal to another room, or exposure to fresh air before an open window, has sometimes sufficed to terminate the crisis. At the same time the clothes of the child should be loosened, in order to prevent all constriction, and if necessary, taken off, to allow of a careful examination of the whole body. I believe that it is a good rule always to place the child, no matter what the cause of the convulsion may be, if it be at all a severe one, in a *warm bath* (96° or 97° F.) This has frequently proved an efficient remedy, according to my experience. It is easily procured in most cases, and I am quite confident that I have never known it do harm, though I have used it in almost every case. The patient should be kept in the bath some ten, fifteen, or twenty minutes, or until the convulsive movements cease; when taken out it is most convenient, and at the same time useful, to envelope it in a small, light blanket, or flannel, for a short time, before the clothes are readjusted.

If the convulsion occur in a strong and vigorous subject; if it be violent, and accompanied by deep red, or still more livid flush of the face, and distension of the veins of the head and neck; if it last more than a few minutes, or is repeated after short intervals of quiet, I would in all cases, without hesitation, recommend the use of *bloodletting*. The detraction of blood is called for, in my opinion for the same reasons as in puerperal convulsions, and indeed in every violent convulsive attack; to save the nervous centres from the effects of the paroxysm, which are in all severe cases, excessive congestion, and in some, fatal effusions. It is useful, moreover, by means of the sedative and relaxing influence which it exerts upon the whole economy, and particularly upon the sanguine and nervous apparatuses. I think, therefore, that we may lay it down as a rule, to employ bloodletting in all instances, except those in which the convulsion depends upon an anemic condition, and in which it is contraindicated by a naturally feeble or by a debilitated state of the constitution; in those which it is clearly unnecessary

from the slight severity or short duration of the attack ; or those
• which occur in the course of other diseases, and particularly at their termination, and in which a resort to it is rendered evidently improper by the circumstances of the concomitant affection. The quantity of blood to be taken, and the method, must depend on the circumstances of the case. It is best to bleed generally whenever this is possible, as the operation is much more speedily performed than local bleeding, and because the sedative and relaxing effects of the detraction upon the economy are more powerful. The blood may be taken either from the arm or jugular vein. We must be guided as to the quantity by the age and constitution of the patient, the violence and duration of the paroxysm, and the cause of the attack. In a strong, hearty child, two or three years of age, in whom the attack is violent, and produced by some cause not likely to continue long in action, and thereby exhaust the strength, we may take from four to six ounces at the first bleeding, and should this fail to exert an influence upon the paroxysm, a rather smaller quantity may be taken in one or two hours afterwards. In younger children, or those who are somewhat feeble or delicate, the amount drawn ought to be less. When general bleeding cannot, from any cause, be employed, we may resort to cups and leeches to the temples or back of the neck, or, as advised by some of the French writers, to more distant parts.

I believe it is useful in all cases of essential and sympathetic convulsions, which resist the employment of a warm bath and bleeding, and also when bleeding cannot be or is not resorted to, to make use of an *emetic* of some kind. The act of vomiting alone is often sufficient to break up a paroxysm of convulsions which has resisted various other means. This I learned first from the advice of an old and experienced practitioner, who was in the habit of employing emetics in all cases of eclampsia of children, and I have since seen it tested on several occasions. Dr. Hall recommends the induction of vomiting in the treatment of the paroxysm of the croup-like convulsion or laryngismus stridulus, and as a means of prevention in epilepsy. In the former he employs irritation of the fauces by tickling with a feather ; in the latter, ipecacuanha. He says that a new mode of action is induced in the true spinal system

by the act of vomiting, so that the disposition to closure of the larynx, and expiratory efforts, is exchanged for sudden acts of inspiration. The emetic which I employ, is ipecacuanha. It may be advantageously combined with tartar emetic in the case of a vigorous child, especially if no depletion have been used. The employment of emetics is, of course, particularly called for, whenever there is a suspicion of the presence of undigested food or of foreign bodies in the stomach.

In addition to warm baths, bleeding, and emetics, *cold applications* to the head will be found proper and useful in nearly all cases which are of any considerable violence. Their use would be improper, however, when the surface is pale, the features contracted, and the pulse small and feeble; but, whenever the skin, especially that of the head, is deeply coloured and turgid, and the pulse full and strong, they ought to be employed from the beginning. While the child is in the bath, its head may be wrapped in a cloth wet with ice-water; or after it has been removed, cold water may be poured from pitchers or a tea-kettle upon the same part. If the latter is done, enough should be employed to prevent the sudden reaction which inevitably takes place when but a small quantity is used. During the after treatment of the case, the cold applications ought to be continued so long as the head remains unnaturally heated.

The administration of a *purgative* dose is proper and useful in many cases of convulsions; particularly when it is found upon inquiry that the child has been constipated prior to the attack; when it is suspected that the bowels may contain crude food or some foreign body; when it is desirable to produce an evacuant effect in a strong plethoric child, or a derivative action from the brain, and when the attack is attended with violent determination of blood towards that organ. The best purgative in severe cases occurring in hearty children is *calomel*. It is advantageous because of its easy administration, its speedy operation, and the powerful sedative influence which it exerts upon the whole economy. The dose should be from three to six grains, according to the age. It ought to be followed in one or two hours by some other cathartic, which may be either castor oil, rhubarb, jalap, or salts. The best

of all is castor oil if it can be given. When the attack is slight or the patient weak and delicate, castor oil is particularly applicable, as it operates with so little irritation to the intestine. Whatever the remedy may be, it should be given only in such quantity as to produce complete evacuation of the bowels and a moderate derivation to those organs, without the risk of occasioning a degree of irritation sufficient to increase the disturbance of the nervous system already existing.

In many cases of eclampsia it will be found that purgative *enemata* are of great service. They may be administered immediately before or after the bath, and not unfrequently have the effect of stopping the paroxysm. They may consist of water holding in suspension or solution castile soap, common salt, molasses, castor oil, or sweet oil. If the first fails to operate in ten or fifteen minutes, another or even a third ought to be given.

Revulsives are of the utmost importance in the treatment of convulsions. They should be employed from the very first, or immediately after the use of the bath. In slight attacks, they alone are often sufficient to suspend the paroxysm, or at least the fit often ceases under their use. Mustard is the most useful and convenient form of application in the great majority of cases. It may be used either in the form of sinapisms, which are to be shifted from place to place, or in that of the foot-bath. When sinapisms are used, they should always be covered with gauze or fine muslin, to avoid the danger of leaving any of the mustard upon the skin after they are taken off. I once saw very bad ulcerations upon the feet of a child from the neglect of this precaution. In the hurry and bustle of the moment, the feet were not washed when the plasters were removed, and the mustard that remained produced vesications which ulcerated. In obstinate attacks, the revulsives ought to be reapplied from time to time, taking care to shift their position in order to avoid vesication.

Antispasmodics are highly recommended by some writers upon the disease, and particularly by M. Brachet, who appears to have used with great effect the oxide of zinc in combination with extract of hyoscyamus. I have but little experience in regard to their

use, but confess myself indisposed to resort to them except after the employment of the means already detailed; during the intervals between the fits, when these occur from time to time; and as a means of prevention in children threatened with the disease. There can be no doubt, from the evidence adduced in regard to their effects, and from what I have myself seen of the influence exerted by valerian upon the convulsive phenomena of acute cerebral diseases, that they have a considerable power of allaying the disorder of the locomotive apparatus present in all convulsive affections. As a means of prevention therefore, as adjuvants to other remedies, and in children of very nervous, irritable temperament, and delicate constitution, in whom it is improper to use the more powerful agents already detailed, I would advise a recourse to substances of this kind. The ones most highly recommended are valerian, oxide of zinc, assafoetida, and camphor. Of these, valerian is the only one which I have employed, and this but to a slight extent. It is best given in the form of the fluid extract, of which from five to ten drops may be administered in water, to a child two years old, every half hour or hour, until several doses have been used, after which it ought to be suspended for a while or given in smaller quantity. M. Brachet gave the oxide of zinc in combination with extract of hyoscyamus, to the amount of at least two grains of the former and four of the latter in the twenty-four hours, divided into four, eight, or twelve doses. A dose was given every two or three hours, and when the symptoms were very violent, the first two or three were repeated at much shorter intervals. M. B. says, speaking of this remedy, (*Traité Prat. des Convulsions dans l'Enfance*. Deux. Edit. p. 402-3,) "I always found it to produce quiet; but whilst the cause remained, the quiet was only momentary, and the remedy seemed to have produced no effect." "This remedy does not destroy the cause (of the convulsion), but it allows time to treat it by calming the nervous erethism."

Opium is a remedy which requires much care and discrimination in its employment, but which in certain conditions of the disease, is of the greatest service. It should rarely be given while there remains any evidences of considerable determination

of blood to the brain, but when this condition does not exist, or after it has been removed by bloodletting, and the use of revulsives, opium often proves very useful in allaying irritability and restlessness, which themselves seem to keep up a disposition to return or continuance of the convulsive phenomena. Somnolence also, and still more, coma, likewise contraindicate the use of opium. Dr. Eberle thinks he has seen much advantage obtained from frictions over the spinal region, with a mixture of equal parts of oil of amber, laudanum, and spirits of camphor, particularly in very young infants.

I shall here conclude my remarks upon the general treatment of eclampsia, and proceed to make some observations on the conduct to be pursued under particular circumstances.

It is always highly important for the direction of the treatment, to discover the cause of the attack. This is sometimes very easy, while in other instances it is exceedingly difficult, and not unfrequently, impossible. If the attack occur in the course of some acute disease, as pneumonia, angina, enteritis, or dysentery, or during the progress of one of the eruptive diseases, the diagnosis of the case is, as a general rule, very easy. If, on the contrary, it occurs at the commencement of one of these affections, the diagnosis will be much more difficult, unless indeed the symptoms of the concomitant disease have already declared themselves, or do so very soon after the convulsion. The treatment in such cases should be that laid down in our general remarks, modified, however, by the requirements of the particular disease during the course of which the eclampsia occurs.

When the attack occurs suddenly in a child previously in good health, or who had been merely slightly ailing for a few hours, the detection of the cause is still more difficult. The most probable causes, under such circumstances are, however, dentition, indigestion, intestinal disorder, or the approach of an acute general or local disease. It is easy to determine by inquiry of the attendants, and by examination of the mouth, whether the child is teething or not. As a general rule, the convulsions which depend solely on the process of dentition, are slight, and last but a short time. In all the instances that I have seen, in which such was the only

cause to be detected, the attack was of this nature. The treatment in such instances is to lance the gums, if they are swelled and inflamed over the advancing teeth; to use warm baths, and to administer enemata. These simple means will seldom fail when eclampsia depends on the process of dentition alone. But when, on the contrary, there is present indigestion, intestinal accumulations, or enteritis, as often happens during dentition, the case becomes more serious, and requires, in addition to the treatment above described, one directed to the particular coexisting morbid condition.

The existence of indigestion as the cause of the attack, can be discovered only by ascertaining with great care the diet of the child during the previous days. If it appear that something of an indigestible nature has been eaten within a short time, and if, at the same time, it be impossible to detect any more evident or probable cause for the attack, we should have a right to conclude that it depends upon indigestion. Under these circumstances the proper treatment is the immediate use of the warm bath, and the earliest possible administration of an emetic of ipecacuanha. The operation of the emetic may often be hastened by tickling the fauces with a quill. If the paroxysm be very severe and long-continued, bleeding ought to be resorted to.

The presence of intestinal accumulations as the cause of the paroxysms may be inferred, when it is found upon inquiry that the patient has been constipated for some days, or that the stools have been scanty and hard, or scanty and very offensive; when the abdomen is distended and hard, and the distension is ascertained by palpation and percussion, not to be merely tympany; and, lastly, when there is no more evident cause for the attack. In such a case the particular treatment is the use of purgatives and enemata, in addition to the other means detailed.

The dependency of the attack on the approach or commencement of some acute general or local disease, can be inferred only from a very careful examination of the antecedent and present phenomena of the case. One of these may be suspected as the cause when we can account for the occurrence of the convulsion on no more reasonable supposition; when neither dentition, indi-

gestion, nor intestinal irritation exist. It is scarcely likely that a convulsion could be occasioned by any of the acute thoracic or abdominal affections, unless the disease had already gone far enough to allow a careful examination of the different rational and physical symptoms, to determine its existence. Perhaps the most difficult cases to diagnosticate, are those which occur at the beginning of the eruptive fevers. Even here, however, a careful search for the prodromic symptoms of the disease, a watchful observance of the condition of the patient in and after the paroxysm, will generally lead to a correct opinion within a few hours, or after a day, and sometimes at the moment of the attack. Of the eruptive diseases, scarlet fever is much the most apt to be accompanied by convulsions at the onset, and in that disease the remarkable rapidity and activity of the pulse, the state of the fauces, the coryza, heat of skin, and early appearance of the eruption, will generally enable us to understand the cause of the convulsion at a very early period.

The treatment of sympathetic eclampsia depending on acute thoracic or abdominal disease, should be that which is proper for the particular malady which they complicate, with the addition of warm baths, revulsives, antispasmodics, and, after depletion, of opium, in the form of Dover's powder combined with nitre. The management of the convulsions which complicate the eruptive fevers, will be specially treated of in the articles on those maladies.

ARTICLE II.

LARYNGISMUS STRIDULUS.

Definition ; synonymes ; frequency.—Laryngismus stridulus belongs to the class of neuroses. It is characterized by crowing inspirations, or by momentary suspensions of the act of respiration ; these attacks occur suddenly, and at irregular intervals, are of short duration, cease suddenly, and are unaccompanied by cough, or other signs of irritation of the larynx. If the disease progresses, it is associated with other convulsive symptoms, as

strabismus, distortion of the face, carpo-pedal spasms, or general convulsions.

It is "the peculiar species of convulsion" of Dr. John Clarke; the inward fits of Underwood; the spasm of the larynx or glottis of Marsh; the laryngismus stridulus of Good; the croup-like convulsion of Dr. Marshall Hall; child-crowing; the spasme de la glotte of the French writers; and the thymic asthma of the Germans. It is not mentioned by Dewees. It is described by Eberle under the title of carpo-pedal spasms.

The frequency of the disease seems to vary in different countries. In France it would appear to be rare. Rilliet and Barthez speak of having seen but one case; and state that they are acquainted with only one other, published by M. Constant in the *Bulletin de Therapeutique*. M. Blache, (article *Nevrose du Larynx*, *Dict. de Méd.* t. xvii, p. 590,) adverts very cursorily to one case. Valleix, (*Guide du Méd. Prat.*, Art. *Asthme Thymique*,) doubts its existence as a distinct disease. In Germany, on the contrary, it would seem to be a rather frequent disease. In England it cannot be very infrequent, since Merriman says it is by no means uncommon. Copland, (*Stridulous Laryngic Suffocation in Children*, *Dict. of Pract. Med.*,) speaks of numerous cases that he has seen, and states that he has had as many as three under treatment at the same time. Ley speaks of having met with considerably above twenty cases. Dr. Marshall Hall remarks that "within the short space of one month, I have seen five cases of croup-like convulsion."

I do not think that it is a common disease in Philadelphia, though it is certainly not extremely rare, since I have seen one fatal case myself, and know of the existence of two others, and of one case of recovery.

Predisposing causes.—Age.—It is generally acknowledged that the disease occurs most frequently during the period of the first dentition, though it has been known to exist as late as six or seven years of age. Of 20 cases (17 collected by authors, and three by myself), in which the age is given, 9 were six months or less of age, 6 between six months and a year, 3 between one and two years of age, 1 of two, and 1 of four years of age; so that of the

20, 15 were under one year. It is evident, therefore, so far as these cases go, that the majority occur within the first, and very few after the second year.

Sex.—It is most frequent in the male sex. Of 49 cases (45 from authors, and 4 by myself), 38 occurred in boys, and 11 in girls.

Constitution.—Authors who have written on the disease, generally express the opinion that it is most frequent in delicate and feeble, and especially in scrofulous constitutions. It is nevertheless acknowledged also that it sometimes occurs in the most healthy and vigorous subjects. It not unfrequently attacks several children in a family. Ley quotes four instances from other writers, in which three children in each family had the disease, and in one all three died. He states that his own experience fully confirms this fact.

Nature and exciting causes ; forms.—Much difference of opinion has prevailed in regard to the nature and exciting causes of laryngismus stridulus, since the disease has attracted the particular notice of the profession. Kopp and other German authors ascribe it to compression of the respiratory organs by enlarged thymus gland, while others of that nation, and some of the English and French writers, class it amongst the neuroses. Dr. Hugh Ley supposed it to depend on compression of the par vagum nerves by enlarged cervical and bronchial glands. Dr. Marshall Hall considers it to be a disease of the reflex system of nerves. Amongst the French writers, Rilliet and Barthez regard it as a neurosis, consisting of spasm of the glottis; Valleix doubts the propriety of regarding it as a distinct disease; Blache (*Dict. de Med.* t. xvii, p. 584), speaks of it as a neurosis of the larynx, which may be either symptomatic or idiopathic.

Before examining in detail the different opinions quoted above, which I propose doing, I will refer to the anatomical appearances of the malady, as observed by M. Hérard, in several autopsies made by himself. (*Bib. du Méd. Prat.* t. v, p. 319–320.)

M. Hérard states that he found the mucous membrane of the air-passages, as a general rule, perfectly healthy, presenting neither redness, inflammatory swelling, œdema, nor accidental products of any kind. The lungs were of the natural colour and density, and

crepitant. They always presented one marked change from their natural condition, however, which was a very high degree of emphysema, more general and strongly marked than in any other disease. This alteration is believed to depend, as it does in whooping-cough, upon the impediments to respiration which exist during the disease.

The heart and great vessels of the thorax often, but not always, contained more blood than usual, as in asphyxia.

M. Hérard states that he has made very minute researches in regard to the condition of the nervous system, examining the brain and spinal marrow, the pneumogastric, recurrent, and diaphragmatic nerves, and those of the extremities even to their terminations, without, however, finding important lesions in any case. He excepts only serous effusion in small quantity, and evidently consecutive, in the ventricles and particularly membranes of the brain, and slight venous congestion of the same kind. The tissues of the brain and spinal marrow retained their ordinary consistence, and presented neither redness nor softening. His researches in regard to the state of the thymus gland will be adverted to presently.

I will now examine, as succinctly as possible, the different opinions which are advocated in regard to the causes of laryngismus stridulus. These may be classed, it seems to me, under four heads. 1. Enlargement of the thymus gland; 2. Enlargement of the cervical and bronchial glands; 3. Organic disease of the cerebro-spinal axis; 4. That which regards it as a simple neurosis, without appreciable anatomical alterations.

1. *Enlargement of the thymus gland.*—That the disease is often coincident with, if not dependent upon, this cause, is proved by the observations of Kopp, Hirsch, Haugsted, Kyll, and others. Hasse (*Pathol. Anat. Syden. Soc. Ed.* p. 384), says there can be little doubt that it sometimes depends upon this cause.

It seems to me that it has been clearly shown by M. Hérard (*Loc. cit.* p. 320, 321), that the disease is entirely independent of any alteration of the thymus. That observer found that in six children between two and four years old, dying of the affection, the gland weighed between half a drachm and a drachm in five,

and four drachms and two scruples in the sixth. These cases alone show that the size of the gland varies greatly in different subjects attacked with the disease. M. Hérard has examined the gland, with a view to the elucidation of this point, in sixty children dying with various diseases, between two and four years of age, (the age of those who had died of the disease under consideration.) In fifty he found that it presented the same arrangement, colour, density, and weight, as in those who had perished with laryngismus stridulus. All of these subjects presented the same aspect; they were pale, thin, and most of them exhausted by diarrhœa. In ten of the sixty, the gland was much more voluminous, weighing from two drachms to two and a half or five drachms, and in one instance an ounce and a quarter. The ten subjects upon which these observations were made died with different diseases, croup, acute laryngitis, asthma, meningitis, and varioloid. All presented the appearances of strong and vigorous health, and the one which presented the largest gland was very fat, and so robust that though only twenty-two months old, he looked to be three or four years. It results therefore from these researches, that the gland is liable to great variations of size, and that its size bears a very exact proportion to the force of the child, being small in those who are but slightly developed, or emaciated by chronic disease, and voluminous in those who are vigorously constituted, or who have died of acute diseases.

That the disease does not depend, at least in all cases, on this cause, is shown also by Haugsted (*Arch. de Méd.* t. xxxiii, 1833, p. 111), who reports the case of a girl, seven years old, in whom the gland weighed five ounces, and measured four inches long, and one and a half in thickness, without its occasioning the least difficulty of breathing of any kind. That it occurs in children in whom the gland is very small, is shown also by Caspari and Pagenstecher (quoted by Hasse, *Loc. cit.*)

2. *Enlargement of the cervical and bronchial glands.*—This condition as a cause of the disease, so strongly advocated by Dr. Ley, and adopted upon his authority by Kyll and Hasse, would seem from certain facts and arguments to be of doubtful agency.

Thus, Mr. Wakely (quoted by Kerr) states that “he possesses

more than one case of tubercular affection in children, where the pneumogastric nerve has been completely flattened by the pressure of tubercles, without giving rise to any remarkable disturbance of the function of respiration." Dr. Hall doubts the correctness of this explanation of the phenomena of the disease, and says that if the contiguity of enlarged glands with the pneumogastric nerve have any effect, it is by their action upon it as an incident excitor, and not as a motor or muscular nerve.

3. *Organic disease of the cerebro-spinal axis.*—That it may depend on this cause is proved by a case mentioned by Dr. Coley (*on Infants and Children*, Bell's edition, p. 226) who states that in a fatal instance which occurred in his own family, the only morbid appearance found on dissection was a large exostosis growing on the inner surface of the occiput, which compressed the cerebellum and produced chronic inflammation of the dura mater. No disease was discoverable either in the cervical or thoracic glands. Dr. Kyll (*Arch. Gen. de Méd.* t. xiv, 1837, p. 94) quotes a case from Dr. Corrigan, of Dublin, which had lasted three months, in spite of calomel, emetics, and antispasmodics. Attention was called by chance to the spinal column, when it was discovered that pressure over the third and fourth cervical vertebræ was very painful, and produced loud cries from the child. Two applications of four leeches, at an interval of two days, to that point, removed all the symptoms, and the child recovered perfectly.

Dr. M. Hall (*Diseases and Derangements of the Nervous System*, 1841, p. 99) states that the crowing inspiration may arise from affections of the centre of the excito-motory system. He quotes a case related to him by Mr. Evans, of Hampstead, of spina bifida, in which "there was a croup-like convulsion whenever the little patient turned so as to press upon the tumour." He states, moreover, that he found induration of the medulla oblongata in one case of the disease.

4. *That it is a neurosis.*—This is the opinion, according to MM. Rilliet and Barthez, of Caspari, Pagenstecher, Roesch, and Hachman. It is that, also, of Rilliet and Barthez, and, as we have already seen, of MM. Blache, Hérard, and Dr. M. Hall.

That the disease is, in fact, in the great majority of cases, a simple neurosis, is proved, I think, by the opinions just quoted, by the autopsies of M. Hérard (already referred to), and by a case published by M. Constant, and cited by M. Blache (*Loc. cit.* p. 584). This was the case of a boy twenty-one months old, who was taken to the Children's Hospital of Paris, with well-marked symptoms of laryngismus stridulus, and died there some days afterwards of small-pox. At the autopsy the larynx and brain were found to be healthy. Merriman also relates two cases in which the children died in fits, both of which were examined by a skilful anatomist, but "not the slightest appearance of cerebral affection" could be discovered.

That it is not always, however, a neurosis, is shown, it seems to me, by the cases quoted under the first head from Drs. Hall and Coley, and by those in which the disease is accompanied from the first by symptoms of inflammation or congestion of the brain.

It has now been shown that the causes of the disease are exceedingly variable and uncertain, and that any opinion which asserts its dependence on an invariable and constant cause is untenable. We must therefore seek some explanation which shall reconcile, as far as possible, the facts related above, and harmonize the various opinions expressed by the authors quoted.

It seems to me that the explanation given by Dr. Hall (*Loc. cit.*), is the only one which accounts satisfactorily for the phenomena of the disease, and reconciles the contradictory accounts of its nature and causes hitherto brought forwards. Dr. Hall regards it as an affection of the excito-motory or true spinal system of nerves, producing in mild cases partial closure of the glottis, and difficult inspirations, while in more severe cases the spasmodic disposition extends to other parts of the body, to the eyeballs, and to the flexors of the fingers and toes. In very violent attacks, the glottis is entirely shut, the respiration for a time suspended, and from the consequent impediment to the circulation, the nervous centres are violently congested, and general convulsions not unfrequently produced.

The causes may be either centric, seated in the nervous centres,

or centripetal, in the excitor or incident nerves. In the great majority of cases, the causes are centripetal, consisting of various morbid conditions situated at the peripheral extremities of the nerves, which become causes in consequence of the irritation they establish in the nerve-extremities, which is transmitted to the spinal centre, and thence reflected through the various efferent or motor nerves to the different portions of the muscular apparatus affected in the disease, the larynx, face, extremities, and lastly, in severe cases, the whole body. The principal causes of this class are dental irritation occurring during dentition; gastric irritation, arising from excessive or improper food; intestinal irritation arising from constipation, intestinal disorder or catharsis; and perhaps the pressure of enlarged cervical or bronchial glands.

The centric class of causes includes such as are seated in the nervous centres. These are much less common than the former class, and give rise to a vastly more dangerous and intractable form of the disease. They are different morbid conditions of the brain and spinal marrow, as inflammation, congestion, and effusion. That such causes sometimes produce the disease is shown by the case of exostosis already quoted from Coley; that of spinal irritation from Kyll; that of Dr. Hall, in which he found induration of the medulla oblongata, and the one of spina bifida reported to Dr. Hall by Mr. Evans. In the latter case the tumour was seated on the loins. Mr. E. proposed to treat it by compression, but on making the attempt, found it was followed immediately "by the affection described by Dr. J. Clarke" (*Hall, Loc. cit.* p. 144). Other centric causes are passion, vexation, fright, contradiction, etc. etc.

This theory of the nature of the disease likewise accounts for the varying character of the convulsive symptoms. The laryngeal spasm, from which the disease derives its name, does not constitute the whole malady; it is only one of the symptoms, though the principal one, and that by which it is particularly characterized. The other convulsive phenomena, which generally occur only in severe attacks, or after the disease has continued for some time, are distortion of the face, strabismus, carpo-pedal spasms, and general convulsions. The hydrocephalic symptoms which occur towards the termination of some cases, and the serous effusions within the cranium found after death, are, it ought to be re-

collected, often the consequences of the congestion of the brain and asphyxia, which take place during the more or less complete closure of the larynx.

Before proceeding to the description of the symptoms, I wish to make a few remarks on the forms of the disease.

M. Hérard (*Loc. cit.*) makes three forms, one, in which the spasm affects chiefly the larynx, to which he applies the term *laryngeal*, another, in which the diaphragm is principally affected, which he calls *diaphragmatic*, and a third, which is a combination of the two just named.

I shall describe but one form, under the title of laryngismus stridulus, but after concluding the history of the symptoms of that affection, I propose to give a short account of another spasmodic disorder of the respiratory apparatus, popularly known in this country under the appellation of "holding-breath spells," and consisting of a sudden and total arrest for a few instants, of the act of respiration. This is thought by Hérard to depend upon total closure of the glottis, and by Dr. Ranking (*Rank. Abst. Med. Sc., July to January, 1848, p. 165*) to occur during expiration, and to depend on spasm of the diaphragm. The latter gentleman states that he has seen the attacks frequently in two of his own children. It seems to me most probable that it depends on sudden spasm of all the respiratory muscles, and not of the diaphragm alone. My reasons for thinking so are, that the attacks do, as Dr. Ranking remarks, occur during expiration; that they are unaccompanied by any sound, at the time; and that when the spasm is over, the child instantly makes a full inspiration, unattended with stridulous sound, and generally bursts into a loud fit of crying, which would scarcely be the case, were there a disposition to spasm of the glottis.

Symptoms; course; duration.—Laryngismus stridulus begins suddenly with a paroxysm of difficult respiration. The larynx is contracted spasmodically, and either prevents or impedes the entrance of air into the lungs. In most cases, the closure of the larynx is only partial, and the respiratory movement continues, but is accompanied by prolonged and difficult inspirations, which give rise to the crowing or stridulous sound, whence the disease

derives its name. The crowing sound is generally heard several times in each paroxysm, owing to the repeated but only partially successful attempts at inspiration; while in very violent cases it occurs only at the beginning and end of the accession, the respiration being entirely suspended in the middle period. At the same time the child presents an appearance of great distress. The body is thrown forcibly backwards, the eyes are fixed and staring, the nostrils dilated, and the whole countenance indicative of great anxiety. If the paroxysm continues many seconds, the face becomes bluish, the extremities cold, and the fingers and toes contracted. After a few seconds, or a minute, or even longer, the spasm of the larynx ceases; a loud, full inspiration takes place; a fit of crying generally follows, and the child either very soon regains its usual spirits, or if the paroxysm have been very severe, seems weak, languid, and drowsy, and returns more slowly to its ordinary condition. Between the paroxysms the child may seem perfectly well, and without the least disorder of respiration, or it will present the signs of the disorder which is the ultimate cause of the laryngeal spasm.

The paroxysms are most apt to occur during sleep, or as the child is waking. They occur spontaneously, and are brought on by fretting or crying, coughing, fright, contrarieties, deglutition, by the sudden application of cold, and other sudden impressions. At the commencement of the disease they recur at rare intervals, and often attract little notice, but as the case progresses, become more frequent, and may amount to twenty or thirty in the day, according to Kerr. They sometimes cease entirely for some weeks, or even months, and then recommence. In a case attended by myself (reported in the *Am. Jour. Med. Sci.* April, 1847, p. 287), the attacks lasted during eighteen days, occurring sometimes two or three times in an hour, and sometimes much less frequently. The child then recovered entirely for a period of seven months, when the disease returned, and after continuing for five days, caused the death of the child in one of the paroxysms.

If the disease continues to progress, it almost always becomes associated with other spasmodic symptoms. The thumbs are drawn tightly into the palms of the hands, and the fingers clasped

over them, which gives to the backs of the hands, a swelled and tumid look. At the same time the toes are strongly flexed under the feet, and the insteps look swelled like the backs of the hands. Sometimes the hands are bent on the fore-arms, and the fore-arms on the arms. There is often distortion of the face. In severe cases, or when the disease has continued for a considerable period, epileptiform convulsions make their appearance, and generally prove fatal.

The disease is apyretic in a large majority of cases. When fever arises it almost always depends on the condition which has occasioned the disordered action of the excito-motory system, or upon some accidental complication. The pulse during the paroxysm is small, corded, rapid, and sometimes imperceptible. In the intervals it is natural or nearly so.

Death may occur very early in the disease, or after some weeks, months, or according to Kyll, years. In a case communicated to me by Dr. Wm. Pepper of this city, death occurred in ten hours from the commencement. In one quoted by Rilliet and Barthez, it took place at the end of three weeks, and in another, of twenty months.

The *duration* is very uncertain. It generally, however, lasts several months. In Dr. Pepper's case, the duration was but ten hours. In my own case it lasted eighteen days, then ceased for seven months, returned and proved fatal in five days. In another, the notes of which were obligingly furnished me by my friend Dr. Benedict, and which I shall append to the article, it lasted four months and a half, and was followed by perfect recovery.

Holding-breath spells.—This form of disorder is mentioned, so far as I know, only by Rilliet and Barthez (t. ii, p. 255, 256), by M. Hérard, and by Dr. Ranking. I have met with five well-marked cases of the affection, and believe it to be of quite common occurrence. It seldom happens that the physician is consulted in regard to it, as those who have charge of children in whom it occurs, almost always ascribe it to temper, and think it of but little moment. It appears to be the result of a sudden spasm of all the respiratory muscles, so that the child ceases for the time to

breathe, from which circumstance no doubt, it has received its name of holding-breath spell. There is no stridulous sound, nor hoarseness of the cry, nor indeed sound of any kind. The face is contracted and bluish, the limbs violently agitated at first, and then stiff, and after a few seconds, or perhaps a minute in severe cases, the spasm yields, and is followed by loud crying, which lasts for a few moments, after which the child seems perfectly well. The attacks recur with variable frequency; there may be several in a day, or but one, or they may occur only at intervals of several days. The most frequent cause of the paroxysms is contradiction. They are determined also by fright, pain, and crying. They never occur spontaneously, and never during sleep, so far as I know. It is to be distinguished from laryngismus stridulus by the absence of the crowing sound, by its not occurring spontaneously or during sleep, and by the absence of carpopedal or other spasmodic symptoms. It is, I believe, a spasmodic affection of respiration, analogous to, though not exactly similar to laryngismus stridulus. I have never met with it except during the period of the first dentition, and always in children of nervous temperament. The five cases that I have met with all recovered, and in one only did the life of the child seem to be at all endangered. In this instance the paroxysms had recurred very frequently for eleven months, and on two occasions were terminated by slight spasmodic movements of the limbs, lasting only for a few instants, and unaccompanied by insensibility or other dangerous symptoms. After these attacks the child was removed to the country, where he recovered perfectly.

Diagnosis.—The only disease with which laryngismus stridulus is likely to be confounded is spasmodic laryngitis, or false croup. From this it may readily be distinguished by the absence of catarrhal symptoms, or fever; by the fact that the paroxysms occur indifferently day or night, and that they are much more frequent; by the absence of cough or hoarseness of the voice, even during the height of the paroxysm; by the occurrence of tonic muscular spasms, and convulsions; and finally by the chronic course of the malady: the converse of all of which symptoms exists in spasmodic croup.

Prognosis.—The prognosis of the disease is always serious, since even the mildest cases may terminate fatally at any moment in one of the paroxysms. It is, however, far from being so dangerous a disease as has been supposed by some writers, and amongst others M. Valleix, who states that it is almost always fatal. (*Guide du Méd. Prat.* t. i, p. 564.) Of 56 cases collected from Pagenstecher, Hachman, Ley, Kopp, Hall, Constant, Rilliet and Barthez, Kyll, and 4 from my own observation, making 60 in all, 4 died of intercurrent or consecutive diseases, while of the remaining 56, 31 were cured, and 25 died of the malady itself.

The prognosis given by the physician ought to depend in great measure upon the cause of the malady. If it depend on dentition, improper diet, or gastro-intestinal disease, the case will in all probability terminate favourably if a proper treatment be directed against those morbid conditions; while if it occur under the influence of a centric cause, or of enlargement of the cervical or bronchial ganglions, the prognosis becomes much more unpromising.

Treatment.—If the views taken of the nature of the disease in the above remarks be correct, it must be evident that for the treatment to offer any considerable chance of success, it must be directed not merely to the removal of the spasm of the larynx, which is only a symptom and not the whole disease, but to the remedying of the deeper-seated cause of the disordered functional action of the excito-motory system of nerves.

When dentition is ascertained to be the cause of the attack, the gums ought to be carefully watched, and freely scarified, so soon as there is the least heat or swelling over the advancing teeth. Dr. Marshall Hall deems the use of the gum-lancet one of the most important means of treatment that we are possessed of, and recommends that the gums should be fully divided, “not once, or occasionally, but *twice*, or even *thrice*, daily.” In another place, he says: “We should lance the gums *freely* and *deeply*, over a great part of their extent, *daily*, or *even twice a day*, and apply a sponge with warm water, so as to encourage the flow of blood.” He even recommends that in very urgent cases, the *lateral* as well as the more prominent portion of the gum, should be scarified. I

would, however, call the attention of the reader to the circumstance, that when the operation of lancing the gum is performed while the tooth is still soft and enclosed in its sac, it is apt to be injured should it be touched by the lancet, so that it makes its appearance at last with a defect which causes an early and rapid decay. This, to be sure, is no argument against an operation which may save the life of the child, but it should lead us, it seems to me, not to cut deeper into the gum than is absolutely necessary, and to avoid, if possible, the germ of the tooth, while still in a pulpy state.

When the disease depends on gastric irritation, the result of an unhealthy milk, or of artificial diet, our attention must be directed principally to the removal of those conditions. A wet-nurse ought to be procured at once if one can be obtained, and the child will nurse. If this cannot be done, the diet must be carefully regulated by the physician. Ass's milk or goat's milk ought to be used if they can be procured; if not, I would recommend the gelatine diet prepared as recommended at page 193. The proportion of the ingredients must be regulated by the condition of the stomach. If the digestive power be very weak, the proportion of milk must be only a fourth or even a sixth for a few days, while the amount of cream must bear its usual ratio to the milk.

When the child is thin and pale, and the stomach evidently weak and dyspeptic, it is well to resort to small quantities of stimulants, and to tonics in proper doses. The best stimulant is fine old brandy, of which from five to ten drops may be given three or four times a day, or every two or three hours. Or we may administer the aromatic spirits of hartshorn in connexion with, or without the brandy; of this about ten or fifteen drops should be given four or five times a day, or alternately with the brandy. Of tonics the most suitable, it seems to me, are quinine, in the dose of a quarter of a grain three or four times a day, or the citrate of iron and quinine, in the dose of half a grain, given in the same way. Another very excellent stimulant and tonic is the Huxham's tincture of bark; of which about five drops may be prescribed in the place of brandy. This kind of treatment will scarcely fail to stimulate the digestive power of the stomach to greater activity after a few days,

and of course to improve the nutritive function and strength of the patient.

When the disease appears to depend on intestinal irritation, we must inquire carefully into its nature and causes. It may be connected with constipation, diarrhœa, or on an unhealthy state of the contents of the bowels. It is often dependent on the presence of crude or imperfectly digested food in the digestive tube, and when this is the case, the only proper method of treatment is to attend to the stomach and to discover and employ some diet that can be digested. The stools are often found to be very offensive, light-coloured, and pasty, conditions generally resulting from imperfect action of the liver. Under these circumstances small doses of mercurials should be resorted to in combination with or followed by mild aperients, as castor oil or rhubarb. When diarrhœa is present, it must be treated according to its causes, as recommended in the articles on simple diarrhœa and entero-colitis. When, on the contrary, constipation appears to be the cause of the disorder, it is to be treated by regulation of the diet, by the daily use of warm water enemata, (particularly recommended by Dr. M. Hall,) or, if these do not answer, by the exhibition of small doses of the mildest aperients.

Dr. Hall states that by strict attention to dentition, and to gastric and intestinal irritation in the *dawn* of the disease, he has succeeded in curing all the cases he has seen but one, and in that he found induration of the medulla oblongata.

By those who suppose the disease to depend on enlargement of the thymic, cervical, or bronchial glands, it has been proposed to endeavour to procure a reduction of the hypertrophy, by frequent applications of leeches, and by the use of exutories upon the thorax, by the employment of strong purgative medicines, and by the administration of mercury, digitalis, and iodine. In a case apparently connected with enlargement of the bronchial or cervical glands, I would prefer to direct my treatment to the invigoration of the general health by attention to diet, to the use of tonics, and by proper exposure to fresh air, whilst I would employ internally, anti-spasmodics and the preparations of iodine.

When the disease depends on a centric cause, that must be treated, if it can be detected, according to its nature.

Antispasmodics.—Whatever be the causes of laryngismus stridulus, it is undoubtedly proper, whilst our chief efforts are directed towards their removal or mitigation, to make use of antispasmodics in order to moderate the spasmodic symptoms which are the expressions of those causes. The remedies of this class most highly recommended are cherry-laurel water, musk, assafœtida, oxide of zinc, and small doses of ipecacuanha. The most efficient are probably the oxide of zinc, which is recommended by M. Brachet, (*Traité Pratique des Convulsions dans l'Enfance*,) as one of the best antispasmodics that can be used in the convulsions of children, the fluid extract of valerian, and aromatic spirits of hartshorn. M. Brachet always combines the oxide of zinc with extract of hyoscyamus, and gives at least two grains of the former with four of the latter, in divided doses, in the twenty-four hours. He states that he has never given more than ten grains of each in the period mentioned. Of the fluid extract of valerian, about a teaspoonful, or even more, might be given in twenty-four hours, to a child one or two years old. It should be mixed with water, of course. The aromatic spirits of hartshorn may be given as recommended above.

It must never be forgotten, however, that remedies of this class are to be employed only as palliatives and adjuvants, and not as curative agents.

Treatment during the paroxysm.—When the child is attacked with one of the paroxysms of difficult breathing, it should be lifted at once into a sitting posture, if it be reclining, and fanned, or carried to an open window, if the weather be not too cold. At the same time, a little cold water should be sprinkled upon the face, and if the attack be violent, we may resort to what is recommended by Dr. Hugh Ley, and Dr. Hall, tickling of the fauces to produce nausea or vomiting, or irritation of the nostrils with a feather, so as to occasion gasping respiration. In a case which occurred to my father, Dr. C. D. Meigs, accompanied with severe general convulsions, he found that the suspension of the respiration could very generally be broken in upon, and the paroxysm sometimes averted,

by the application of a piece of ice, wrapped in a cloth, to the epigastrium and lower part of the sternum.

To prevent congestion of the brain and effusion, which sometimes take place as the effects of the attacks, Dr. Hall recommends a few leeches or cups to the head, the application of an alcoholic lotion over the whole head, or the use of the ice-cap. At the same time the bowels ought to be speedily moved by large enemata, either of simple water, or of water containing salt.

Removal to the country.—When the disease persists, in spite of the means above recommended, and especially when it depends on dentition or digestive irritation, change of air will often produce a wonderful effect, and should always be tried. The good effects of removal from the city to the country are strikingly shown in the case communicated to me by Dr. Benedict.

Case communicated by Dr. Pepper.

“A boy aged four months, remarkably healthy and well-developed, after suffering a few days with slight catarrhal symptoms, was suddenly seized with a peculiar stridulous crowing respiration.

“I saw the child about half an hour from the commencement of the attack, and found it with a pulse of 140, pale face, and livid lips. The pupils were contracted and the hands firmly clinched; the crowing sound was very loud, and attended every act of inspiration. At times the respiration and circulation would be entirely suspended for many seconds, followed by great lividity of the surface, and coldness of the extremities.

“Eight or ten leeches were applied behind the ears, the feet placed in warm water, and a dose of *Ol. ricin.* administered, to be followed by saline enemata.

“Four hours from the commencement of the attack, all the symptoms were greatly aggravated; the wrists and fingers were firmly flexed, these spasms coinciding with the arrest of the circulation and respiration; there was now perfect insensibility. The child was placed in a warm bath, cold was applied to the head, and a sinapism along the spine, without, however, affording any relief to the crowing inspiration, or other spasmodic symptoms.

“At the suggestion of Dr. C. D. Meigs, the child was now placed on its right side, with the shoulders elevated; this position to be maintained at least six hours. At the end of that time the child was in no respect improved, and accordingly, at the suggestion of Dr. M., six leeches were applied over the cardiac region; 3i of lac assafœtid. was thrown into the rectum, and a blister applied to the back of the neck.

“The child expired at midnight, about ten hours from the commencement of the attack, the crowing respiration, with more or less asphyxia, having persisted throughout.

“*Autopsy thirty-six hours after death.*—Mucous membrane of larynx injected, but in other respects natural. Thymus gland $3\frac{1}{2}$ inches long, $2\frac{1}{2}$ wide, and at its upper part $\frac{3}{4}$ of an inch thick. Weight, 620 grains, or ten drachms and one scruple. Lower lobes of both lungs greatly congested. Heart natural. The brain *unfortunately* could not be examined.”

Remarks.—It seems to me that the above case was clearly one of laryngismus stridulus, dependent upon a centric cause, probably congestion of the cerebellum or medulla oblongata. It was, in fact, a case of what is called by M. Valleix “eclampsia with suffocation.” Nevertheless, violent general convulsions, attended with crowing respiration from the first, are very rare; and the above case is curious as an instance of that kind. I would particularly call the attention of the reader to the marked signs of asphyxia that were present, which condition, in all probability, conduced very much to the rapidly fatal termination.

Case communicated by Dr. Benedict.

“The subject of this case was a boy born in July, 1845. He was a large, hearty child, and remained well until January, 1846, when his mother’s milk failed, and he was placed upon artificial diet. From this time to May following, his diet was cream and water, barley water, oatmeal, arrow-root, pounded crackers boiled with water, and gum water, all of which were tried in turn, being prepared and administered with the greatest caution, as to time

and quantity. A wet-nurse was tried, but the child refused the breast entirely.

"On the 27th January, he was attacked with diarrhœa which lasted one week. This was followed by constipation, the stools being white, firm, tenacious, and offensive. The constipation continued up to July, when it was replaced by diarrhœa.

"February 4th, 1846.—On this day, the child being seven months old, was first observed a spasm of the larynx, producing a shrill, croupal whistle, or *ooh, ooh*, during two or three successive respirations, and followed by a cessation of breathing for some seconds, long enough to dash water in his face, carry him to the window, pat him on the back, etc. These spells occurred during the sleeping and waking state, and especially during crying or laughing, and continued almost daily and often many times a day and night until June, when he was taken into the country.

"Simultaneously with the laryngeal spasm, appeared contractions of the upper extremities, the thumbs being drawn tightly into the palms of the hands, the fingers flexed over the thumbs, and the hands bent on the fore-arms. The backs of the hands were swollen, and the skin looked tight and polished.

"For a few days in the middle of February there was a subsidence of all the symptoms, with decided improvement in every respect.

"On the 25th of the same month, occurred a return of all the symptoms, with extension of the spasm to the feet, the toes being bent under the feet, the insteps much swelled and having a polished appearance. At the same time there were occasional spasmodic movements of the muscles of the face, arms, and body, resembling those of chorea. This condition continued with occasional relaxations up to the 11th of June.

"The stomach was exceedingly delicate, rejecting the most carefully selected nourishment, and at times refusing all food. The child became pale, thin, and timid, was disturbed by the slightest noise, and shunned the light as painful.

"He was removed to the country on the 11th of June. There his health was gradually restored. The appetite improved, the spasm of the larynx and contractions of the extremities gradually

relaxed, and the thumbs were at last liberated, the skin under them having taken on, the appearance of mucous membrane. There was no return of the disease after the middle of June, although the child had a severe attack of diarrhœa in July, after which he got perfectly well, and has remained so up to the present time (June, 1847). The first tooth made its appearance in September, and he now has fourteen, and has cut them all without the least accident. During the last eight months he has been remarkably fat and hearty.

“I am not aware that any medicine had any effect in removing the disease. Calomel in large and small doses, antispasmodics of all kinds, frictions over the spine, blisters to the back of the head, alteratives, laxatives, etc., were persevered in without benefit. On removing him to the country, and feeding him on milk warm from the cow, at first diluted, and afterwards pure, an improvement was speedily observed.”

Dr. B. adds: “There cannot, I think, be any doubt that the disease originated in the stomach, and extended to the bowels, perhaps the liver, and to the nervous system.”

Remarks.—The above case was evidently one of laryngismus stridulus, as that disease is described by different medical writers. It must be clear to every one, I think, that the cause was seated as Dr. Benedict remarks in the digestive apparatus. The history of the case, the onset of the disease soon after the child was put upon artificial diet, the difficulty of finding food to agree well, the condition of the bowels, the offensive, bileless stools, the persistence of the case so long as the stomach continued feeble and the food improper, and the rapid improvement after the child had felt the tonifying influence of the country air, all seem to me to show conclusively that the difficulty was in fact disordered digestion.

I would recommend those who wish to observe still farther the influence of disordered digestion in the production of nervous disease, to peruse three cases detailed by Dr. Coley (*Pract. Treatise on the Dis. of Children*, Bell's edition, pages 233, 234, 235.)

Case observed by the author.

The following case is the only one I have met with myself. I extract the following account of it from a paper on croup. (*Am. Journ. Med. Sci.* April, 1847.)

The patient was a girl, five months of age. I saw the child first on the 28th of March, 1844. The first attack occurred the day before I was called, but as the mother supposed it to be a matter of but little consequence, she did not send for me until the next day. The child was well grown, and except a rather too great paleness, looked strong and healthy. It was playful and good-humoured, nursed freely, had no fever, and between the paroxysms presented the appearances of perfect health. The paroxysms occurred frequently in the course of the day and night, sometimes two or three times in an hour, or not so often. They often waked the little thing suddenly from tranquil sleep. The accession consisted of a succession of long and difficult inspirations, accompanied by a peculiar whistling or crowing sound, such as might be supposed to depend on the passage of air through a narrow aperture. During the attack, the face assumed an expression of great anxiety; the respiratory muscles contracted with violence, and there seemed to be for the time imminent danger of suffocation. After several seconds or a minute, the shrillness of the sound diminished, the struggling subsided, and soon the respiration became perfectly natural, and the child seemed well. The paroxysms were usually followed by fits of crying, which, however, were easily pacified.

The paroxysms gradually diminished in frequency and violence, and ceased entirely after the 13th of April. The treatment consisted simply in careful attention to the general health, and in the frequent use of warm baths and mild nauseants.

The child remained perfectly well, with the exception of a slight attack of cholera infantum, until the following November, seven months after, when the disorder recurred. Several paroxysms occurred between the 12th and 17th of the month, but as they were slight and unattended by other symptoms of illness, the

mother was not alarmed, and paid but little attention to them. On the 17th of the same month, the child was sitting on the floor amusing itself with some playthings. There were no persons in the room except young children. They saw the little thing stoop forward suddenly, as though in play, and therefore did not regard it immediately. As it remained in that position, however, they went to it, took it up, and found it was dead. It had perished suddenly, no doubt in one of the paroxysms of crowing.

An autopsy was made, in which the larynx and thoracic organs were examined, but nothing was found to explain the cause of the disease or the sudden death.

ARTICLE III.

CONTRACTION WITH RIGIDITY.

This is the disease called by the French *contracture*. I shall treat of it as idiopathic contraction with rigidity. It has been little known until within a few years, and yet is clearly not a *very rare* affection in Paris, from the number of cases on record in different medical journals and works. I have never met with an instance myself in this country. The case of laryngismus stridulus communicated to me by Dr. Benedict, and appended to the article on that disease, furnishes a very good example of contraction co-existing with the former affection.

The disease is evidently one of the forms of eclampsia, which assumes such a variety of shapes during infancy and childhood. Though it generally exists as an idiopathic and distinct malady, it is in other cases associated with, or follows laryngismus stridulus or spasm of the glottis, and in others again, is combined with attacks of general convulsions.

Definition.—By idiopathic contraction with rigidity (*contracture* of the French writers), is meant the involuntary tonic contraction of different flexor muscles of the extremities, particularly those of the fingers and toes, but sometimes of the fore-arms and arms also, existing independently of organic disease of the cerebro-spinal

axis. It has been described by different English writers in connexion with laryngismus stridulus, under the title of "carpo-pedal spasms," "cerebral spasmodic croup," "croup-like convulsions," etc., etc. I believe, however, that it will be useful to describe it separately from that disorder, for though of the same nature, and sometimes associated with it, it often exists independently of such complication.

Causes.—It is most common between the ages of one and three years. It is much oftener sympathetic than essential, and its most frequent causes are difficult dentition, various diseases of the digestive tube, pneumonia, bronchitis, masturbation, and unfavourable hygienic conditions. In some few cases, the disease is truly essential, since no pathological cause whatever can be detected. It is merely necessary to say that it is often symptomatic of disease of the brain, but of that form of the affection nothing will be said in the present article.

Nature of the disease.—It appears to consist of a functional derangement of the true spinal system, occurring without any cause that can be detected; or determined by the existence of some irritation affecting incident excitor nerves. I once saw a child two years of age, who, after a restless, uneasy night, presented in the morning tonic contraction of the flexors of all the toes of both feet, so that the insteps were swelled, and looked smooth and polished. There was no other sign of sickness except peevishness. Learning on inquiry that the bowels had been somewhat constipated for several days, and that the materials of the scanty stools which had been discharged, were dark-coloured and very offensive, I ordered a dose of castor oil containing two grains of calomel. The contraction continued unyielding until six o'clock in the afternoon, when a very copious, dark-coloured, viscid and offensive stool occurred, and the contraction immediately ceased. Here the cause of the contraction was evidently an accumulation of unhealthy fecal matter in the intestine, which, irritating certain sensitive cords of the excito-motory system, caused a reflex motor action that gave rise to permanent muscular contractions. In other cases the disturbance of the excito-motory system depends on the irritation of excitor nerves occasioned by the process of

dentition, by indigestion, by diarrhœa, pneumonia, pleurisy, etc. In other instances, again, to which the term essential must be applied, it seems to depend simply on general debility and anemia, which are well known to be productive of functional disease of the nervous system.

Symptoms ; course ; duration.—The disease rarely attacks children previously in good health, but generally those already suffering from some disorder of the general health, or a severe local affection. When sympathetic, the first symptom noted is the contraction which constitutes the disease. When essential, on the contrary, the onset is sometimes marked by various nervous symptoms, such as giddiness, headache, or somnolence, which soon pass off, leaving the simple contraction with rigidity as the only disease. In most cases, however, the attack begins with the muscular contraction, which generally affects the superior extremities first, and gradually extends to the inferior.

When the disease is fully developed, the thumbs are drawn down into the palms of the hands, and the fingers, strongly flexed at the metacarpo-phalangeal articulations, cover and conceal the thumbs. At the same time that the metacarpo-phalangeal articulations are flexed, the phalanges themselves remain extended and the fingers are separated from each other. The contraction generally affects the wrist-joints also, so that the hands are strongly flexed upon the fore-arms, and in some rare cases the latter upon the arms. The disorder usually affects the inferior extremities also, the toes being in a state of tonic flexion or extension, the foot rigidly extended upon the leg, and its point sometimes drawn inwards. The spasm very rarely extends to the knees.

Children old enough to describe their sensations generally complain of stiffness in the affected parts, with more or less severe pains darting along the course of the nerves. The contracted muscles are hard and rigid to the touch, and sometimes enlarged so as to appear in strong relief under the skin at all ages. In slight cases the contractions can be overcome by very moderate force and without pain, whilst in those which are more severe, the attempt is difficult and productive of acute pain in the rigid parts. The backs of the hands and insteps present a swollen appearance,

and the skin over these points is smooth and polished. In the case communicated by Dr. Benedict, appended to the article on laryngismus stridulus, the skin under the thumbs had assumed the appearances of mucous membrane, from the long and close confinement of the member.

In addition to the symptoms already enumerated, which are characteristic of the malady, there are others which require attention. The child is of course unable to walk or perform any prehensile movement. The intelligence and senses always remain perfect in simple, uncomplicated cases. The nervous system shows signs of disorder in the form of restlessness or languor, and irritability, with crying and peevishness. In the great majority of instances, these are the only nervous symptoms, though in some there are general or partial convulsions, strabismus, and diminution of sensibility. Of these the most frequent is convulsions, which generally come on a few days after the attack, or precede the fatal termination. In the case of Dr. Benedict, referred to above, there were occasional choreatic movements of the face, arms, and body. The simple disease is unaccompanied by any febrile movement, and the organic functions go on naturally. In the sympathetic form, on the contrary, there are the various symptoms of the disease which acts as the cause of the contraction, whether that be abdominal or thoracic. The most common train of symptoms, in young children, is probably, that which accompanies gastric or intestinal derangement, dentition, etc. The *course* and *duration* of the disease are very irregular and uncertain. When once developed it may last from weeks to months, either slowly increasing in severity, or remaining stationary for a length of time. As a general rule, after it has lasted for some time, it becomes intermittent, sometimes diminishing or even disappearing entirely for a period, then reappearing or increasing, to subside or cease again, and so changing without regularity or evident cause, until at last recovery gradually takes place, or death occurs from the concomitant disease, or in a paroxysm of convulsions.

Diagnosis.—The only difficulty in the diagnosis of idiopathic contraction is to distinguish it from symptomatic contraction, or that which depends upon cerebral or spinal disease. The kinds of

cerebral disease which most frequently occasion contraction are tubercle of the brain, and meningeal hemorrhage. The distinction can generally be made with considerable facility, however, by attention to the various disorders of intelligence and sensibility, to the fever, constipation, vomiting, and different modes of invasion and progress which characterize the symptomatic form. The following table, taken from Rilliet and Barthez, will assist in the diagnosis.

SYMPTOMATIC CONTRACTION.	ESSENTIAL CONTRACTION.
Cerebral symptoms, special functional disorders, (convulsions, strabismus, dilatation of the pupils, etc.,) preceding or accompanying the contraction.	Similar cerebral symptoms, but only in exceptional cases, sometimes accompanying, but never scarcely preceding the contraction.
In many cases irregularity of the pulse.	No irregularity of the pulse.
Generally partial, and commencing usually in the elbows and knees, and in a single extremity.	Binary, commencing in the fingers and toes.
Almost always permanent.	Remarkably intermittent.

Prognosis.—The prognosis must depend on the cause of the malady. The contraction itself has no influence whatever on the termination. The fatal termination has always resulted from the anterior or concomitant disease. Six cases observed by M. Barrier all recovered. The case communicated to me by Dr. Benedict, in connexion with laryngismus stridulus, also terminated favourably. The prognosis is favourable, therefore, when the attack occurs in a child of naturally good constitution, and when the cause of the disease is not a permanent or incurable one. The possibility of the occurrence of fatal convulsions should always lead us to make a guarded prognosis.

Treatment.—The treatment must depend on the circumstances under which the disease has made its appearance. When it occurs in the course of an acute local affection, the treatment must of course be that which is proper for the concomitant disorder. When it depends on dentition, or on gastric or intestinal derangement induced by improper diet, the treatment is the same precisely as

that recommended for laryngismus stridulus dependent on the same causes.

It may be stated that, as a general rule, all violent remedies, as bleeding, calomel except in very minute doses as an alterative, drastic cathartics, and blisters, can scarcely fail to be injurious, unless manifestly necessary in the treatment of the concomitant affection.

It is proper in almost all cases to combine with the treatment already recommended, the employment of antispasmodic remedies, particularly when the contractions persist after the removal of the primary disease.

The best remedies of this class are the warm bath, used every day ; orange-flower water ; the fluid extract of valerian ; assafœtida, and camphor. The diet ought generally to be nutritious and strengthening, particularly when the patient is weak and delicate.

In conclusion, I may state that the treatment should be very much the same as that proposed for laryngismus stridulus, and I therefore refer the reader to that subject for more detailed information.

ARTICLE IV.

CHOREA.

Definition ; synonymes ; frequency.—Chorea is a non-febrile, convulsive disease, characterized by irregular and imperfectly co-ordinated, but not completely involuntary, contractions of different parts of the muscular system, and particularly of the extremities.

It is called also St. Vitus's dance, chorea sancti viti, choreomania, epilepsia saltatoria, and by various other titles.

Without being very rare, chorea is certainly not of very frequent occurrence. M. Ruz states that of 32,976 children admitted into the Children's Hospital of Paris in ten years, only 189 were affected with chorea, or 1 in 377. (*Dict. de Méd.* t. vii, p. 544.) I have met with but four cases in private practice in the course of several years' experience.

Predisposing causes.—*Age.*—Chorea very rarely, some writers say never, occurs during infancy. M. Constant, however, reports a case at four months of age. According to M. Rufz, it is seldom met with between one and six years of age, since of 189 cases, in only 10 did it occur within that period; while between six and ten years of age it is much more common (61 in 189 cases); and between ten and fifteen years still more so (118 in 189). It is therefore much the most frequent about the period of puberty.

Sex.—It is much more frequent in girls than boys. This is the experience of all writers.

Constitution does not seem to exert much influence in its production, though it is generally thought to be most apt to occur in children of delicate, excitable, and nervous temperament. The belief in *hereditary* predisposition seems to be unfounded. The disease appears to commence more frequently in summer than in winter, and yet it is scarcely known in tropical climates.

Exciting causes.—Of many exciting causes that have been mentioned by different writers, the one which seems most frequent and most clearly established, is the influence of terror. Besides this are cited imitation, blows and falls upon the head, fits of violent anger, contrarieties, masturbation, the difficult establishment of the menstrual function in girls, or suppression of that function, and the sudden drying up of ulcers or eruptions. Various diseases have been thought to occasion chorea, particularly those of the gastro-intestinal tube.

Anatomical lesions.—It seems well established by the researches of many different observers that there is no characteristic anatomical alteration in chorea, since in a large majority of the cases examined after death, no lesion of the cerebro-spinal axis can be detected. In some few instances, however, lesions of these organs have been met with, the most frequent of which are inflammation of the tubercula quadrigemina, serous effusions, hypertrophy of the cortical substance of the brain, induration or softening of the spinal marrow, and other lesions. From these circumstances, the disease has been divided, like convulsions, into idiopathic and symptomatic.

Symptoms; course; duration.—The disease may be general

or partial ; in the first case it affects all the limbs, the face, and some of the muscles of the trunk ; in the second it implicates only one side, the upper extremities, or a single member. It has been asserted that often only one side was affected, and that in most of the cases it was the left. This is denied, however, by Rilliet and Barthez, who state that they have met with but a single instance in which it was confined to one side throughout the attack. Of four cases that I have seen, it was general in three, and confined entirely to the right side in one. I shall describe first the prodromes of the disease, then the invasion, and afterwards the symptoms as they exist in fully developed cases.

Prodromic symptoms.—It is doubtful whether there are, as a general rule, any well-marked prodromic symptoms. The only ones that have been mentioned with any authority are irritability and peevishness of temper, an unusual degree of impressibility, languor, debility, disturbance of the organic functions, exhibited by deranged appetite and an irregular state of the bowels, and after a time a certain quickness and irregularity of the movements, which mark the commencement of the characteristic symptoms of the malady.

Invasion.—The onset of the disease is, as already stated, either sudden or gradual, so that it may be several days or longer in reaching any considerable degree of severity, or it may, particularly when the cause has been of a sudden and energetic nature, reach its height in a few hours. In most cases, however, it begins with some unusual and singular movements in one of the upper extremities, and as a general rule in the left. The choreatic movements are often observed first in the fingers, and at the same time, or soon after, in the face. Sooner or later they increase in severity, and extend to the other arm, to the legs and to the tongue, and the disease is fully developed.

Symptoms of confirmed general chorea.—At this stage the movements are exceedingly diversified and irregular. The limbs are agitated by involuntary contractions of the muscles into every attitude possible for them to assume. The fingers are opened and shut, brought together or separated without any regularity. The hands are flexed and extended upon the fore-arms, or pronated and

supinated, whilst the fore-arms are flexed or extended upon the arms, and the arms moved at the shoulders into every imaginable position. Such are the irregularity and rapidity of the movements that it is often with great difficulty that the patient can seize anything with the hands, and when once the object is attained, the child frequently cannot do with it what it wishes. This imperfect control over the movements of the hands and arms sometimes prevents the patient from carrying its food and drink to the mouth, excepting with the utmost difficulty, and may make it necessary to feed the child.

The inferior extremities are affected with movements similar to those of the arms. Walking is always more or less difficult, and in some severe cases impracticable. The patient totters from side to side, or walks rapidly a short distance, and then suddenly stops. Sometimes the progression is accomplished in a zigzag direction, and at others by fits and starts as it were, whilst in others again, the walk is rapid and sudden, almost a run. The child often falls while walking or running, either from meeting a slight obstacle, or in consequence of the irregular and imperfect muscular action. In some instances standing is impossible, the knees bending suddenly under the weight of the body. It was no doubt the peculiar, irregular and dancing movements of the inferior extremities during the attempts to walk and stand, that gave to the disease its original name of St. Vitus's dance.

The convulsive movements of the face and head are not less singular than those of the limbs. The face is distorted into all kinds of expressions, so that it assumes by turns that of the most opposite emotions : sadness, terror, joy, or grief. The mouth is opened and shut, or its corners drawn apart with the greatest irregularity ; the tongue is occasionally protruded between the teeth, and sometimes moved rapidly in the mouth, so as to cause a clacking sound ; the lower jaw is depressed and elevated, or moved in a lateral direction, and with such violence perhaps as to injure the tongue or teeth. In consequence of the irregular motions of the tongue and mouth, articulation becomes difficult, and the child either stutters or speaks slowly and badly, or can pronounce only monosyllables. Whilst the face and limbs are thus contorted,

the head is moved rapidly from side to side, or backwards and forwards, or undergoes constant rotation. In severe cases the choreatic movements affect the trunk also, so that the patient cannot lie upon a bed, but rolls and twists about the floor with such violence as to bruise and excoriate the skin. Deglutition is sometimes slightly embarrassed, and the child is obliged to swallow with great rapidity; in some few cases a peculiar loud cry, like that which occurs in hysteria, dependent apparently upon a spasm of the larynx, has also been observed. The organic muscular apparatus is probably never affected with true choreatic spasms.

The disease is unaccompanied by pain unless it be attended with some complication, and what is very singular and remarkable, the constant and often very violent muscular contractions do not seem to occasion fatigue.

The general symptoms require some attention. The choreatic movements are almost always increased by emotion, as terror, anger, contrarieties, and by the consciousness of being observed. Sleep generally suspends them entirely. In very bad cases they are said to produce insomnia, or to wake the child frequently in the night. The intelligence is rarely affected, except in very severe and long-continued attacks. The temper is often irritable and capricious. General and special sensibility commonly remain natural. In simple, uncomplicated attacks, the pulse, as a rule, remains natural; the appetite is preserved; there is no unusual thirst; and the bowels continue regular.

It is said that idiocy is apt to occur in cases which last for a number of years.

The *course* of the disease is acute or chronic. In a large majority of cases it is acute, the symptoms becoming more and more violent until they reach their height, when they remain stationary for a time, and then subside and disappear under the influence of treatment, or in the natural course of the malady. In fatal cases the symptoms are constantly aggravated; the movements become so violent as to make it necessary to secure the child in bed, or in a straight jacket; the patients, deprived of sleep, become feeble and emaciated; the respiration becomes diffi-

cult; intelligence is abolished; the pupils are contracted; and the child dies.

The *duration* is irregular, varying in acute cases between one and three months. The average duration is probably about six or nine weeks. In very slight attacks it may be much less. The duration of chronic cases is from months to years. In fatal cases the duration is sometimes very short. In one it was nine only, and in another twenty-seven days.

It should not be forgotten that relapses are very common.

Nature of chorea.—Some doubt exists as to the nature of the disease under consideration. That it is not an organic affection of the nervous centres is clear from the whole history of the malady, from the great variety of lesions found in some instances, and from the total absence of anatomical changes in others. Dr. M. Hall regards it as an affection of the true spinal system, but in this he is opposed, and I think, with reason, by Dr. Carpenter, who says (*Principles of Human Physiol.* Lond. note, p. 234): "It is true that there is considerable irregularity in the ordinary reflex actions; but the irregularity is still greater in those to which volition or emotion are the stimuli. Moreover, the body is at rest during sleep; and the 'spinal system never sleeps.'" Dr. C. is disposed to think that the cerebellum, which is the organ which co-ordinates and harmonizes the muscular motions, is probably the chief seat of the disease, and this, it appears to me, is the most reasonable theory which has as yet been offered in regard to the real nature of the affection.

The *diagnosis* of chorea cannot, it seems to me, be difficult, and I shall therefore make no remarks upon it.

Prognosis.—Idiopathic, simple chorea, independent of organic disease of the nervous centres, and of complications, is rarely fatal. Nevertheless, even under these circumstances, it sometimes terminates fatally, since MM. Ruz, Legendre, and Rilliet and Barthez, have each met with an instance. When the disease, on the contrary, is occasioned by an affection of the brain or spinal marrow, it becomes very dangerous. The degree of danger will depend on that of the disease which determines the chorea.

Dr. Copland states that he has met with three or four fatal cases,

that Dr. Prichard has recorded four; and that Dr. Brown refers to three in his practice; but he does not inform us whether they were idiopathic, complicated, or symptomatic.

Whenever, in a case of chorea, the convulsive motions become incessant, and the respiration embarrassed, and still more when subsultus tendinum takes the place of the choreatic movements, a fatal termination is greatly to be apprehended.

Treatment.—Many different plans of treatment, and a great variety of drugs have been proposed for the cure of the disease under consideration. These facts alone may serve to teach us that the effects of treatment are not clearly appreciated, and also, when taken in connexion with the circumstance that fatal cases are rare, that the disease tends naturally to recovery in a good proportion of the cases. This feature of the natural history of the disease is shown also by the evidence given by Dr. Bardsley, senior, who mentions, that in the Manchester Infirmary, notwithstanding the variety of treatment adopted by successive practitioners, an incurable case had not presented itself in the course of thirty-three years. (*Tweedie's Lib. Pract. Med. Am. Ed.*, vol. ii, p. 46.)

It seems to me that the only rules to be laid down for its treatment are those which apply to all the convulsive affections depending on functional disorder of the nervous system. These are attention to the general health, to the removal of any local derangement or disease which may exert an evil influence upon the nervous system, and the employment of such remedies as have been found to exert a controlling effect upon spasmodic and convulsive affections generally, and particularly antispasmodics.

I shall consider, under different heads, the various means that have been recommended, endeavouring in the course of my remarks to distinguish the cases to which each remedy is best adapted.

Purgatives.—This class of remedies has been extensively employed, and often exclusively relied upon by some very high authorities, especially by English writers. When relied upon exclusively in the treatment, an active cathartic is given every day, or every second or third day; and there can be no doubt that many cases have recovered under this plan. It seems to me, however, that

they ought to be used, in general, only to such an extent as may be necessary to secure a soluble and healthful condition of the bowels. When, on the contrary, the stools are natural and healthful in all respects, it can scarcely be proper to employ powerful purgatives in the treatment of the disease. I would, therefore, resort to them only when there is constipation, or when the discharges present some unnatural appearances as to colour, odour, etc. Under the latter circumstances we may resort to any of the somewhat active substances of the class, as cream of tartar and jalap, sulphate of magnesia, rhubarb, aloes, etc. When the discharges from the bowels are clay-coloured, or dark and offensive, when the mouth is pasty, the tongue loaded with a thick yellowish fur, and the breath heavy, it is generally most proper to employ a mercurial. Dr. Copland advises that we should commence with the exhibition of a full dose of calomel, either alone or with other purgatives, or followed by them in five or six hours. He adds that the doses of calomel ought not to be frequently repeated in the disease, and thinks that it is not serviceable "to continue purgatives long, without either exhibiting them with a bitter tonic or antispasmodic remedy, or with both, or alternating them with those remedies."

Bloodletting can rarely be necessary. The only circumstances that would seem to call for its employment, are severe headache, with signs of determination of blood to the brain, and the occurrence of the disease in a girl at the age of puberty, in whom there is reason to suspect that the cause of the disorder is the want of the menstrual function. In both these cases it is best to employ local bleeding; in the first to the temples, or behind the ears; in the last to the groins and upper parts of the thighs. It is proper to remark, however, that general bleeding has been recommended and practised by some most distinguished physicians. The evidence of late observers seems to show, nevertheless, that it is rarely, if ever, necessary, and there must be many cases in which it would only increase the already excessive excitability of the nervous system.

Antispasmodics are amongst the most important remedies we have to oppose to the disease. The weight of evidence seems to

show, indeed, that they, in conjunction with a moderate use of purgatives, and careful regulation of the hygienic conditions of the patient, ought to constitute the treatment in the great majority of cases. Of the various remedies of this class that have been employed, those which seem to have exerted the most beneficial influence, are valerian, assafœtida, oxide of zinc, camphor, and the root of the cimicifuga or black-snake root.

Of these different remedies the one most employed in this city at present is, I think, the cimicifuga. This was first introduced into use by Dr. Jesse Young, and is now extensively employed and much relied upon. Dr. Wood (*Pract. of Med.* vol. ii, p. 755,) says: "I have in repeated instances found it of itself adequate to the cure of the disease." I have employed it myself only in two instances. In one of these the child recovered under its use, whilst in the other it failed entirely. In the latter case recovery afterwards took place under the use of iron, the sea-bath, and in the course of time. The cimicifuga is given in powder, tincture, or decoction, and should be continued for several weeks in gradually increasing doses, until some visible effect is produced, as nausea, headache, vertigo, or disordered vision. The usual doses are from half a drachm to a drachm of the powder, from one to two ounces of the officinal decoction, or one or two drachms of a saturated tincture, given three times a day.

The French authors chiefly recommend valerian, oxide of zinc, and assafœtida. Of these the one which has the highest reputation is valerian, and from the evidence adduced in its favour, there can be no doubt that it exerts a very beneficial influence upon the disease. It may be given in the form of powder, infusion or fluid extract. The dose of the powder is from twelve to eighteen grains in the day, to commence with, to be rapidly increased to several drachms, as the stomach becomes accustomed to it. It may be given in honey or preserve. I should prefer the fluid extract, of which half a teaspoonful may be given to a child eight or ten years old, three times a day, and the quantity gradually increased. The oil of valerian is employed by some practitioners. Oxide of zinc is given in doses of a grain every three hours to children eight years old, and is much relied upon by some practi-

tioners. Assafoetida is recommended both by English and French writers. It is best given in pill, on account of the nauseous taste of the mixture. Two three-grain pills may be given to a child of four or six years of age, three times a day. Dr. Bardsley gave it by injection, in combination with laudanum, every evening, after using musk and camphor through the day.

Narcotics have been recommended by some writers. Those which are most employed are opium, belladonna, stramonium, and of late, strychnia. Substances of this class are seldom, however, made the basis of treatment. Opium is useful in some cases in which the agitation is very great, so that the sleep of the child is much disturbed, but it is seldom necessary except as an adjuvant to other means; and the remark applies equally to other remedies of the class. Within a few years M. Trousseau has employed with success the sulphate of strychnia. It seems to me, however, that a remedy so dangerous as this, ought not to be employed in the cases of children, except when urgently necessary, which is certainly not true of chorea.

Tonics.—Whenever the disease occurs in debilitated and anemic individuals, remedies of this class prove of great efficacy. The ferruginous preparations are those most clearly indicated under the circumstances. Any of them may be selected. The best are the subcarbonate, Vallet's pills, and the pure metallic iron, (Ferrum per hydrogen.) Quinine is also recommended when the patient is feeble and weak. It may be given alone or in combination with iron. The citrate of iron and quinine would form a very good prescription under the circumstances mentioned.

The cold plunge and shower bath have also been resorted to by a number of practitioners, and there is evidence to show that they have often proved useful. The cases in which they are used should be selected, however. They ought not to be employed unless followed by full reaction, nor unless the child is willing to take them. When the use of the bath terrifies or shocks the patient greatly, it cannot be proper. A warm or tepid bath used once a day, or every second day, would always be useful in promoting the general health, when the cold bath is not borne well.

Sulphur baths, made by dissolving about four ounces of the sulphuret of potassium in an ordinary bath, were employed with very good effects by M. Baudelocque. The bath was administered every day, during a period of from half an hour to an hour. Rilliet and Barthez state that eight of the cases observed by them were treated almost exclusively by this means. Five of these recovered with considerable rapidity, whilst in three, the treatment failed entirely, and even seemed to exasperate the choreatic movements.

A great variety of remedies besides those we have mentioned have been employed, and have more or less evidence in their favour. Amongst them are sulphate of zinc, nitrate of silver, sub-nitrate of bismuth, iodine, and a host of others which it is useless to enumerate. The sulphate of zinc has undoubtedly proved efficacious in some instances. About two grains may be given at first three times a day, and gradually increased to six or eight if the stomach bears the remedy well.

Counter-irritation to the spine, in all its shapes, from pustulation with tartar emetic, issues, and blisters, down to frictions with coarse towels, have been proposed and employed in the treatment. It seems to me that the use of any but the milder remedies of this class is unnecessarily harsh and cruel, except when the disease is evidently dependent upon an affection of the brain or spinal marrow. The great majority of cases will recover perfectly well without a resort to such violent means, and they ought therefore to be avoided.

Electricity has been resorted to, and apparently with good effects in some instances, and it might therefore be tried when other and simpler means fail, or in conjunction with these means.

Hygienic treatment.—The management of the hygiene of the patient is quite as important as any other part of the treatment. The diet should be arranged to suit the particular condition of the individual, and with a view to procure and maintain the most healthful possible state of the digestive apparatus. It should always be light and easily digestible, in order that neither the stomach nor bowels may be oppressed and deranged by the products of an imperfect digestion. When the stomach is weak and dyspeptic, the food ought to consist for some days chiefly of preparations of milk and bread, whilst in the mean time, some tonic remedy is ad-

ministered internally, in order to invigorate the power of the organ. As the digestive function becomes stronger, the child ought, as a general rule, to be put upon the use of the kind of diet most likely to promote general health and vigour of body. It ought to consist, in my opinion, of bread, milk, the plain, wholesome meats, and simple vegetables. Coffee and tea, and all other nervous stimulants had better be avoided. The meats ought to be mutton, beef, chicken, or turkey. There are few vegetables, besides rice and potatoes, which are suitable under the circumstances. All candies, preserves, unripe, coarse, or dried fruit, hot bread and cakes, except the very simplest, ought to be withheld.

Of dress I need merely say that it must be suited to the season. Exercise, or at least, exposure to fresh air and insolation, are of the utmost consequence. When the disease is so violent as to prevent the child from walking, it ought to be taken to ride as often as possible. In cases which seem connected with a debilitated and anemic condition of the constitution, removal to the country, and particularly to the seaside, will often effect a cure with great rapidity. Whenever, indeed, a patient inhabiting a large city or town can be conveniently taken to the seaside in the summer, it ought to be done, as this course is useful not only at the time, but by strengthening and invigorating the constitution for the future, lessens the danger of a relapse.

CLASS IV.

ERUPTIVE FEVERS.

ARTICLE I.

SCARLET FEVER OR SCARLATINA.

Definition ; frequency ; forms.—Scarlet fever is an epidemic and contagious exantheme, characterized by continued fever ; by a scarlet rash, which appears on the second day of the disease, ends about the sixth or seventh, and is followed by desquamation ; and by simultaneous inflammation of the tonsils, and of the mucous membrane of the mouth and pharynx.

The *frequency* of the disease is exceedingly variable in different years, because of its epidemic nature. I find by reference to the tables of mortality of this city, published by Dr. G. Emerson, (*Am. Journ. Med. Sciences*, vol. i, 1827,) that in the twenty years from 1807 to 1827, there were 93 deaths from the disease under twenty years of age. In thirteen of these years, from 1 to 8 deaths occurred per annum ; in five successive years, 1812 to 1817, not a single death is reported, while in the two remaining years, 1820 and 1821, the deaths were 30 in the former, and 13 in the latter. In another communication in the same journal (November, 1831), Dr. E. gives the mortality from the disease under twenty years of age, during the four years from 1827 to 1830, inclusive. In 1827 there was one death ; in 1828 none ; in 1829 nine ; and in 1830 forty.

It is, I believe, a decidedly less frequent disease on the whole than measles, though when short periods of time are taken, the deaths from scarlatina sometimes preponderate. Guersent and Blache (*Dict. de Méd.* t. 28, p. 173), state that it is less frequent

than measles or variola. They added together the cases of eruptive fevers collected in 1838 and 1839, by Roger, Rilliet and Barthez, and Barrier, in the Children's Hospital at Paris, and found that there had been only 157 cases of scarlet fever, whilst there were 267 of measles, and 213 of variola and varioloid. It appears from Dr. Emerson's paper that in the period of twenty years referred to, there were only 93 deaths from scarlet fever, whilst there were 654 from measles, under twenty years of age.

To show how uncertain the proportion is, however, we need only quote from Dr. Condie's note, the fact that whilst in the ten years preceding 1845, there were 2154 deaths from scarlet fever in this city, under fifteen years of age, there were only 574 from measles.

The *forms* of the disease generally enumerated are the simple, anginose, and malignant. Authors differ widely in their descriptions of these three forms. Thus most of the English authors include in the simple form only the cases in which there is no affection of the fauces, while the anginose form includes all in which there is any throat-affection whatever. Rayer, on the contrary, describes under the head of the simple form the cases in which the throat-affection is mild, while he considers the anginose form to be that in which a pseudo-membranous angina occurs. Again, the descriptions of the malignant form are vague and uncertain, some including under this form only the rapidly fatal cases in which cerebral symptoms are present, while others include those also which are rendered malignant by the occurrence of pseudo-membranous angina.

I have been tempted by the confusion which exists in the descriptions of these different forms, and by the belief that the division is faulty and imperfect, to seek some other more consonant with what my own observation has taught me. I have determined therefore to describe two forms or degrees of the disease, which I shall designate *regular* and *grave*.

By the term regular I mean the typical form of the disease, or that which it assumes in the majority of the cases. In this form the angina is simple and the eruption regular in all respects; there is no predominance of one set of symptoms over another, but all

hold a due relation to each other. This form includes the scarlatina simplex of all writers, and many of the cases of scarlatina anginosa of the English authors.

Under the title of grave form, I shall describe the cases which depart from the regular course of the disease and are rendered dangerous by the occurrence of severe symptoms which do not belong in the same degree to the simple affection. I shall subdivide this form into two varieties, the *grave anginose*, which will include all the cases accompanied by pseudo-membranous, ulcerative, or gangrenous angina; and the *grave cerebral*, which will include those marked by the early occurrence of dangerous cerebral symptoms. This form includes some of the cases of scarlatina anginosa, and all those of the scarlatina maligna of writers, dividing, however, those in which pseudo-membranous angina determines the type of the attack, from those in which the cerebral or nervous symptoms give the stamp to the malady.

Causes.—The two chief causes of scarlatina are *contagion* and *epidemic* influence. Of these the latter is apparently by far the most active. Though the fact of the contagious character of the malady has been doubted by some it seems clearly proved by the evidence adduced by various writers, and in my personal experience, I have several times known one child in a family to contract the disease from direct exposure to it, or from its presence as an epidemic in the community, and in five, seven, or nine days after the first fell sick, a second, a third, and even a fourth child, has taken the disease from the first. In other instances, on the contrary, it would seem that either several children in one family contract the disease nearly simultaneously from the epidemic influence, or else that the period of incubation is very short. For example in the course of the last winter, a child five months old, who had never been out of the house, was seized with the disease. On the second day after the eruption appeared on this child, his sister, between four and five years old, fell sick, and on the third day another sister, the only remaining child, of between two and three years of age. In the first of these cases the disease must have been contracted through the epidemic influence which was at that time prevalent in the city, since the child had in no way been

directly exposed to it. In the other two, we must either suppose the cause to have been the same, or else that the period of incubation was only two and three days in the respective cases.

The period of incubation is shorter than in the other contagious eruptive diseases. It may be stated to vary between two or three days and two or three weeks. Guersent and Blache are of opinion that in the majority of cases, it is from three to seven days. Rilliet and Barthez found that of 38 cases in which the time was recorded, it was between 2 and 7 days in 16, between 8 and 13 in 14, and 15 and 40 in 8 cases. My own observation would fix it at about seven days in the majority of cases.

It is impossible to fix with any certainty the length of time during which the power of imparting the contagion continues in the patient. Cazenove (*Abrégé Prat. des Mal. de la Peau*, p. 54), states that it lasts throughout the period of desquamation, and that it would even seem to be most active at that time.

The epidemics of scarlet fever vary exceedingly in their extent and violence. During the years 1841 and 1842, the disease prevailed very extensively in this city, and assumed a malignant type, so that in a considerable number of families two, three, and even four children perished within a very short period. Since that time it has been less extensively disseminated and much less fatal.

The disease prevails at all seasons, but is most frequent in the spring and summer, and next in the autumn. It rarely occurs more than once in the same individual, but that it does so sometimes is proved by facts brought forward by different authors. I once attended a child in this city with perfectly well-marked scarlet fever, attested by subsequent anasarca, who had had the disease two years previously under the care of my father, Dr. C. D. Meigs.

Age.—Rilliet and Barthez state that it is most common from six to ten years of age. Of 70 cases that I have seen, in which the age was noted, 20 occurred under 3 years of age, 22 between 3 and 5 years, 14 between 5 and 7, 12 between 7 and 10, and 2 between 10 and 15. From this it would appear to be more common in the first five years than between the ages of five and ten, since

of the 70 cases, 42 occurred in the former, and only 26 in the latter period. By uniting the statistical tables of Dr. Emerson with those of Dr. Condie (*Dis. of Child.* 2d ed. note, p. 86), I obtain the deaths from scarlatina in this city at different ages, for a period of thirty years. Their tables show clearly that the disease is most common between the ages of one and five years. The total mortality under ten years, during the time stated, was 2171, of which 130 were under one year of age, 411 between one and two, 1130 between two and five, and 510 between five and ten. The earliest age at which I have seen it perfectly well marked, was five months.

The influence of *sex* seems not to have been determined with certainty. Dr. Tweedie (*Cyclop. of Pract. Med.* Art. Scarlatina), says it is most common in girls. Rilliet and Barthez, on the contrary, state it to be more common in boys. Of 82 cases under 15 years of age that I have seen, in which the sex was noted, 35 occurred in males, and 47 in females. The truth is probably that under puberty it attacks the two sexes with about equal frequency, while after that age it is most common in females.

Symptoms ; course ; duration.—*Regular form.*—To render the description of the symptoms more intelligible, I shall divide the course of the disease into the three stages of invasion, eruption, and desquamation.

Stage of invasion.—The first symptom observed in the great majority of cases is fever, marked by considerable acceleration of the pulse, and heat of skin. In some few cases the fever is preceded by the ordinary prodromes of febrile diseases, as languor, lassitude, pains in the back and limbs, and slight rigors. Simultaneously with the fever, there is, in nearly all cases, more or less soreness of the throat. In all that I have examined, even those in which no pain was complained of, there has been redness, or redness with swelling, of the fauces. In a considerable number of cases vomiting occurs, or if not vomiting, some degree of nausea. There is complete anorexia ; the thirst is acute ; the bowels are usually in their natural condition, or slightly constipated. The child is quiet and dull, or else restless and irritable, and sometimes there is delirium ; the face is generally flushed, and the eyes

often slightly injected. The duration of these symptoms is irregular. They are said to last generally about a day, but they may continue either a shorter or longer period. I have often known them to continue less than a day, and very rarely more than two.

Stage of eruption.—The eruption generally appears first on the face and neck, whence it extends rapidly over the whole surface. It continues to increase in extent and intensity, so as to reach its maximum about the third or fourth day. It appears first in minute dark-red points dotted upon a rose-coloured surface, which form patches of irregular shape, of considerable size, level with the skin, disappearing under pressure, divided at first by healthy portions of skin, but rapidly running together, and giving to large portions of the surface an uniform scarlet colour. The eruption is not generally equally diffused over the whole body, but is more marked upon one portion than another. It is generally very vivid upon the face and especially on the cheeks. It is often most intense on the back, and is there of a deeper colour than elsewhere, and not unfrequently assumes a purple hue. It is generally very well marked on the abdomen and thighs, and assumes in those regions a particularly bright tint.

It does not always cover the whole surface, but in some very mild cases, and as we shall find when treating of the complications of the disease, in very severe cases, it may occur only in patches of moderate extent upon different portions of the body, leaving us at times in some doubt as to the real nature of the rash.

The surface of the eruption is smooth and even to the touch, unless, as not unfrequently happens, it is accompanied by the development of miliary vesicles, or crops of minute pimples, or pustules. A certain degree of roughness is sometimes occasioned also by enlargement of the papillæ of the skin in various parts of the body, particularly on the extensor surfaces of the limbs; but these are evidently independent of the characteristic eruption. The skin upon some parts of the body, especially the face, hands, and feet, often presents a swollen appearance, rendering the movements somewhat stiff. There is in most cases a feeling of burn-

ing, irritation, and itching in the skin, the latter of which symptoms increases as the malady progresses.

The eruption generally reaches its height about the fourth day, and then remains stationary for one, or less frequently two days, after which it begins to decline. Its decline is marked by a diminution in the intensity of the colour, which, from scarlet becomes red, then rose-coloured, and growing paler and paler, finally disappears entirely about the sixth, seventh, or eighth day.

The symptoms which preceded the eruption do not subside on its appearance, but persist or are augmented. The febrile movement continues unabated; the pulse is full, strong, and frequent, rising to 100, 120, 130, and even 160; the skin is burning hot, dry, and loses its softness and suppleness. The expression of the face is generally natural. The eye is often animated, and slightly injected. The respiration is generally easy and natural, though sometimes when the fever is violent, it becomes quickened. The auscultation and percussion are natural, unless some complication exists. There is often a rather frequent cough, which is dry, and evidently depends on the guttural inflammation, and not on any bronchial or pulmonary affection; it exists during the early period of the eruption, and declines with the inflammation of the fauces. The voice is seldom altered beyond having a nasal sound, so long as the disease continues simple and regular. If it become hoarse or whispering, it indicates a probable extension of inflammation from the pharynx to the larynx. The anorexia continues until the eruption begins to decline, and the thirst is acute up to the same period, when it moderates. At first the dorsum of the tongue is covered with a whitish or yellowish-white fur of variable thickness, while its tip and edges are of a deep red colour. After two or three days, and during the increase of the eruption, the coating just described disappears from the tongue, and its whole surface assumes a deep red tint and a shining appearance, which makes it look like raw flesh. At the same time it is often much diminished in size from contraction of its tissues, and its papillæ become enlarged and projecting; this condition generally lasts from six to ten days, after which the tongue returns to its natural state; it is commonly moist throughout the attack. Vomiting rarely occurs

in the regular disease; the bowels continue nearly in their natural condition; in some few cases slight diarrhœa occurs, but more frequently there is very moderate constipation which requires the use of mild laxatives. The abdomen is natural in most of the cases. Sometimes, however, there is slight tension and pain for a few days, which coincide generally with enlargement of the liver, or more rarely of the spleen. The urinary secretion is usually more or less reddened as in other febrile diseases. Early in the second, or even in the first stage, the fauces present the signs of inflammatory action; the pharynx is reddened, and in some cases swelled; the tonsils enlarge and become red; the sub-maxillary and lymphatic glands are somewhat tumefied, and tender to the touch, and when the case is at all severe, deglutition is generally painful, and in some instances extremely so. The absence of complaints of sore throat in a child, or the fact of its swallowing without hesitation or apparent difficulty, is no proof that angina does not exist, as I have always found upon examination in a good light, much greater redness than natural, and in many instances redness and swelling combined. As the eruption progresses, and the tongue loses its coat and becomes red, the inflammation of the pharynx usually augments; the redness becomes deeper; the tonsils are more swelled and painful, and dotted over with small white spots, or with thin, whitish, and soft false membranes. The throat-affection, however, is rarely severe enough to constitute a serious danger in simple regular scarlatina, while in many of the malignant cases, it is a frequent cause of a fatal termination. During the eruption the nostrils are either dry and incrustated, or there is some coryza. The strength of the child is reduced for the time, but there are no signs of prostration, and the decubitus is indifferent. There is almost always more or less disorder of the nervous system, sometimes amounting only to headache and restlessness, while in other instances there is great irritability, wakefulness, or delirium.

Stage of decline and desquamation.—The eruption reaches its height, as already stated, about the third or fourth day, then remains stationary for one or two days, and afterwards declines gradually, so that no traces are left on the sixth, usually, or

at most in rare cases, on the ninth or tenth. The other symptoms, both general and local, decline with the eruption; the pulse loses its frequency, and falls to the natural standard; the heat of the surface first subsides and then disappears, but the skin remains somewhat harsh; the redness and swelling of the tonsils and pharynx diminish; the spots of false membrane are absorbed or thrown off; the deglutition becomes easy if it have been difficult, and soon all signs of throat-affection vanish; the tongue cleans off, becomes reddish and glossy, and after a time returns to its natural state.

At the time that the subsidence of all the symptoms takes place, *désquamation* begins. It dates therefore in most cases from about the sixth day, though it may be either earlier or later. It commences in most of the cases on the face and neck, though in a few instances it appears first on the abdomen. It then extends gradually over the body and becomes general. About the thorax and abdomen it occurs in the form of minute points, like those which result from the desiccation of sudamina; on the face it is in the form of thin light scales or squamæ, while on the extremities large flakes of the epidermis become separated from the derm, and are removed by the child, or rubbed off by his movements in bed; these flakes are sometimes so large on the hands and feet as to form complete moulds of the fingers and toes, or even of the hands and feet. The whole process usually occupies some ten or twelve days, but may be prolonged even into the third week. It is generally accompanied by roughness and dryness, and some itching and irritation of the skin. Not unfrequently, the surface beneath the exfoliation is left tender and irritable for some time afterwards.

Symptoms of the grave anginose form.—This is the form of the disease described by M. Rayer and Dr. Geo. B. Wood, amongst others, under the title of scarlatina anginosa. Most English authors include also under that title all the cases in which there is any pharyngeal inflammation whatever, whilst I have deemed it more correct to refer such cases to the regular form, so long as the inflammation is not violent enough to constitute a complication or irregularity. In the form now about to be described, I shall, as before stated, include all the cases which are rendered dangerous

and irregular, by the occurrence of pseudo-membranous, ulcerative, or gangrenous angina.

This form begins generally with greater violence than regular cases of the disease. The disturbance of the circulation, heat of skin, and nervous symptoms are usually more marked. The redness and swelling of the fauces are found upon examination to be more considerable; the difficulty and pain of deglutition are more complained of by older children, and are shown in those who are younger, by their refusal to swallow, by their crying upon making the attempt, and in some instances by a positive inability to perform the movement. The false membrane is never, or very rarely, present on the first day of the attack. In most cases it is not found until the second or third, and often not before the fifth or sixth day. Rilliet and Barthez state that they have known it not to appear until the tenth and eleventh days. It appears first in small, thin, whitish, yellowish, or ash-coloured points or patches, on one or both tonsils, or the soft palate only, where it remains limited, or extends to the pharynx, which it may cover in whole or in part. The patches are of variable thickness and consistence, and adhere sometimes very slightly, and sometimes with considerable tenacity to the mucous membrane beneath. They may remain for a day, and then be thrown off not to be again produced; or they may form in several successive crops, until the case is terminated; or, as most frequently happens, they last three or four days, or more, and are then detached. The mucous membrane upon which they are seated is found in various conditions. It may present the redness and swelling indicative of severe inflammation, or it may be softened, ulcerated, and according to Guersent and Blache, gangrenous, though generally what have been supposed to be sloughs were in fact portions of altered false membrane. There is more or less fœtor of the breath, sometimes amounting to a gangrenous odour, after the appearance of the pseudo-membrane. The severity of the symptoms is in proportion to the extent and thickness of the false membrane.

We have already seen that it is not uncommon to find ulcerations beneath the false membranes. In other cases of the grave anginose form, the throat-affection assumes very great violence

without the presence of any exudation whatever. In some of these the mucous membrane is of a deep red or even purplish hue, its consistence is softened, and it is swelled, and covered with a layer of grayish or sanious pus. The tonsils are enlarged, infiltrated with pus, softened, and easily break down under the finger. In other cases, in addition to the redness and softening, ulcerations are present. These may be superficial, amounting only to erosions, or they may extend through the mucous, and even sub-mucous tissue to the muscles beneath. They are generally seated in the pharynx, but may exist also in the tonsils, and in some rare cases extend into the larynx. In still more malignant attacks of the disease, we find evidences of gangrene of the pharynx. It is important to distinguish between those in which the pseudo-membrane becomes so changed as to assume the form of sloughs, and those in which the tissues of the pharynx are really gangrenous. The former constitute by far the greater number of the cases which have been generally regarded as instances of gangrene of the throat. That gangrene of these tissues does actually occur in some few cases, is proved, however, by the evidence of Dr. Tweedie, who says (*Loc. cit.* p. 650), that in malignant scarlatina "the membrane of the pharynx is sometimes of a dark, livid colour, and occasionally in a sloughing state," and by that of Guer-sent and Blache (*Dict. de Méd. Art. Scarlatine*, p. 159), who state that they met with several instances of gangrene of the pharynx in the pseudo-membranous angina which prevailed in 1841.

An almost constant accompaniment of the grave anginose form is inflammation and swelling of the sub-maxillary lymphatic glands and surrounding cellular tissue. The tumefaction is generally confined at first to the glands beneath the jaw, which become painful to the touch. After a short time it extends to the parts behind the angle of the jaw, and beneath that bone, until at last the sides of the neck and the throat are largely distended, so as to interfere with or even in great measure prevent the opening of the mouth, and by the pressure which they exert on the internal parts of the throat, to add to the difficulty of deglutition which already exists. In some cases the pressure is so considerable as to embarrass the respiration of the child. This swelling has been generally sup-

posed to depend on inflammation of the parotid glands; but MM. Bretonneau, Guersent and Blache, and Barthez and Rilliet, all state that parotitis is of exceedingly rare occurrence, and that the swelling in question depends nearly always on the causes just described. The last-named writers state, moreover, that the tumefaction of the cellular tissue is often of the nature of active œdema. The enlargement generally disappears, in favourable cases, in from three to twelve days, by resolution, while in others it terminates by suppuration of the glands and surrounding parts.

In the form of the disease we are now considering, it is common to observe violent *coryza*, which may be either purulent or pseudo-membranous. It may appear from the very first, or not for several days after the eruption has commenced. The discharge is yellowish, granular, thin, very offensive, and highly acrid, so as to excoriate very much the upper lip. It sometimes flows in great abundance, and generally continues up to the moment of death, or until all the symptoms are moderated.

Otorrhœa is another symptom of this form. It generally occurs simultaneously with the *coryza*. The discharge is at first thin and watery, much like that from the nostrils, and becomes gradually thicker as the case advances. The quantity is extremely variable. In some cases I have known it to fill the meatuses and conchæ of both ears, and then to flow out and make large stains upon the pillow, or to collect very rapidly after being wiped away. It is, like the *coryza*, an unfavourable symptom, as it is a mark of the grave form of the disease, and because, if the child recovers, it is very apt to result in deafness, which is but too often permanent.

These symptoms, *coryza* and *otorrhœa*, sometimes exist also in cases of the regular form, but they do not then assume the peculiar characters which they present in grave cases. The discharges are much less abundant, and the mucus or pus healthy and scarcely offensive in smell; they last but a short time, and are very rarely accompanied at the time, or followed by more than a slight degree of deafness.

The eruption is generally stated to appear later than in the regular form, and often to be less vivid and less extensive. It is

also said to occupy only portions, and not the whole of the body, to occur in irregular patches, or to appear and disappear alternately. This has not been the case in the instances which I have seen. In all but one of these, nine in number, the eruption occurred early, generally within twenty-four hours from the onset. It was of a deep brick-red or livid colour, and covered the whole surface. In the exceptional case, the eruption did not take place until the seventh day, when it appeared in patches on the wrists and knees. On the eighth day it extended to the rest of the extremities and abdomen, and on the ninth was general, and of a rather dark hue.

The *general symptoms* are more severe in this than in the regular form. It sometimes happens that for one or two days, or even longer, the case promises to be one of the latter kind, but then suddenly assumes the threatening features of the form under consideration. The fever is usually intense, the pulse being full and strong, and rising very soon after the onset to 140, 150, or 170; the skin is very hot and dry; there is more restlessness and irritability than in the regular form, and after one, two, or three days, appears a strong disposition to delirium and stupor, not unfrequently merging into coma. The respiration is accelerated, and in many instances, owing to the throat-affection, laboured and difficult. In most of the cases, a loud gurgling, which is very characteristic, is heard in the throat, particularly when the child is asleep or dozing. This depends in part upon the collection of viscid and tenacious secretions in the fauces, which sometimes embarrass the respiration so much as to make it necessary to remove them with a mop, or by the operation of an emetic, and in part upon the existence of the coryza of which we have spoken. This latter symptom is one of very serious consequence in infants, as in them, it alone may cause death, and always adds very much to the danger. There is generally some cough, which may be frequent and troublesome, though not usually so, unless there be a disposition to laryngeal complication. The voice is hoarse, guttural, and sometimes whispering. When the cough is very frequent, and still more, when it becomes hoarse and croupal, in connexion with hoarse or whispering voice, or aphonia, there is great reason to fear the extension of the exudation into the larynx, which constitutes an almost fatal

accident. The face is deeply flushed at first, and the expression anxious. If no improvement take place, the case, in four or five days, or even less, assumes a still more threatening aspect. The pulse becomes very rapid and small; the restlessness and delirium pass into drowsiness or coma; the tongue becomes brown and dry; the teeth are covered with sordes; the lips are dry, cracked, and bleeding; diarrhœa is apt to occur; and the patient dies in from three to ten days, in a perfectly well-marked typhous condition. In other instances, on the contrary, the case runs on from week to week, and at last, after an illness of four, five, or six weeks, the child either dies, or recovers after all chances for life seemed to have been lost.

Laryngitis has been supposed by some persons to be a frequent complication of the disease, while others assert that it rarely, if ever, occurs. Bretonneau has never met with it. Rayer says he does not know that the exudation has ever been found in the larynx or trachea. Tweedie (*Cyclop. Pract. Med.* Art. Scarlatina, p. 640) states that in the dissections he has made he has not seen an instance of the membranous exudation extending into the larynx. That it does sometimes occur, however, is proved beyond a doubt by the evidence of MM. Guersent and Blache, Rilliet and Barthez, and others, and by my own observation. Rilliet and Barthez report three cases in which it was found in the larynx after death. These gentlemen state, however, that they have never observed the peculiar symptoms of croup. This does not accord with my own experience, for in one of the cases that I have seen, all the peculiar symptoms of that malady were present during life. The subject of this case was a boy two years of age. A few days after the invasion of the disease, a severe and extensive pseudo-membranous angina was developed. This was soon followed by all the symptoms of croup,—hoarse cough, stridulous respiration, weak, feeble cry, dyspnœa, and whispering voice, which lasted about five days, when the angina and croupal symptoms both very much diminished, and the child seemed in a fair way to recover; suddenly, however, extensive tumefaction of one side of the neck took place, and he died in twenty-four hours. Unfortunately no examination could be made. The symptoms which indicate a disposition to implication of the larynx are frequent, hoarse and croupal cough, hoarse

and whispering voice or cry, aphonia, and dyspnœa with stridulous respiration.

Symptoms of the grave cerebral form.—This form may exist as such from the commencement of the attack, or may supervene upon the regular or grave anginose form. In the majority of the cases that I have met with, the invasion has been altogether different from that of either of the other two forms. Of ten cases that I have seen, eight began with cerebral symptoms, while two presented for three or four days the characters of the regular disease, after which the cerebral symptoms made their appearance, and soon led to a fatal termination.

The cases which began with cerebral symptoms were very much the most violent attacks of the disease that came under my observation. The onset was in some instantaneous. In one, the little patient, a girl two years old, whose brother and sister had been sick for some days with scarlatina, was put to bed in the evening in her usual health, which was strong and vigorous. She slept quietly through the night, but was found by the mother the next morning in a state of drowsiness, violent fever, and covered with a deep-red scarlatinous rash. She soon became comatose, and died on the third day. In another case, a boy eleven months old was a little fretful in the afternoon, but was put to bed in the evening as usual, and went to sleep. About ten o'clock the nurse heard a rustling in the bed, and on going to it, found him in a violent general convulsion. The next morning he was covered with a scarlet rash, which became deeper and deeper as the disease went on. On the second day he was nearly insensible, and had frequent attacks of convulsions; on the third day he had retraction of the neck, with spasmodic twitchings, and at the end of that day, died in a state of coma. In a third case, a boy six years old, whose sister had been sick for a week with a simple regular attack, went to bed well. At three o'clock in the morning, he was attacked with vomiting and purging, paleness and coolness of the skin, and great exhaustion. At nine o'clock he was drowsy and dull, the skin pale and cool, and the pulse extremely rapid; the vomiting and purging had ceased; at 12 M. he was comatose and had a convulsion. From this time he continued comatose until he

died at 6 P.M. of the same day, after an illness of fifteen hours. In a fourth instance, the invasion was that of croup; after a few hours came on coma and convulsions; patches of eruption then appeared on the trunk, and death occurred in twenty-four hours from the beginning. The child, a boy five years old, was thought to be so well the afternoon of the day he was taken sick, that he had been sent out on a visit to a relation, and while there fell sick. In a fifth case the onset was sudden, with violent fever, drowsiness, deep suffusion of the skin, and in a few hours insensibility, then general convulsions, and death in thirty-six hours. In a sixth, in a boy four years old, the attack came on with vomiting, paleness, drowsiness, and then a scarlet rash; after a few days, coryza and otorrhœa occurred; there was dry cracked tongue and lips; in the second week, the child was comatose with occasional attacks of extreme jactitation, and the most violent hydrocephalic cries, which condition lasted ten days. After this there was diarrhœa, extreme emaciation, loss of speech, and entire deafness. Gradually, however, the fever disappeared, the tongue cleaned off, and intelligence very slowly returned; in the sixth week convalescence was firmly established, and the child recovered perfectly with the exception of his hearing, which remained very dull in consequence of the perforation of both membranæ tympanorum.

In this form of the disease, therefore, the symptoms are of the most virulent character. The onset is sudden. The child passes within a few hours from a state of apparent health, into one of the extremest danger. Most of the cases begin with violent fever, and great depression of strength. The pulse soon becomes very rapid (140, 150, 180), or so quick that it cannot be counted, and at the same time is small and often irregular. The skin is dry and burning hot in some parts, in others cool or even cold. There is generally nausea or vomiting, which is sometimes violent and constant. This is accompanied in some cases, but, in my experience, only in the severest of all, by colliquative diarrhœa and meteorism. Delirium often exists from the first, or else there is drowsiness and dulness of intelligence, verging gradually into coma. In the most violent cases, the stupor or coma alternate with con-

vulsions, which may cause a fatal termination in eighteen, twenty-four, or thirty-six hours. In cases rather less violent, the fever and irregular heat continue; the cervical and sub-maxillary ganglions and tonsils, become swelled; the fauces are of deep red colour, and generally very much tumefied, from inflammation and infiltration, and there is considerable difficulty of deglutition. Generally the tonsils, and later in the attack the soft palate and pharynx, are covered with pseudo-membranous exudations, which may be in the form of cheesy, pulpy, slightly adherent flocculi, or in that of yellowish-white, tougher and more adherent patches. The nostrils at the same time are reddish and dry, and often incrustrated, from the drying of the secretions of the part. The respiration is accelerated, and sometimes rendered very difficult by the swelling of the fauces, or by the viscid secretion which clogs those parts. The countenance is flushed and heated, or pale and very anxious. The eruption varies according to the violence of the case. In the severest one that I saw, that which proved fatal in eighteen hours, no eruption whatever was perceived, and we only knew it to be scarlatina by the characters of the other symptoms, and by the fact that the sister of the boy had been sick in the same house with the disease for a week. In the case which terminated in twenty-four hours, the eruption showed itself in the form of scarlet patches about the face and upper part of the body, twelve hours after the onset. In the other eight cases, which lasted not less than three days, the eruption was perfectly well marked. It covered the whole surface, was at first scarlet in colour, soon ran into a deep red, and then became violet or purplish. M. Gueretin (*Arch. de Med.* t. i, p. 292, 1842), in his account of the acute malignant form which he witnessed, states that the eruption was nearly constant. In all my cases it occurred within twenty-four hours from the invasion, while in those of M. Gueretin, it appeared within twenty-four or forty-eight hours, or as more frequently happened, not until the fourth or fifth day.

If no favourable change takes place, the patient grows weaker and weaker; the delirium continues, or is replaced by coma; subsultus tendinum, rigidity of the limbs, spasmodic twitchings or general convulsions, make their appearance; the eruption becomes

more and more livid; the pulse grows smaller, more frequent, and irregular; respiration is more embarrassed; deglutition becomes impossible; and the patient dies in from three to seven or nine days. In some few instances the child struggles on for several weeks, and dies in a state of utter exhaustion, or having a constitution of great power of endurance, at last surmounts the disease and recovers.

The *duration*, as we have already seen, is variable. Of the ten cases of the grave cerebral form that I have met with, one proved fatal in 18, one in 24, and one in 36 hours. Of the remaining seven, four died on the third day, one on the seventh, one at the end of the fifth week, and the last recovered after an illness of six weeks.

Complications and sequelæ.—*Dropsy.*—This is one of the most frequent and important sequelæ of the disease. It occurred in a fifth of the cases of Rilliet and Barthez, and in seven of the 82, or about a twelfth of those observed by myself. It occurs generally in the course of the second or third week of the disease, and during the process of desquamation. It is thought to follow cases of moderate severity much more frequently than those of a grave character. Dr. Tweedie states that it has never been observed to succeed a malignant attack. This does not, however, accord with my own experience, since of the seven cases that I have seen, two occurred in the course of the grave anginose form of the disease. The effusion may attack any one of the cavities or tissues of the body, or all at once. The most common form in which it appears is anasarca, after which the most frequent are, in the order in which they are mentioned, œdema of the lung, hydrothorax, ascites, hydropericardium, and hydrocephalus. The exciting cause of the dropsy is now generally believed to be cold, contracted generally by exposure to air and moisture, at too early a period. I have rarely known it to occur when the patient has been confined to the chamber or house, until after the twenty-first day; while, on the other hand, I have seen it follow immediately upon a ride in cool weather on the fourteenth day, the child having apparently been convalescent for several days before. I have known it to occur also when the child has been allowed to run through the house exposed

to draughts from open doors and windows. I am in the habit now of always directing the mother or nurse to keep the patient confined to the chamber for three weeks from the onset of the disease, or if it be allowed to run through the house, to take care to have it well clothed, and to keep the windows and doors carefully closed should the weather be cold or cloudy. It is very often dependent on disease of the kidneys. Rilliet and Barthez state that they found the characteristic renal lesions of Bright's disease, in more than half of all their cases of dropsy, and in more than two-thirds of those of anasarca. M. Legendre, on the contrary, ascribes it to simple ordinary inflammation, or congestion of the kidneys.

The symptoms which precede and accompany this complication are languor, lassitude, irritability, loss of appetite, restless sleep, and after a short time fever, with frequent, corded pulse, and hot dry skin. In some cases, however, the fever is very slightly marked, and the effusion is preceded only by the other symptoms just detailed. Sometimes there is nausea and vomiting also, and generally a moderate degree of constipation. The effusion usually commences in the face, and extends thence to the hands and feet, and is either limited to these parts, or spreads over the whole surface, and gradually to the internal organs. In some instances, the effusion takes place with great rapidity, affecting the cellular tissue and various internal organs simultaneously, and causing a fatal termination in a very short space of time. Guersent and Blache have known it to end fatally in twelve, fourteen, or thirty-six hours, though more commonly it runs on for one or two weeks, or even longer. In six of the seven cases that I have met with, the form of the effusion was anasarca, of which all but one recovered. In the seventh case hydrocephalus occurred suddenly several days after full convalescence from anasarca, and the child died in twenty-four hours after the most frightful general convulsions. The skin where the effusion has taken place, is firm, hard, and elastic to the touch, does not generally pit, and is of a dull white colour. In very mild cases where the effusion is slight, I have been able to determine the cause of the fever only by slight swelling of the face, particularly of the eyelids, and by a little

puffiness of the backs of the hands and feet. When the effusion attacks the thoracic organs, its presence is to be detected by the dyspnœa, which is sometimes extreme, and by the physical signs. Hydrocephalus is not an uncommon form of the affection. When it does occur it generally affects the ventricles, and more rarely, the sub-arachnoid tissue. It occasions drowsiness, dilatation or contraction of the pupils, and sometimes the most violent convulsions, and may prove rapidly fatal.

In regard to the appearance of the urine, a subject of great interest and importance, it may be stated that it is usually of a blackish, or more or less dark red colour, in the first few days after the appearance of the dropsy. After eight or nine days the colour generally becomes brownish, and as the case progresses and approaches a cure, the fluid becomes less and less dark in colour, until about the fifteenth or twentieth days, when it is usually as pale or paler than in the natural condition. The discoloration just described is said to depend on the presence of blood in the urine, which may be easily ascertained by examination with the microscope.

At the same time that the urine is discoloured, it is more or less turbid, especially when first voided, and though it becomes clearer after a while, from the deposit of little clots or reddish or whitish flocculi at the bottom of the vase, it never becomes entirely limpid. The specific gravity is somewhat diminished, but not to the same extent as in Bright's disease.

M. Legendre (from whom this account is chiefly taken,) states that in the fourteen cases analyzed by him, the urine was always coagulable by heat and nitric acid. The precipitate varied, however, in quantity and appearance, according to the colour of the urine, and distance of time from the invasion of the anasarca. Very abundant when the blackish or reddish colour indicated the presence of a large quantity of blood; the coagulum diminished as the urine became lighter coloured. When the urine contained much blood, the precipitate obtained consisted of a number of flocculi, which rapidly fell to the bottom of the tube; when, on the contrary, the amount of blood was small, the urine being of a pale yellow colour, the precipitate, caused at the moment of boiling,

merely gave an opaline tint to the fluid, and as the boiling was continued, furnished a delicate coagulum, which fell slowly to the bottom of the tube. The colour of the precipitate is said not to be of a pure white as in Bright's disease, but of a dirty brown or ash-gray tint.

The author just quoted is of opinion that the anatomical lesions of the kidneys observed in fatal cases of scarlatinous dropsy, the characters of the urine, and the curability of the disease, all show that it is not dependent upon granular degeneration, or Bright's disease of the kidneys, but rather upon simple ordinary inflammation, or even simple congestion of those organs.

The degree of danger to be apprehended from this complication depends upon the form which it assumes. Cazenave (*Loc. cit.* p. 52,) says that there is no danger from it so long as it remains confined to the subcutaneous cellular tissue, and this is probably true. When, however, it attacks the brain or lungs it becomes exceedingly dangerous. Dr. Wood (*Pract. of Med.* vol. i, p. 403,) says that he has seen but one fatal case from dropsy, and in that the heart was diseased. I have met with but two. It would seem to be much more dangerous in the Parisian hospitals than in private practice in this country, since Guersent and Blache speak of having saw it prove fatal in twelve, fourteen, and thirty-six hours, after one or two weeks, or even two or three months; and Rilliet and Barthez refer to it as often proving fatal.

Diarrhæa is not an uncommon accident of the disease. It generally depends on simple functional derangement of the bowels. In some cases, however, it is so severe or long-continued as to constitute a serious complication. Under these circumstances, it depends on follicular entero-colitis, slight erythematous inflammation, or simple softening of the intestinal mucous membrane.

Bronchitis and pneumonia are rare. *Inflammation of the serous membranes* is more common, occasioning in some cases the dropsical effusions which have already been treated of. Scarlatina may be coincident with variola or measles. I have never seen it in connexion with the former, but in two cases which came under my observation it was complicated with measles.

Anatomical lesions.—The eruption sometimes disappears en-

tirely after death, and on other occasions assumes a deep livid or purple appearance. The epidermis is generally loosened upon the integument, so as to be peeled off with great facility. The most important lesions, and those which seem to belong to the nature of the disease independent of complications, are congestions of different parts of the body, particularly the brain, serous membranes, spleen, glands of Peyer, and intestinal follicles. It is a curious fact that, even when the cerebral symptoms have been most severe, and we might expect to find evidences of violent inflammation of the brain, nothing is observed after death, in the majority of cases, but congestion of the large veins and sinuses of the brain, of the pia mater, or of the cerebral substance. There is rarely any unnatural amount of serous effusion into the ventricles, or meshes of the pia mater. Dr. Tweedie says, "indeed, we have frequently been surprised, in examining rapidly fatal cases, to find no morbid appearances that could explain the cause of death." Nevertheless effusions within the cranium sometimes exist, as has been already stated in the remarks upon hydrocephalus.

The respiratory organs are usually healthy, with the exception of congestion and serous engorgement. The abdominal viscera often present appearances analogous to those of typhoid fever. The glands of Brunner and Peyer are not unfrequently enlarged, and sometimes reddened or softened. In a smaller number of cases the mesenteric glands are slightly inflamed and increased in size, and the spleen redder than usual and softened. These lesions have no necessary relation to the form of the disease, since they are often absent in typhoid cases, and present in those of a different type.

The kidneys are healthy, with the exception of some degree of congestion, unless the case has been complicated with dropsy. Under these circumstances they often present the characteristic lesions of Bright's disease.

The blood presents very different appearances in different cases. It is viscid or serous, dark-coloured or light, and fluid or coagulated, the clots being of variable colour and density. The proportion of its constituent elements is changed. The fibrine maintains its usual relation to the mass of the fluid (3 parts in 1000),

or is very slightly augmented, while the quantity of the globules is increased to 136 or 146, according to Andral, instead of 127 in 1000 parts.

Diagnosis.—It seems to me impossible to distinguish scarlatina from other febrile or eruptive fevers by the symptoms which precede the eruption. The only signs upon which a diagnosis at that time might be grounded, are great frequency of pulse, which is characteristic of this disease, some soreness or redness of the fauces, and the prevalence of the disease in the community. But these are all exceedingly fallacious, and the physician should be content to wait for the eruption before he ventures to speak with certainty. After the eruption has come out it can scarcely be mistaken for anything else.

From measles it may be distinguished by the differences in the prodromes, course, and eruptions of the two affections. The prodromic stage of scarlatina rarely lasts more than twenty-four hours, and is very often much less; that of measles, on the contrary, is almost always from three to four days; in scarlatina the rash appears suddenly and is often completed in a single day; in measles it appears on the face first and extends gradually to the rest of the surface, seldom reaching the hands and feet before the end of the second day; the eruption of measles occurs first in distinct papulæ, which coalesce and form patches of an irregular crescentic shape; that of scarlatina is in the form of innumerable minute dots or punctuations, placed so closely together as to give to large portions of the surface an uniform colour, like that produced by blushing. The colour of the two eruptions is different, that of measles being dark like raspberry juice, and that of scarlatina of a more or less bright scarlet tint. The presence of catarrhal symptoms in measles and their absence in scarlet fever; the absence of angina in the former disease, or its very slight character, and the severity of the throat-affection in scarlatina; and lastly, the greater severity of the febrile symptoms, particularly the frequency of the pulse and heat of skin, in scarlatina, are other points of difference which will assist in making the diagnosis, rarely, it seems to me, difficult, more certain.

From roseola it may be distinguished by the tint of the eruption,

which is much brighter in roseola ; by the characters of the patches of eruption, which are more regular in shape, but of much smaller size in that affection ; and by the absence or very slight degree of sore-throat in roseola. Moreover, the latter disease is generally of shorter duration, is a milder affection, and therefore accompanied by far less fever and general disturbance of the constitution.

Prognosis.—It is impossible to obtain a useful average mortality of scarlet fever, since the disease varies so greatly under different circumstances, that the results obtained during one period, are inapplicable to cases observed at another. This is proved by the experience of almost every physician, and by the evidence of many writers. It is proved, also, by the following facts. M. Gueretin (*Loc. cit.* p. 283) states that the mortality in the epidemic observed by him was about one in twelve : of 99 cases, 8 died. Rilliet and Barthez lost a little more than half their cases : of 87 the total, 46 were fatal. These cases, let it be remarked, however, occurred in the hospital for children in Paris, which will account for the very great fatality. Of the 82 cases that I have seen, 13, or not quite a sixth, were fatal.

The prognosis must be based therefore in part on the character of the epidemic prevailing at the time. It must depend also on the form of the disease. The regular and simple form is rarely fatal. Of 82 cases of the disease observed by myself, 73 belonged to this form, and of these not one was fatal. The grave form, on the contrary, is always exceedingly dangerous, and of the two classes of this form that I have made, the cerebral is much more so than the anginose. Of 9 cases of the latter kind, four died ; while of 10 of the cerebral form, all but one perished. It is clear, therefore, that the occurrence of severe cerebral symptoms early in the disease, is always of the worst augury. The character of these symptoms also should guide us in our prognosis. Excessive jactitation or irritability, delirium, coma, and the hydrocephalic cries, are all unfavourable symptoms, but not in the same degree as those connected with the locomotive apparatus. Rilliet and Barthez state that they have seen recoveries take place in cases in which the intelligence of the patient had been very much disordered, while of those who, "*during the first fifteen days of scar.*

latina, were taken with convulsions, convulsive movements, contractions, in a word, any symptoms affecting the locomotive apparatus, all without exception, died." This does not accord exactly with my own experience. Of the 19 grave cases, convulsions occurred in seven in the "first fifteen days" of the disease, and in one on the twenty-fifth day. I am happy to be able to state, however, that contrary to the experience of the authors just quoted, two of the seven cases mentioned recovered. One of these occurred in a boy seven years old, who had a general convulsion, lasting several minutes, on the second day of the attack, which was followed by delirium and coma alternately, but no return of the convulsions. The case was a most violent one, and lasted six weeks, leaving the child at the termination very deaf, but otherwise in good health. The other instance occurred in a child five months old. The convulsive symptoms appeared on the ninth day, and consisted of strabismus, spasmodic retraction of the head, and occasional slight spasms of the limbs. They alternated with coma, and disappeared on the tenth day, until the seventeenth and eighteenth, when the strabismus reappeared. The child recovered perfectly. In ten cases, severe and prolonged delirium or coma occurred, and of these three recovered. We may conclude, therefore, that convulsive symptoms in the early stage of the disease, indicate an almost certainly fatal termination; while severe or prolonged delirium and coma are also extremely unfavourable symptoms, but rather less so than those just mentioned.

Other unfavourable symptoms are, extremely frequent or very violent pulse; intense heat or unnatural coolness of the skin; deficiency or sudden disappearance of the eruption; a livid or purple tint of the eruption; slow and imperfect capillary circulation, ascertained by pressure; the appearance of petechiæ, ecchymoses, or hemorrhages; violent vomiting and colliquative diarrhœa; great violence of the throat-affection, whether from tumefaction, great abundance of pseudo-membranous exudation, or disposition to ulceration and sloughing; and lastly, severe coryza or otorrhœa. A disposition to typhoid symptoms, indicated by dulness of the intelligence, dusky hue of the skin, frequent and feeble pulse, dry,

brown tongue, sordes on the teeth, meteorism, and disposition to diarrhœa, is always dangerous.

When, on the contrary, the fever is moderate, the cerebral symptoms absent or very slight, and the eruption regular, and of a bright tint; when there is no disposition to typhoid symptoms; when the throat-affection is mild, and the disease pursues a regular, uniform course, we have every reason to expect a favourable termination in a large majority of the cases.

Treatment.—Hygienic treatment.—In all cases of the disease, whether of the regular or grave form, the strictest attention should be paid to the hygienic conditions of the patient. The room in which the child is placed ought to be, if possible, large, and at all events well ventilated. The temperature in winter should be carefully attended to. I always direct it to be kept at from 68° to 70° F., unless the fever is violent, and the child complains of heat, in which case, it may be allowed to fall to 66°, but not often lower, in consequence of the great susceptibility to the influence of cold. The clothing ought to be moderate, not enough to increase the heat of skin and keep up constant perspiration, nor yet so little as to endanger chilliness. The diet should consist, in most of the cases, of weak milk and water, with or without bread, according to the severity of the case, and state of the stomach. If the fever be very severe, barley-water, or arrow-root prepared with water alone, may be given. Nothing more substantial than these articles ought to be permitted, in most cases, until after the patient is decidedly convalescent, when broth with rice boiled in it, or plain boiled rice, and then some light meat in small quantity, may be allowed, until the child gradually resumes its old habits. When, however, the case runs on for a length of time, or symptoms of prostration come on, light chicken or mutton water may be given at once, and small quantities of wine whey, or weak milk punch added, according to the degree of the symptoms.

Treatment of the regular form.—In the great majority of cases, this form needs but very simple treatment. Some laxative, as magnesia, castor oil, or syrup of rhubarb, in such dose as to produce two or three stools, may commence the treatment; or, if the general symptoms be rather more severe than usual, an emetic of

ipecacuanha had better precede the cathartic. After this, some diaphoretic should be given every two or four hours. If the skin is very hot and dry, I prefer the antimonial wine and sweet spts. of nitre, in the dose of two to four drops of the former, with eight or ten of the latter; or a teaspoonful of neutral mixture, with a little nitre, or the spts. mindereri, may be substituted. At the same time a bath should be administered. This may be either a common bath at a moderate temperature (94° to 96°), or the affusion bath, given in the following manner. Prepare a bucketful of warm water (96° to 98°) containing from half a pint to a pint of vinegar; undress the child, and place it standing in a large tub, with its head and shoulders slightly bent forwards; then pour the vinegar and water from a pitcher over the body, letting it fall from a height of two or three feet, in a small, steady stream, on the nucha, so that it shall run over the whole surface, and fall into the tub. The moment the bath is finished, wrap the child in a warm blanket, which should be ready, and lay it in bed, or hold it on the lap, for twenty minutes, or longer if perspiration is induced, after which it is to be wiped dry and dressed. If the fever be violent and accompanied with great dryness of the skin, two bucketsful of water may be used. This bath is often followed by copious perspiration and sound, refreshing sleep, with great diminution of the heat and restlessness. It may be repeated twice or even oftener in the day. If the case be so mild as not to require an immersion bath, the pediluvium may be used with great benefit, as a sedative and diaphoretic. A moderate dose of some mild cathartic, or an enema, should be used from time to time, through the course of the disease, if the bowels are not moved spontaneously. This simple treatment will, I believe, carry the great majority of the cases of the regular form to a safe termination. Sometimes, however, even while the disease pursues a regular, uniform course, the general or local symptoms assume a degree of activity which renders more energetic treatment necessary.

The febrile movement may be unusually active, and attended with so much restlessness, or by such an amount of delirium at night, as to threaten a change into the grave form of the malady. When this is the case, it is proper to resort to depletion, unless

there be some strongly contra-indicating circumstances present. We may judge of the propriety of the measure by the constitution of the child, the state of the circulation, and the character of the eruption. If the child be not very delicate, if the pulse be full and not excessively frequent, if the eruption be neither dark nor livid, showing a slow and languid capillary circulation, a venesection of from three to six ounces may be safely and usefully practised, and even repeated in twelve hours if necessary. In cases in which there has been unusual restlessness, with violent complaints of headache, in older children, without very great fever, I have resorted to applications of leeches to the temples with much benefit. At the same time a somewhat active cathartic may be given. It is necessary to be careful in the use of purgatives; for it must be improper and unsafe to give those which are irritating, or such doses of others as might prove so, in a disease which in its severe forms, shows a strong disposition to choleric states of the bowels. I would rather, therefore, give a medium dose of a laxative remedy, and repeat it from time to time, than run the risk of exciting by a single over-dose, a condition of irritation which could scarcely fail to do mischief, by interfering with the regular course of the malady. For these reasons I generally resort to magnesia, followed by lemonade; to castor oil in orange juice, in the dose of a dessert-spoonful for children over three years of age, and a teaspoonful under that age; to simple syrup of rhubarb in the dose of a dessert or tablespoonful; to a teaspoonful of salts; or some similar remedy, giving directions that the dose shall be repeated in six hours, or assisted by an enema, if it fail to operate. At the same time the affusion bath as above directed, or the tepid immersion bath, ought to be used several times in the twenty-four hours, according to its effects, the temperature of the body, and the degree of restlessness.

The angina needs no treatment whatever in a large majority of the cases. The physician should never, however, neglect to examine the fauces, when the case assumes any degree of severity. If, under these circumstances, he finds evidences of severe inflammation of those parts, in the form of swelling, bright or deep redness, and still more, patches of whitish exudation, he may

fairly presume that this assists to occasion the unusual severity of the general symptoms, and should immediately apply remedies to check or modify the local disease. These may consist, under the restrictions already mentioned, of a moderate venesection, followed or not by an application of leeches to the throat; or, if the local symptoms predominate over the general, or in very young children, of leeches alone. The number of leeches must depend of course upon the constitution and age of the child, and size of the leeches. I generally direct from two to three ounces of blood to be taken from a child two years old, and from three to five from those who are older. A great many different local remedies are recommended by different authorities. Those which I have made use of are the following: a solution of nitrate of silver (5 to 10 grs. to the ounce,) to be applied twice or three times a day; powdered alum used in the same way; and a solution of sulphate of copper and quinine (6 grains of each to an ounce of rose water), which has been very much used and greatly depended upon by my father, and which I have found very beneficial. This is to be applied in the same manner as the solution of nitrate of silver. With one of these I have always succeeded very well in this class of cases. Rilliet and Barthez recommend the following preparation:—*R.*—Acid. muriat. ʒi, vel. ii; Mel. Rosæ ʒi.—*M.* It is proper to avoid, under the circumstances above described, the use of caustic applications, as they are not needed, and as they might aggravate the local disease.

Treatment of the grave form.—Bloodletting.—The propriety of bloodletting in the grave forms of the disease is questioned by many able observers, while others recommend it highly as an efficient means of controlling the dangerous symptoms. Guersent and Blache (*Loc. cit.* p. 177), state that in the ataxic malignant form “it is rarely useful to take blood, unless the general reaction is very acute;” and in another place they say that in the adynamic typhoid form, bleeding has never seemed to them to be of any use. Dr. Burrows (*Libr. Pract. Med.* vol. i, p. 365,) states that Dr. Williams has drawn up a table of different epidemics of scarlet fever which have prevailed from 1763 to 1834. Dr. W. says, “the conclusion which inevitably follows is, that the chances of

recovery are diminished by the practice of bleeding, in the ratio of nearly four to one, as compared with the chances, supposing the patient not to have been bled." Dr. Burrows says, speaking of the anginose form, that in particular epidemics, or in some cases, bleeding may be required, but that in general the state of the circulation will not bear bleeding. Under the head of *scarlatina maligna*, he says: "If bloodletting from the arm be a remedy of doubtful propriety in the former two varieties, it is here hazardous in the extreme. At the very onset of the disease the condition of the throat, or fierce delirium, may require the application of a few leeches beneath the jaw, or the abstraction of a few ounces of blood by cupping from the back of the neck." Dr. G. B. Wood, (*Pract. of Med.* vol. i, p. 406,) observes, that he has "seldom found it advisable to bleed in any case; and I do not remember the instance in which it appears to me that I had occasion to repent my abstinence." Rilliet and Barthez recommend a bleeding in the early stage of the anginose form, to be followed by an application of leeches in robust but not in delicate children. In the malignant form with cerebral symptoms, they recommend a bleeding, if possible. M. Guerin (*Loc. cit.* p. 301,) says, speaking of malignant cases, that the most energetic antiphlogistic treatment did not manifestly arrest the progress of the violent febrile phenomena, and that in robust subjects leeches to the neck and mastoid processes, did not sensibly ameliorate the cerebral congestion and delirium. Dr. Eberle follows Armstrong in recommending active bloodletting in the *early period* of the malignant form, but adds that it must only be during that period, "for the approach of collapse renders bloodletting utterly inadmissible."

Trousseau and Pideux (*Trait. de Therapeutique*, t. i, p. 591, 597,) strongly oppose bloodletting in scarlet fever, except in some very rare cases, in which there is "a state of general turgescence, cerebral congestion, painful tumefaction with stiffness of the articulations, rather elevated pulse, vomiting, imperfect generalization of the eruption." At page 596 are the following words, "of all the eruptive fevers, *scarlatina* supports antiphlogistic treatment least well."

It ought to be recollected in the consideration of the propriety

of bloodletting, that the cerebral symptoms which make their appearance in the early part of the disease, even during the first two weeks, are rarely dependent on inflammatory processes going on in the brain. This has been already shown in our remarks upon the cerebral symptoms. I will merely repeat here, that Rilliet and Barthez state, that a more or less active sanguine congestion is the only alteration generally, but not always, found in fatal cases, and that in some instances this congestion is not greater than what is met with in several diseases unaccompanied by cerebral symptoms. Are not these symptoms very analogous to those which occur in typhoid fever, and which, according to Louis, cannot be shown to depend on any *appreciable* lesion of the brain? It seems to me most probable that this class of symptoms is dependent upon the state of the blood, which, being diseased or poisoned, fails to carry on healthfully the functions of the nervous centres. If this supposition be correct, what good can arise from treatment which only takes from the circulating channels a small quantity of fluid, leaving behind a remainder just as irritating and unfit for carrying on the functions of the economy as that which has been removed?

On the whole, it is clear, I think, that the weight of evidence is against the use of bloodletting to any considerable extent in grave cases. If used at all, it is to be used only in the earliest period, and even then with great caution. My own opinion, derived from personal experience, is as follows:—I believe that I have seen general depletion useful in seven cases of the regular form, in which there was a tendency towards the grave form, shown by the presence of excessive reaction, and still more by great jactitation and irritability, alternating with drowsiness and delirium. But, in those sudden attacks of the disease, in which it assumes from the very start, the terrible symptoms which threaten extreme danger to the patient; in which we find the child, within a few hours of the onset delirious or comatose, or labouring under convulsions, convulsive movements or contractions; in which the eruption is imperfect or scanty, or copious and of a deep livid tint; in which, in other words, there are either strongly marked ataxic or adynamic symptoms, general bloodletting has never seemed to me at all advantageous, and I have several times feared that it had been injurious. As to leeches,

I have never known them to be really useful except in one case, and in that they were used very sparingly, and after an interval of two days. In all the other cases they appeared to be without any effect.

No depletion was employed in five of the nine cases of the grave anginose form that came under my observation, and of these two died and three recovered. Of the four remaining cases two were bled from the arm, of which one recovered and one died; one was leeches upon the throat, and one on the temples, the former of which proved fatal, the latter recovered. In one of the ten grave cerebral cases the treatment was not recorded. Of the remaining nine, a single venesection was used in two; in three, two venesections were employed, in one with the addition of leeches; in one leeches were twice employed, once to the throat, and once to the temples; and lastly, in three no depletion whatever was used. Of the nine cases, only one recovered, and that was the one in which leeches were employed alone on two different occasions. I will add that it has appeared to me that depletion in grave cerebral cases has very generally been followed by an increase of the nervous symptoms, by deeper coma, and by a more rapid approach of the convulsive phenomena. Most assuredly, I have never seen it produce any of the evidently favourable effects which follow its employment in the phlegmasia, or in sudden determinations of blood to the brain.

Purgatives ought to be used with care, and only in such doses as to secure a soluble state of the bowels, and never to cause violent diarrhœa. M. Gueretin recommends, as the only treatment that he has found to be really useful in the malignant form, small doses of purgatives repeated two, three, or four times a day, so as to produce from two to four stools a day. If the stools became more frequent he suspended the purgative. This treatment was continued until the febrile symptoms had ceased. The remedy he preferred was calomel with jalap, in doses proportioned to the age of the child. This is the practice also of M. Bretonneau.

Emetics are highly recommended by various writers in the early stage of the disease. Dr. Eberle (*Dis. of Children*, p. 461,) says, "If called sufficiently early, these should always be our first remedies."

I have prescribed them in several cases, and have certainly thought them useful in the regular form, but must confess that like all other remedies that I have used, they seemed to exert but little influence over the grave forms. In young children, in whom large collections of viscid secretions in the fauces occasion difficult respiration, an emetic of ipecacuanha is often serviceable in mitigating that symptom.

The antiseptic preparations of *soda* have been lauded by some persons as useful in the treatment of the malignant forms. I have not, however, met with any satisfactory evidence in its favour. I have only used it in two instances. One was a case of the grave pseudo-membranous form which lasted five weeks. The liq. sodæ chlorinatæ was given in the dose of five drops in a mucilaginous mixture every three hours for several days, without the least visible effect. This case proved fatal. The second was an instance of the same form. The same remedy was employed whilst the tongue was dry, cracked, and blackish in colour. Under its use the typhoid symptoms were slightly ameliorated, but not so rapidly as they afterwards were under the use of spirits of turpentine. The child recovered from this stage of the disease, but died on the twenty-sixth day of convulsions.

Baths; lotions; affusions.—Of the various means that I have employed or seen employed in grave cases, these alone have seemed to me to exert a manifest influence upon the disease. The warm bath at 95° to 97°, continued for twenty minutes or half an hour, has always appeared to ameliorate for the time being the condition of the patient. From being entirely comatose, the child has, while in the bath, awakened from its stupor and regained a slight degree of intelligence, so as to open its eyes, look round and drink freely. Unfortunately, the effect has always been transient, and though the heat of skin has remained rather less for some time after the immersion, the coma and disposition to convulsions have very soon returned. The same statements are made by M. Guérin, (*Loc. cit.* page 302.) I have also used the warm vinegar and water affusion, as described under the regular form, but without any more permanent effects. Sponging with tepid or warm water has usually been followed by marked diminution of the heat of the

surface and of the frequency of the pulse; but like the effects of all other remedies, the improvement has generally been temporary only, and the symptoms have soon resumed their previous violence.

Lotions, by sponging with cool and sometimes cold water, are highly recommended by many authors. This plan is resorted to when the skin is intensely hot and dry, and is employed for several minutes until the heat is reduced, and the restlessness of the patient moderated. It must be repeated several times a day to be of any service. It is scarcely necessary to say that lotions are to be used only when reaction is strong and well-marked, and not when the skin is pale and cool, and the pulse rapid and feeble.

We come now to the consideration of another method of treatment, which has been asserted to be most efficient in the violent forms of the disease by several persons of high authority in medicine, while by others it is considered dangerous and improper. I refer to the use of affusions with cold water. This treatment was particularly relied on by Dr. J. Currie of Edinburgh. Let it be observed, however, that Dr. Currie limits its use to cases to which he applies the term *anginose*, many of which, I doubt not from his description, would now be included amongst the cases of the regular form. He mentions another class of cases which he thinks ought rather to be called "*purpurata*," characterized by "extreme feebleness and rapidity of the pulse, and great fetor of the breath The heat does not rise much above the standard of health. Great debility, oppression, headache, pain in the back, vomiting, and sometimes purging, accompany its rapid progress; the patient sinks into the low delirium, and expires on the second, third, or fourth day. The cold affusion is scarcely applicable to it, and the tepid affusion makes little impression upon it. In my experience, indeed, all remedies have been equally unsuccessful. It outstrips in rapidity, and it equals in fatality, the purple confluent small-pox, to which it may be compared." (*Currie's Med. Reports*, Philad. p. 277.) It is clear, therefore, that Dr. Currie, when he speaks of nearly invariable success in upwards of one hundred and fifty cases (p. 286), had to do, not with the malignant, or at least, not with the most malignant forms, for which we are seeking a remedy,

but with cases of the regular form, or at most with those of the malignant anginose type. Indeed, at page 294, we find the following remarks. "It has come to my knowledge, that in two cases of scarlatina, of the most malignant nature, the patients have been taken out of bed, under the low delirium, with the skin cool and moist, and the pulse scarcely perceptible. In this state, supported by the attendants, several gallons of perfectly cold water were madly poured over them, on the supposed authority of this work! I need scarcely add that the effects were almost immediately fatal." I have been induced to enter thus much into detail, in regard to the use of cold affusions, because of the intrinsic importance of the subject, and because of the remarks upon it in the work of Rilliet and Barthez, who bring forward Currie's success, as a strong argument in favour of their employment, in that form of the disease in which cerebral symptoms predominate. Currie does not recommend them, however, except in cases in which the reaction is full and strong, as indicated by very great heat of skin, scarlet eruption, and rapid, but not feeble pulse. In the famous cases of his own two children, it is evident that the attacks were not malignant, for the skin was very hot (108° and 109° F.), and no mention is made either of stupor or delirium, much less of convulsive phenomena.

The evidence brought forward by Currie, Gregory, and Rilliet and Barthez, in favour of the efficacy of cold affusions in the treatment of severe cases of the disease, is such, however, as ought to call attention to the point. It seems to me that they should be restricted to cases in which the reaction is perfectly well marked, in which the skin is hot and dry, the pulse though frequent (150 or 160) strong, and the eruption not of too dark a tint. The child is to be undressed, and placed erect or sitting in a tub, while four or five gallons of water, at from 60° to 70° F., are poured over the head and body. The good effects of the remedy are said to be an immediate reduction of the heat, a diminution of the rapidity of the pulse, which in one of Dr. Gregory's children fell in half an hour after the cold affusion from 160 to 120, a disposition to sleep and quiet, and, according to Dr. Gregory, a seeming arrest of the throat-affection. These good effects of the affusions are transient,

however, as the heat of skin, and rapidity of the circulation, return in the course of one or two hours. For this reason it is necessary to repeat them frequently, once in two or three hours at least, in order to render the effects permanent. Currie used fourteen affusions for one of his own children, and twelve for another, in thirty-two hours. These were not, however, all cold. Gregory used for his child five "good sousings," to use his own words, in twenty-four hours.

Rilliet and Barthez give in the following words the conclusions of Henke in regard to the use of cold affusions: 1. The cold affusions are not adapted for a *general* method of treatment. 2. The slight, or simply inflammatory forms, do not at all demand so energetic a treatment. 3. Their employment must be reserved for cases in which the disease is epidemic, and accompanied by intense heat and dryness of the skin, and by smallness and acceleration of the pulse, and for those in which the cerebral symptoms are very violent and characterized by great restlessness, alternating with drowsiness, commencing very early in the disease. Scarlet fever, under these circumstances, is so dangerous, and so often mortal, that recourse ought to be had to all curative means, and in children the cold affusions are much more strongly indicated than bleeding. (*Loc. cit.* vol. ii, p. 653.)

Believing that evidence of the good effects of any plan of treatment in grave cases of scarlet fever, must be acceptable to all who feel an interest in the progress of medicine, I insert at this place an account of the employment and effects of cold lotions, by Dr. Hiram Corson, of Conshohocken, Montgomery county, Pennsylvania. The cases narrated occurred in his own practice, and were kindly communicated by letter, at my request. Dr. Corson writes to me in July, 1847:

"Dear Doctor,

"Scarlet fever is a disease that has prevailed very much in our region during the last seventeen years, and has caused me much thought and anxiety. It will give me great pleasure to make you acquainted with the *results* of a plan of treatment, which I owe mainly to Doctor Samuel Jackson, formerly of Northum-

berland, now of your city, who first put me in the way of treating the disease successfully. In 1833, I treated the disease, which, however, was not malignant, very successfully, with iced drinks, moderate purges, and slight irritation externally upon the throat, and thought the practice peculiar to myself, but afterwards saw in the May and August numbers of the Am. Journ. of Med. Sciences, the communications of Dr. Jackson. Encouraged by these, I prepared to try the cold externally, when a most unfortunate trial, by a neighbouring physician, so alarmed the people about the application of cold, that I could not prevail upon them to suffer the trial. From 1838, until within the last two years, we have annually had the scarlet fever for some months, and my treatment, with the exception of iced drinks sometimes, and cold to the head occasionally, was like that in general use, until August, 1844. At that time I was called to a child eight months old, who had been sick two days. There was great swelling of the glands of both sides of the neck, hot skin, frequent pulse, but no eruption; slight discharge from the nose; the glands not easily seen upon the inside, but the drinks came back through the nose sometimes, and it could not take more than one draw at the breast, without dropping the nipple, because of the obstruction in the nostrils impeding respiration when the mouth was closed. I stated candidly to the mother that I had never saved a child in that condition, and of that age, by the old treatment, and recommended *ice externally and internally*, cold water to the head, and no medicine. I could urge nothing upon the score of experience, but she agreed. Lumps of ice were folded in linen cloths and held night and day upon the two sides of the throat; while a small thin piece enclosed in white gauze was held in the mouth. In less than three hours improvement was manifest in the ability to swallow. The swelling of the glands, the heat, and the frequency of the pulse all regularly diminished, and in two days the child could nurse well and was out of danger.

“The next severe case occurred in about two weeks. It was one of the most intense scarlet eruption, with tumefaction and ulceration of the tonsils, vomiting, coryza, great frequency of the pulse, excessive restlessness, and swelling of the external glands. The

heat was intense ; there was heaviness amounting almost to stupor. My treatment was a kind of half and half : emetics, purgatives, cold externally and internally. Being but half satisfied with myself, my course was vacillating and inefficient, and I at length called in a friend, who turned the scale in favour of irritating gargles, and our patient died. I was mortified and provoked, and determined to act out my convictions at the next opportunity. A few days after I was called to two boys of five and seven years of age, who had been blistered upon the throat, legs and arms, and had had hot drinks, calomel purges, etc., etc., and who were discharging copiously from the nose, and were almost deaf. Their countenances were sunken, the throats gangrenous, pulse above 150 ; their appearance was that of persons in typhus fever. I expressed my fears of the blisters, predicting that they would all be gangrenous in twenty-four hours, and that they would be likely to destroy the patients. I had cloths dipped in iced water wrapped round the neck, ice was put into the mouth, and cold water poured upon the heads, which were much affected. The throats were filled with ropy mucus, which was expelled through the mouth and nose during the coughing which attended efforts to vomit. The palate was literally destroyed by gangrene. A few hours produced an amendment. The blisters mortified extensively, and though both children recovered from the disease, one died two weeks afterwards from the sloughing of the throat and neck from the blisters.

“ I now treated all the cases that occurred with cold externally and internally ; moving the bowels with equal parts of cream of tartar and jalap. The cases were seen early and easily subdued, and it seemed to me as though the remedy was very efficient, or that my patients had a mild disease. That the latter was not the case, however, I thought probable from the fact that in my region, many cases differently treated died ; while in Norristown, only four miles distant, children from one to twelve years or more, were swept off after an illness of only two or three days, the deaths being evidently produced by disease of the brain.

“ On the 16th July, 1845, I was called to see a little girl four years and nine months old. She had been sick a day or two.

The case began with vomiting. The eruption has been out since morning (now, 6 P. M.); redness the most intense all over that I ever saw; pulse as rapid as it could be to be counted. The mother had been alarmed during the last few hours, in consequence of delirium and jerking, which she feared was the prelude to convulsions. There was tumefaction of the sub-maxillary ganglions; tongue furred, with projecting red points; breath hot and offensive. When she found some one holding her wrist, she started from her dozing state, and being somewhat afraid of the 'doctor,' went off immediately into one of the most terrific convulsions that I ever saw. It lasted, in spite of ice to the head, or rather iced water *constantly* poured upon it, almost half an hour. I stayed with her, had her undressed, and placed two nieces of mine (her mother being one) by her side. A large tub of water with cakes of ice, at least a peck, floating in it, was brought into the room, and during the *whole* night, these two persons bathed her from head to foot with the water from this tub, applying it by means of large sponges. It was to me a most painful case (independent of the convulsions), but in order to be certain that I had a case fit for a trial of the ice, I had my brother (a physician practising at Norristown, where the disease was very fatal) brought at 10 P. M., to see the case, and to say whether it was the same as those that had for a few weeks been carrying off some of the finest children in Norristown, and carrying terror into every family. He assured me that it was one of the most violent character, and that she would in all probability not live till morning. She was at this time free from convulsions, but in a muttering delirium. As I had perfect control in the case, I assured him that she should live if I could quench the fire that was burning out her vitals, by the use of ice. Not a moment did the attendants whom I had placed by her intermit their labours. Before midnight reason had returned, and her mother said she was more herself than she had been during the whole day. I had gone away, but returned at sunrise, and found her cooled off perfectly. There was scarcely the least appearance of eruption, the skin was cool, the head cool, the intellect clear, and the pulse moderate in frequency and force. She had been unable to drink for many hours, and her tongue, which

had been very much cut during the convulsion, was so swelled and sore, that I could obtain no view of the throat. I now directed the mother to intermit the sponging, doing it only once in every two hours, until I returned. My return was delayed until 4 P. M., when I found that the heat of skin, frequency of pulse, eruption, and delirium had all returned. She was moving her hands as if feeling for something, slowly protruding and withdrawing the tongue, and muttering. She did not notice her mother's questions, and was apparently unconscious to all that was going on. We threw on the water, ice-cold, in the utmost profusion, and lapped cloths dipped in the water around the neck, changing them every minute or two. We poured it upon the head constantly, holding a large basin under to catch it. In one hour, reason returned. We continued it until the eruption almost disappeared, until the child shrank from it, and until she was ready to shiver with cold. I now gave her cream of tartar and jalap, directed the water to be used just as was needed to keep down the heat, and had no farther trouble with her. I forgot to say that so soon as she could swallow, cold drinks and ice were kept in the mouth. She took no more medicine. The wounds in the tongue healed up kindly.

“There were two younger children in the family, both of whom were attacked a few days after, while apparently in good health, with vomiting and the same symptoms as in the first case. The throats were red and swelled, etc. Cold cloths were wrapped around the neck; they were purged with jalap and cream of tartar; as the heat of skin and eruption appeared, ice water was profusely applied to the whole body, so as to keep down the heat, and allow but a very moderate eruption to show itself. They were well in a few days without a bad symptom. It was now mid-winter. The cases followed each other rapidly. I treated them all in the same way, and *all* with like happy results. The disease had a wide range, extending from the Schuylkill across the highlands between Norristown and Doylestown, and was in that range very destructive in many families. There was much alarm, and I was called two miles back of Norristown to a girl about eleven years old. The eruption had been out about twenty-four hours. The throat was swelled and covered with white patches

(generally called ulcers); tongue dry, hot, and red; skin hot as skin could be; and, what to me characterizes the most malignant cases, the eruption instead of being of a bright scarlet, was of a purple red, like the congestion sometimes seen in the faces of old drunkards. There was great oppression, not *difficulty* of breathing, but a state like that which exists when a person is deathly sick but cannot vomit; with extreme restlessness and jactitation. The disease had been so fatal, that the mother thought the case almost beyond remedy, but when I told her that the cold had proved successful, she was eager to try it. It was 8 o'clock, A.M. The girl was stripped, and the iced water applied all over. Ice was lapped around the neck, and positive directions given to continue the applications without intermission until I returned. It was about four miles from me, and I did not return for seven hours. The moment my eyes rested upon her, I knew that we had done *too much*. She was white as the sheet upon which she lay. The neighbours had been in and desired the mother to desist, that 'she would kill her,' but she had been true to her trust. The child was apparently bloodless, covered with 'goose-skin,' and shivering with cold. Her pulse was *small* and much less frequent, but not weak or fluttering, and she was sensible. (I forgot to say that in the morning she was quite flighty.) I told the mother we had used rather more cold than was necessary, but that if we left it off now, she would probably do well. I omitted it for two hours, and gave nothing. At the expiration of that time, the heat, and with it the eruption, showed themselves, so as to cause me to direct the sponging to be used just so as to keep them in check. The ice was kept constantly to the neck, and water frequently poured over the neck. I had no more trouble with her, although she desquamated from head to foot.

Six other children in the family took the disease. Five of them had the ice and ice water used upon them, and all did well. I gave none of them any medicine except a little cream of tartar and jalap, to move the bowels moderately. I gave this combination because it is pleasant to children, and easily swallowed. The sixth case was a very mild one, so that the mother merely gave it a little castor oil, and it did well, and seemed perfectly recovered

in a few days. Indeed the attack was so mild, that it would not have been detected as scarlet fever, if it had occurred at any other time. It was attacked with dropsy and an affection of the lungs, about two weeks after, lingered for several weeks, and finally died of pneumonic disease.

"I suppose I have attended more than a hundred cases of scarlet fever of every grade, since I began the cold treatment. In no instance where I had it fairly applied did it fail. Indeed I have lost but two patients since.

"In every variety of sore throat and quinsy, in summer and in winter, my treatment is ice around the neck; or, when the nurse is faithful, iced cloths, renewed as soon as they approach the heat of the neck.

"In no single instance have I seen dropsy follow scarlet fever that had been treated by cold affusion. I have never seen it occur except after the mildest cases of the disease, those that had probably only needed a mild laxative."

I will now make a short statement of my own experience in the external use of cold. I have never employed the cold affusion over the whole body, and never saw it employed but once. In that instance a single bucket-full of water at 70° was poured over the child, but as it was not repeated, no good effects, beyond a very transient reduction of the heat, and quiet for a short time, were produced. In another instance I made repeated affusions upon the head with water at 70° , pouring at one time seven buckets-full upon that part. This was a case attended with coma, strabismus, and spasmodic retraction of the head. In addition to the affusions, cloths dipped into iced water were kept applied the greater part of the time. These means, especially the affusions, were evidently advantageous, and the child recovered.

Since receiving the above letter, I have resorted to lotions with cool water, (70°), in two cases of the grave anginose form, and in both with benefit. In one of them particularly, its effects were immediately and evidently advantageous. The case occurred in a hearty, vigorous girl, twelve years of age. On the third day of the attack, the symptoms were as follows. The pulse was between 160 and 170, small and quick; skin intensely hot; eruption very

copious, and of a deep dark red colour, tending to violet; capillary circulation slow and languid; tongue black, and covered with a hard dry crust; teeth and lips dry and covered with dark incrustations. There was very great agitation and restlessness, with constant moaning and complaining, and total insomnia. Under these circumstances, I directed the nurse to sponge the head and extremities of the patient with water of the temperature of the room (68° to 70°). As the water became heated by contact with the skin, small pieces of ice were put into the basin so as to keep the temperature at the degree mentioned. At the end of four hours, the washing having been continued all the time, I found the patient decidedly more comfortable. The pulse had fallen to 140, and increased in volume; the heat of skin was much reduced; the colour of the eruption had improved, having become much more scarlet in tint; the capillary circulation was more active; the agitation and restlessness had very much moderated, and the child had slept somewhat at short intervals. This treatment, in conjunction with the internal administration of the solution of chlorinated soda, and small doses of spirits of turpentine, was continued for several days, the sponging being used whenever the heat and restlessness were great, and the pulse very rapid. The child convalesced about the end of the third week, but was unfortunately seized with symptoms of hydrocephalus on the twenty-fifth day, and died in twenty-three hours, after the most frightful convulsions I ever saw.

Tonics and stimulants.—Whenever in the course of scarlet fever, the low typhoid symptoms we have described, make their appearance, it is necessary to resort to tonics and stimulants. This condition I have never seen occur but once in the acute cerebral form, which lasts only a few days. That was in a case the onset of which was like that of violent cholera morbus. It is in the slow and tedious cases of both the grave anginose and cerebral form, and not unfrequently in the early period of the former, that adynamic symptoms generally occur. The pulse becomes frequent and small; the skin cool and moist, or hot and cold by turns; the tongue is dry and cracked; there is sordes upon the teeth; and there is great jactitation, muttering delirium,

and various nervous symptoms, which all clearly indicate great exhaustion of the vital powers. Under these circumstances it is proper to resort to whatever means are likely to uphold the constitution, and impart to it strength to resist the slow disease that tends to destroy it. With this view the diet ought to consist of milk preparations, and of light animal broths, with bread, if the child will take them. At the same time wine whey in proper doses, and at fixed periods, ought to be given;—or the whey may be mixed with arrowroot water;—or wine may be given in simple cold water. If the prostration be very great, small quantities of brandy may be used. We may resort also to the internal use of quinine, in the dose of a grain three or four times a day, to a child two or three years old, or to the cold infusion of bark. The aromatic spirits of hartshorn is useful in doses of ten or fifteen drops every two or three hours; or the carbonate of ammonia in emulsion; or the infusion of serpentaria, which is highly spoken of by some of the German authors. For my own part, I rely chiefly on diet, wine and brandy, and quinine. This treatment should be continued as long as the adynamic symptoms last. I believe, however, that I saw good effects obtained recently in one case, from the use of the chlorinated soda according to the following formula:—
R.—Liqu. Sodæ chlorinat. gtts. xl; Syrup Tolutani ℥i; Aquæ font. ℥iii.—M. Give a tablespoonful every three hours to a child from eight to twelve years old. I afterwards employed in the same case, on account of the occurrence of a considerable and painful degree of meteorism, small doses, three drops every three hours, of spirits of turpentine.

Treatment of the Angina.—The pharyngeal inflammation requires a chief share of our attention in the grave anginose variety of the disease.

It is scarcely necessary, after the previous remarks on blood-letting, to say much in regard to its employment in combating this element of the malady. It may be used with great caution in the very earliest stages, while the reaction is still full and strong. I prefer leeches to bleeding, and believe that about four ounces are as much as ought generally to be taken from a child three or four years old.

When the external swelling is considerable, benefit is sometimes derived, I think from the steady application of warm poultices to the part. They should be enclosed in portions of thin soft flannel, and secured by means of a very light cravat. They ought to be renewed every two or three hours. The reader's attention is called to the use of cold applications to the throat as recommended by Dr. Corson, in the letter appended to my remarks on baths and lotions. A great variety of local remedies have been proposed by different authorities. Amongst the best are powdered alum, and solutions of nitrate of silver and sulphate of copper or zinc. Cauterization of the throat, with the view of arresting the formation of the exudation, so useful and important in primary pseudo-membranous pharyngitis, seems to be of doubtful propriety in this disease. Gueretin (*Loc. cit.* p. 300), is of opinion that cauterization increases the phlogosis, augments the tumefaction of the ganglions, and aggravates the fetidity of the breath. Cazenave, on the contrary, (*Abreg. Prat. des Mal de la Peau*, p. 56,) advises the early touching of the diphtheritic patches with muriatic acid or nitrate of silver, in order to modify the peculiar inflammation. He also states that M. Bielt habitually employed a mixture of equal parts of lemon juice and honey. Rilliet and Barthez recommend an application consisting of equal parts of honey of roses and muriatic acid. Cayenne pepper in infusion or substance has been recommended by different authors. Dr. G. B. Wood, (*Loc. cit.* vol. i, p. 408,) thinks that it exercises a peculiar and very happy influence "when the pseudo-membranous or gangrenous patches are observed in the fauces, and when the colour of the mucous membrane is dark red." He mixes the powder in water, and applies it to the fauces by means of a large camel's hair pencil. When the breath is very fetid, the liq. sodæ chlorinatæ, diluted with eight to ten parts of water, is said to be very serviceable. I have usually preferred the solution of nitrate of silver, or that of sulphate of copper and quinine, both of which have already been mentioned.

In the use of any of these preparations in children, it is necessary to apply them to the fauces in the manner described in the article on idiopathic pseudo-membranous pharyngitis. When viscous

secretions collect in the fauces in such quantity as to cause serious annoyance to the child, and embarrass the respiration, they ought to be removed by means of a sponge mop, or camel's hair brush. When coryza is present, the nostrils should also be cleansed from time to time with a small brush, and then freely anointed with sweet oil, or some mild ointment, or they may be touched with the wash used for the throat. To perform these little offices for the child, almost always requires force, but they are followed by such comparative ease and comfort, and I doubt not, mitigation of the disease, that they ought to be insisted upon.

For the *otorrhœa* which sometimes occurs, it is seldom necessary to do more during the violence of the attack, than to cleanse the ears twice or three times a day, by syringing with warm water and castile soap, or with a weak solution of alum. After the violence of the attack has subsided, this complication should be treated as in idiopathic cases.

Treatment of the dropsy.—In mild cases the only treatment necessary is the use of some mild purgative, as castor oil magnesia or a small dose of calomel, warm baths when the fever is considerable, minute doses of antimony and sweet spirits of nitre, a simple diaphoretic, as cream of tartar lemonade with sweet spirits of nitre, carefully regulated diet, and strict confinement to bed.

In more severe cases, when the fever is violent, or when the disease attacks some of the cavities, and particularly when convulsions, coma, or violent delirium occur, indicating inflammation of the membranes or cavities of the brain, resort must be had to depletion. The mode of depletion must depend on the nature of the case and the present condition and constitution of the patient. If possible, venesection is to be preferred, and when that cannot be borne, cups or leeches may be substituted. Active doses of cathartics ought to be given immediately after depletion, and if the symptoms are very urgent, enemata may be employed to hasten their operation. Warm baths are of great service in the treatment of this complication. They promote diaphoresis, and thus moderate the febrile movement, and assist in removing the effusion. After these remedies, or in conjunction with them, diuretics are to be chiefly relied on. The best is probably digitalis, which may be used either in powder or infusion; I would prefer to give it in combination with

the acetum scillæ, as recommended under the head of pleurisy. If given in infusion, a teaspoonful of the officinal preparation may be directed for a child four years old, to be repeated every four or six hours, carefully watching its effects. Calomel is highly recommended by many writers, and would no doubt be useful in connexion with the other treatment.

Prophylactic treatment.—It has been asserted that the use of belladonna by persons exposed to the contagion of the disease, has the power of imparting perfect or nearly perfect immunity from its attacks. Not having had the slightest experience in regard to this matter, I can offer no opinion of my own upon it. From the evidence brought forward in the European works that I have seen, its efficacy seems to me to be left in considerable doubt. Rilliet and Barthez are of opinion that it is at least worthy of trial. Cazenave (*Loc. cit.* p. 58,) states that “M. Biett saw the disease reign epidemically in one of the lofty valleys of Switzerland, and respect, almost without exception, children to whom the belladonna had been administered.” Guersent and Blache (*Loc. cit.* p. 180,) after citing various accounts of its use, conclude that “these trials ought, undoubtedly, to be continued.” According to Dr. Condie (*Loc. cit.* pp. 441, 442,) Dr. Irwin made an extensive trial of its prophylactic powers in South Carolina, and found that of two hundred and fifty children who took it, less than half a dozen had the disease, and that very mildly. Dr. McKee, in an extension of the same epidemic, used it with like success.

Dr. Condie himself made use of it, “but although redness and dryness of the throat, and a diffuse scarlet efflorescence were produced in the majority of the cases, we never found it in any, to exert the slightest influence in mitigating the character, or preventing the occurrence of scarlatina. The experiments were made during the prevalence of the disease, and in numerous instances, the subjects of them were attacked. In one case, the efflorescence was kept up by the use of belladonna, for forty-eight hours; in a week afterwards, this individual took the disease, in its most violent form, and died on the fourth day.”

Dr. Irwin gave it in the following manner. Three grains of the extract were dissolved in an ounce of cinnamon water, and two or

three drops of the solution given morning and evening, to a child under one year old, and one drop more for every year above that age.

Hufeland's formula is as follows, according to Rilliet and Barthez :—*R.* Extract. Belladonnæ gr. iii ; Alcohol 3j ; Aquæ Distillat 3ss. A drop morning and evening for each year of the age of the child.

ARTICLE II.

MEASLES, RUBEOLA OR MORBILLI.

Definition ; frequency ; forms.—Measles are an epidemic and contagious exantheme, characterized by catarrhal symptoms, continued fever, and an eruption, generally on the fourth day, of a crimson rash, in the form of stigmatized dots, like flea-bites, slightly elevated, which coalesce into irregular circles or crescents. It ends about the seventh day by desquamation.

The *frequency* of the disease is very irregular in different years because of its epidemic nature. Thus, according to the tables of Dr. Emerson (*Loc. cit.*), the mortality from measles under twenty years of age, in the twenty years from 1807 to 1827, was 654. In seven of these years, (1807, 1809, 1813, 1817, 1818, 1821, 1822), not a death is recorded ; in five, the deaths varied between one and eight for each ; while in the remaining years, they were as follows : 20 in 1812 ; 38 in 1825 ; 47 in 1820 ; 71 in 1808 ; 98 in 1826 ; 99 in 1824 ; 106 in 1819 ; and 155 in 1823. During the same period, the deaths from scarlet fever were, as has been already stated, only 93, which shows a great preponderance of measles. If, however, these results are compared with those given by Dr. Condie, for the ten years preceding 1845, it will be found that scarlatina was far more fatal during that period than measles ; for whilst the deaths under 15 years of age from the former numbered 2154, those from the latter were only 574.

I shall describe two *forms* of the disease ; the *regular* or *rubeola*

vulgaris; and the *malignant* or *rubeola maligna*. I shall afterwards treat of its *irregularities* and *complications*.

Causes.—A chief cause of the disease is its *epidemic* nature. Of this there can be no doubt, as it is proved by the evidence of all observers.

Contagion.—Its infectious nature is universally admitted. This is thought to begin with the primary fever, and to continue up to the period of desquamation. The precise period at which it ceases is not however known. The disease may be carried in fomites. It has been propagated also by inoculation, with the blood taken from a patient, and with serum obtained from the vesicles which sometimes accompany the eruption.

The period of incubation is from five or six, to twenty days or even longer. The average duration is about a week or ten days. In the inoculated cases the disease appeared about the sixth or seventh days.

Rilliet and Barthez conclude that measles are more frequent, less contagious, and have longer stages of incubation and of prodromes than scarlet fever.

The same authors are of opinion that variola is somewhat more rare, rather more contagious, and that its period of incubation and its prodromic stage are a little shorter than those of measles.

Measles, like other contagious diseases, rarely occur a second time in the same individual.

Age.—It appears from the tables of Emerson and Condie, that they are most frequent between the ages of 1 and 2 years, for while they report 395 deaths in that period, there were but 468 between 2 and 5 years. According to my personal experience, it is most frequent in the second, third, and fourth, and then in the sixth and seventh years of life. The largest number of cases occurred in the second, sixth, and seventh years.

Sex.—It would appear to attack the two sexes with about equal frequency. Of 135 cases that I have seen, in which the sex was noted, 65 occurred in females, and 70 in males.

Symptoms ; course ; duration.—*Regular form of the disease*.—*Stage of invasion*.—Measles begin with languor, irritability, sometimes chilliness, anorexia, aching in the back and limbs, fever,

thirst, headache, and various signs of irritation of the mucous membrane of the eyes, nose, fauces, and larynx.

The chilliness or horripilations which are mentioned by almost all writers, are difficult to appreciate in children. I have seldom known the child itself to complain of them, but upon inquiry of the mother or nurse, have sometimes been told that they had observed some coolness of the hands or feet, or a disposition to keep near the fire, and a desire for additional clothing. These, therefore, are not important symptoms. Neither is the aching in the back and limbs, as it is seldom complained of by children, and can be ascertained in those who are older only by close questioning, or suspected in the younger by their complaining when they are moved. Fever is very rarely absent. It almost always comes on with, or very soon after the other prodromes, but in rare cases does not begin until the second day. It is almost invariably continued, after it once begins, except that it remits somewhat about daylight and in the early part of the morning, to become exacerbated again in the after part of the day. Its intensity increases, and the remissions become less distinct and shorter, as the time for the appearance of the eruption approaches. The pulse is increased in frequency, force, and volume, but rarely attains the same ratio that it does in scarlet fever. At the same time the skin becomes warm and dry, the face is generally flushed, and there is considerable restlessness and irritability at first, often passing into quiet and drowsiness as the eruptive point approaches. The fever is accompanied by thirst, partial or complete anorexia, and generally by headache, which is frontal, and often complained of by children old enough to give an account of their sensations. Vomiting occurs sometimes, but not as a general rule. The catarrhal symptoms commence with, or may even precede the fever. They constitute the most characteristic symptoms of the disease, and indeed the only ones by which we are able to distinguish it with any certainty in the first stage. They are irritation and redness of the conjunctiva, especially that of the eyelids, lachrymation, suffusion of the eyes, sensibility to light, stuffing of the nose, coryza, sneezing, slight soreness of the throat, cough, some constriction of the thorax, and slight dyspnœa. The state of the eyes and nose are very important as signs of the

disease. They are not always present in the same degree, being very strongly marked in some instances, in others less so, and in some rare cases, absent. They are important because there are few cases of ordinary cold in which they are present to the same extent, or if so, the accompanying general symptoms are slight compared with those of measles. I have rarely known the faucial affection severe enough to elicit complaints, and never to produce difficulty of deglutition. It consists generally only of slight redness of the tonsils, soft palate, and pharynx, which is most strongly marked about the time that the eruption makes its appearance. The cough usually appears on the first day. Infrequent and slight at first, it becomes more troublesome as the case progresses, until it assumes on the third or fourth day a character which is peculiar, and which may often lead to a suspicion as to the true nature of the attack. It is laryngeal, hard, dry, rather hoarse, and occurs generally in short paroxysms. At the same time the voice is often hoarse. The tongue is usually white and somewhat furred; the bowels remain in their natural condition, or there may be slight constipation or diarrhœa. Constipation is most frequent, according to my own experience. The drowsiness, to which we have already alluded, often exists during the first stage. I have noticed it in a great many cases. The child, if undisturbed, sleeps quietly for many hours, or for the greater part of one or two days, waking only from time to time to ask for drink, and then sinking off to sleep again. The symptom is not alarming, unless it be connected with others which indicate local disease, or unless it passes into coma, or alternates with violent delirium. Other nervous symptoms which sometimes occur, especially when the fever is violent, are restlessness, irritability, occasional delirium at night, and in very rare cases, convulsions. Of 167 cases observed by Rilliet and Barthez, the latter symptom appeared in the first stage only in one, and was then confined to the eyeballs. I have met with it twice in 137 cases. In one it occurred on the first day in a boy five years of age, of nervous temperament, and who had had several convulsive attacks during the process of dentition. The convulsions were general but slight, lasted only a short time, and were not followed by any bad consequences. In

the other case the sickness began with fever, drowsiness, tremulous movements of the hands, delirium, and in a few hours a slight general convulsion. On the second day there were two attacks of convulsions, both, however, slight. The other symptoms continued as before. On the third day the child was better, the fever having diminished, and the nervous symptoms in great measure disappeared. On the fourth, fifth, and sixth days, the fever returned, and on the middle of the sixth day, a full measles rash made its appearance. There was no recurrence of the nervous symptoms, and the case ended favourably. MM. Guersent and Blache (*Dict. de Med.* t. 27, p. 658), mention another prodromic symptom, which has sometimes enabled them to recognise the approach of measles before the eruption. This is a peculiar redness, a rose-coloured punctuation, of the roof of the mouth, soft palate and uvula, differing from that of scarlatina.

The *duration* of the prodromic stage is generally from three to four days. In a large majority of the cases that I have seen, the eruption has begun to appear in the course of the fourth day. This stage may, however, last only one or two days, or be prolonged to five, six, or seven, and, according to Guersent and Blache, (*Loc. cit.* p. 659,) it lasted in one case, with all the characteristic symptoms, fifteen days.

Second stage, or that of eruption.—The eruption generally appears some time in the course of the fourth day, showing itself first on the chin or cheeks, or some other part of the face, and extending gradually to the neck and trunk, and finally to the extremities. It is often completed in from twenty-four to forty-eight hours. It begins in the form of distinct spots, not unlike flea-bites, of a more or less bright rose or crimson colour, verging sometimes towards a deep red, of a roundish shape, with irregular edges, and of different sizes, varying between half a line and three lines in diameter. When fully formed they constitute true papulæ, which are felt to be slightly elevated and firm to the touch, with broad, flat summits. When pressed upon, their colour disappears, but rapidly returns when the pressure is removed. Distinct and scanty at first, the spots or stigmata soon become more numerous, and arrange themselves into clusters of an irregular crescentic or semi-

lunar shape. The number of these clusters and the consequent general tint of the skin depend upon the amount and intensity of the eruption. In very mild cases, or when the eruption is imperfect, the clusters of papulæ are few in number, and separated by large portions of healthy skin. In severe cases, on the contrary, the patches are so numerous, and coalesce so closely, that the skin assumes a general deep red tint. Yet it ought to be remarked, that on close examination it can be observed that the papulæ never run completely into each other, so as to form a continuous red surface, unless it be over very small spaces, and only in some parts of the surface, more particularly the face.

The fever does not diminish when the eruption makes its appearance, and sometimes augments. The skin retains its heat; the irritation of the eyes continues and is sometimes very severe; the nostrils are dry and incrustated, or there is coryza, and in some few cases epistaxis. The face is at the same time flushed, independently of the eruption, the red colour of the skin being observable in the intervals between the papulæ, and it looks swelled and turgid, from tumefaction of the cheeks and particularly of the eyelids. The cough continues, and is loud, hoarse, and frequent in most cases, but in others short, scarcely hoarse, and but slightly marked. The voice is usually but not always a little hoarse. The respiration is slightly quickened in regular cases, but generally very little beyond the natural rate. The tongue is covered with a yellowish or whitish fur in its middle, while the edges and tip are clean and red. It remains moist and soft, unless some complication occurs. The tonsils, soft palate, and pharynx, present considerable redness, without tumefaction. The abdomen commonly remains natural, though in some few cases there is slight soreness over its whole extent or in the iliac fossæ. Slight diarrhœa often occurs at this time. It seldom lasts more than from one to three days. In other cases the stools are natural, or there may be moderate constipation. The anorexia and thirst continue until the stage of decline occurs. About the time of the appearance of the rash, there is often considerable restlessness, anxiety, starting, and twitching in sleep, slight delirium, and in children old enough to describe their sensa-

tions, complaints of headache. The strength of the patient is not decidedly affected in most of the cases.

Stage of decline and desquamation.—The disease having reached its height in the course of the sixth day, the second of the eruption, remains nearly stationary for one or two days longer, and begins to subside about the seventh or eighth of the disease, or third or fourth of the eruption. The eruption fades first on the face and neck, and has often very much or wholly subsided on those parts while it is still vivid on the extremities. The papulæ lose some of their colour, become less prominent, and diminish in size, and when pressed upon do not disappear entirely as they did at first, but leave a dull or yellowish stain behind. A little later, they assume a dirty yellow or copperish tint, which does not disappear under pressure, showing that a slight ecchymosis has taken place into the substance of the derm. These stains continue a variable length of time, and are finally removed by absorption. As the eruption disappears, a slight furfuraceous desquamation takes place in a considerable number of the cases, but not by any means in all. This begins usually about the face, and may either be limited to that part, or extend to other portions of the body. It is seldom general, however, and is often scarcely noticeable. It occurs between the eighth and eleventh days of the disease, or fourth and seventh of the rash.

From the moment the eruption passes its highest point of intensity and begins to decline, the other symptoms do the same. The pulse rapidly loses in frequency, and regains its ordinary characters. The heat of skin passes away, often with considerable perspiration, but sometimes with gentle moisture only. The various catarrhal symptoms subside; the cough is less frequent, loses its hoarseness, becomes softer, and gradually ceases entirely. The tongue cleans off; appetite returns; thirst ceases; the restlessness and irritability disappear; and the child returns to its ordinary condition of health.

Irregularities of the disease.—Under this term I shall attempt to describe only the anomalous symptoms of the disease, which occur independently of complications. Those which are produced

by the latter cause will be fully treated of when I come to consider the subject of the complications.

In some cases, the symptoms of the prodromic stage are so slight that they pass almost unobserved, and the child is scarcely thought to be sick until the rash makes its appearance. In others, owing to some peculiarity of the temperament, or to the state of the constitution at the time, they are much more severe than usual, or some one symptom may be in excess. In one case that came under my own observation, (June, 1847,) in a girl seven years old, the nausea and vomiting were very distressing, and accompanied by the most intense frontal headache. She complained precisely as children generally do with tubercular meningitis, and was, moreover, extremely restless, and at night delirious. Nevertheless, the eruption came out on the fourth day, was perfectly regular in its characters and course, the unpleasant symptoms ceased from that moment, and the patient recovered without any further bad symptoms. I have already spoken of two cases accompanied by general convulsions at the commencement of the first stage. The course of the disease in the subsequent stages, was regular in all respects. In two other cases, in girls, sisters, seven and nine years old respectively, of highly nervous temperament, the headache in the first stage was so intense as to require the application of leeches for its relief; yet the disease was regular in its other characters.

The eruption presents various irregularities which ought to be noticed. It has already been stated that the amount of the rash varies according to the severity of the case, although in other respects regular. Sometimes the papulæ are comparatively small in size and few in number, and consequently, the clusters in which they are arranged have considerable spaces of healthy skin between. When this is the case, the stigmata are usually rough, lighter in colour, and from this circumstance and the fact that the spaces between the clusters are large, the general tint of the skin is much less deep than in severer cases, in which the opposite of these characters prevails. In some of the mildest cases, the amount of eruption upon the extremities has been very small, or after forming, it has suddenly, in the space of a night, faded to

such a degree as to seem almost a retrocession. But as this sudden disappearance has not been accompanied or followed by bad symptoms, it is clear that its cause was merely the great mildness of the attack. In such instances the general symptoms have always been slight, and the whole duration of the sickness shorter by two or three days than in severe cases.

I have already described the dull yellowish stains which remain after the papulæ have faded. These stains sometimes assume, in malignant cases, a livid or purplish hue, from the occurrence of passive hemorrhage into the tissue of the derma. They may, however, assume a dark and purpureous appearance, without any malignant or dangerous symptoms whatever. This happened in a family in which I attended seven cases of the disease in 1845. In three of them (boys of 10, 5 and 1 year old, respectively), the eruption, which was copious and regular in all, became in one night, at the moment of decline, of a dark brown or light purple hue. The spots did not disappear at all under pressure, and were evidently formed by true ecchymoses. The general symptoms were all favourable. The only peculiarity to be observed was that the fever had disappeared very suddenly, and that the extremities were slightly cooler than natural. The convalescence was as usual, except that the ecchymotic spots disappeared very slowly and gradually.

Several authors describe a form of measles without eruption. They state that during the epidemic prevalence of the disease, some children present all the catarrhal and febrile symptoms, without the eruption, and that they are protected against future attacks. The last assertion, at least, must be very difficult to prove. For my own part, I have never met with such cases, and should I ever seem to do so, would certainly not call them measles, lest by so doing the parents might be induced, on future occasions, to expose the child unnecessarily to the disease, when, should any evil consequences follow, they might justly question the wisdom of the physician.

Willan and other authors have described another variety of the disease, to which is applied the term *rubeola sine catarrho*, or measles without catarrhal symptoms. Such cases are said to

present no catarrhal symptoms whatever, and little or no febrile reaction. They are stated, moreover, to occur generally during the epidemic prevalence of measles. Most authors agree that this form does not protect the constitution against the true disease, and some regard it only as an eruption resembling measles, dependent upon gastric disorder. I at present recollect perfectly three cases of eruption in children, which had they been accompanied by cough and fever, I should certainly have called measles. They all occurred in infants. The rash was preceded for two or three days by feverishness, uneasiness, restlessness during sleep, and slight diarrhœa, after which the eruption suddenly made its appearance and covered the whole integument within twenty-four hours. There were no catarrhal symptoms whatever. At the same time the febrile symptoms disappeared and the children seemed quite well. The eruption never lasted over forty-eight hours, and disappeared without leaving a trace behind. These were, I believe, cases of roseola æstiva. I would ask whether those described by authors are not probably instances of the same kind?

Rubeola Maligna.—This form may occur either as an epidemic or sporadic affection. Generally, however, it prevails as an epidemic, and depends upon some peculiarity which it is impossible to understand. The few sporadic cases which are met with, may be traced generally to some vicious state of the constitution of the individual, or to the unfavourable hygienic conditions in which he is placed. The symptoms assume ataxic or adynamic characters, which give to the case the features of the typhous or typhoid type of disease. They may make their appearance in the prodromic, or, as happens more frequently, not before the eruptive stage. When they begin in the first stage, the case is marked by great frequency and feebleness of the pulse; by prostration; by unusual dyspnœa and oppression; and especially by greater violence of the nervous symptoms, as delirium or stupor. Sometimes, even in this stage, petechiæ make their appearance; there are lividity and soreness of the fauces, discharges of dark blood from the nostrils, and sometimes profuse and exhausting diarrhœa or dysenteric discharges. When the time for the eruption to appear arrives, this comes out slowly and imperfectly, or irregu-

larly, and generally assumes a livid, purplish, or blackish colour, owing to the passive exudation of blood into the papules, and hence the name sometimes given to it, of *Rubeola Nigra*, or *black measles*. This form of the disease assumes in fact, many of the features of purpura hemorrhagica. The patient may die of exhaustion, of congestion of some important organ, as the brain or lungs, of the diarrhœa or dysentery which sometimes complicate the disease, or finally of the hemorrhages which occur in consequence of the dissolved and fluid state of the blood; or he may, after a severe struggle with the violence of the disease, recover his health.

Complications and sequelæ.—Rilliet and Barthez begin their chapter on the complications of the disease, with the following excellent remarks. “*Rubeola* manifests itself by an inflammation or inflammatory fluxion of the skin and all the mucous membranes. The regular course of the disease depends upon the conservation of a due equilibrium between these two kinds of fluxions. That which is seated in the skin ought in general to predominate: if the equilibrium be destroyed by any cause whatever, whether accidental or inherent to the disease, if the predominance of the inflammation takes place in the mucous membranes, there will result a phlegmasia of some one of those tissues.

“It is easy to foresee, by attention to these circumstances, that the inflammatory complications of measles will be most apt to fall upon the mucous membranes, and that broncho-pneumonia, pharyngo-laryngitis, and intestinal inflammations will be the most frequent of all.” I am indebted to the work of Rilliet and Barthez for many of the facts in regard to the complications of measles.

Bronchitis, Pneumonia, and Broncho-Pneumonia.—These constitute by far the most frequent and important of the complications of measles. In 167 cases Rilliet and Barthez met with 24 cases of bronchitis, 7 of pneumonia without bronchitis, and 58 of lobular broncho-pneumonia. This statement shows how very large a proportion of the cases of measles occurring in the Children’s Hospital at Paris, became complicated in the course of the attack. The proportion in private practice is much smaller,

since in 137 cases, I have met with only 3 of bronchitis, 3 of lobar pneumonia, and 9 of broncho-pneumonia. They are, however, in private practice, according to my experience, much the most important of all the complications likely to occur. Of 4 deaths which occurred in the 137 cases that I have seen, 3 were caused by broncho-pneumonia.

The time at which these different complications make their appearance is important. This may happen during the prodromic stage, early in the eruptive stage, during the decline of the eruption, or after the eruption. The most common period for their occurrence is the prodromic stage. It is difficult or impossible to ascertain their causes in a great many cases. In some instances they evidently depend upon cold. Age has some influence upon their production, as broncho-pneumonia is most apt to occur in young children, whilst lobar pneumonia and simple bronchitis attack those who are older.

The *physical signs* of these affections are the same as when they exist in the idiopathic form. The rational signs are increase of cough, which, instead of being merely laryngeal, becomes deeper and either pneumonic or catarrhal; dyspnœa, which is sometimes excessive, the number of respirations mounting up to 40, 50, and, in severe cases, to 60 and 80; the pulse is more frequent than in regular measles, and in very bad cases becomes rapid and small; the skin is hot and dry; the face is pale and anxious in severe cases, in which the eruption does not appear; the child is generally restless and irritable, with broken, irregular sleep, or in the most violent cases, is dull and soporose. In two of the fatal cases that came under my observation, convulsions occurred. It should be remarked, however, that in one, the child, a boy only nine months old, was labouring under an attack of whooping-cough, and that it was in one of the paroxysms of that malady, that the death took place. In the other case, that of a boy eighteen months old, the convulsions occurred first on the day of the eruption, and then ceased, to recur again the third day afterwards. The broncho-pneumonia dated from before the appearance of the eruption, and was no doubt the cause of the convulsions and death.

When a pulmonary complication begins in the prodromic stage, it almost always modifies the eruption in some manner, either retarding or rendering it irregular or imperfect. When it dates from the second stage, it may cause a partial or complete retrocession of the eruption. I have known the eruption to be retarded one and two days, so as not to come out until the fifth or sixth. When the rash does appear, whether at the usual period or later, it is evidently with difficulty. It is pale and scanty, or abundant on one part of the body, and scanty on another, or appears and disappears alternately. At length it either comes out fully, and the threatening symptoms pass away, or the eruption lasts the usual, or nearly the usual length of time, in its pale and imperfect condition, and the child recovers slowly and gradually from the complication, which has become the most important part of the sickness; or, in fatal cases, the symptoms grow worse and worse, and the child dies after a few days, or a longer time, according as the inflammation assumes the acute or chronic type.

Whenever it is observed in a case of measles, that there is more drowsiness or irritability than usual, that the pulse is more frequent or stronger than it ought to be, it becomes important to ascertain carefully the state of the respiration. If this be accelerated, the thorax ought to be examined with strict attention by auscultation and percussion, to discover whether there be not some pulmonic inflammation at work, likely to convert the disorder from a mild one, as it almost always is when uncomplicated, into one dangerous to life, which it will assuredly become, should any pulmonic complication be allowed to steal unawares upon the patient.

The prognosis of the pulmonic complications of measles would appear to be very unfavourable in hospitals for children, since Rilliet and Barthez state that scarcely one patient in four or five recovered. Of the 15 cases that I have seen, I have already stated that 3 died of broncho-pneumonia, and if we recollect that one of these was complicated also with pertussis and morbid dentition, it will be seen that the prognosis is, as might be expected, vastly more favourable in private than in hospital practice.

Laryngitis is a common complication of the disease. The authors just quoted, met with it in 35 of their 167 cases. It occurred

in 7 of the 137 cases that came under my observation. It is often accompanied by pharyngitis.

Autopsies show that the laryngitis may be slight, severe, or accompanied with pseudo-membranous exudations. The inflammation may be simple, therefore, consisting merely of different degrees of redness, or of redness with thickening and softening of the mucous membrane; it may be more intense and accompanied by ulcerations or erosions; or, lastly, it may be associated with an exudation of false membranes.

The symptoms of this complication will depend upon the form the inflammation assumes. It is unnecessary to describe them here, as they are the same as those of the idiopathic affection, which has already been fully treated of.

The occurrence of laryngitis exerts but little influence on the rash, particularly as it almost always appears during the decline of the latter. It is seldom fatal, unless it assume the pseudo-membranous form. The seven cases that came under my observation were attacks of the simple disease, and all recovered.

Inflammation of the intestines.—According to Rilliet and Barthez, lesions of the intestinal mucous membrane are the most frequent complications after pulmonary affections. About a third of the cases presented at the autopsy erythematous inflammation of the mucous membrane; a fifth offered follicular entero-colitis; a seventh ulcerative inflammation, and a fourth softening. Some presented several of the lesions united, and in a few no lesion was found, though the symptoms of entero-colitis had existed during life. I give these data from the above authors, not because they apply to private practice generally, but merely in order to show what are the tendencies of the disease, when disposed from unfavourable hygienic conditions to take on complications. I have met with only six instances of intestinal inflammation in the 137 cases that have come under my own observation. Four of these occurred in the same family, in children of seven, five, three, and one year old respectively. They were cases of entero-colitis, accompanied in two, with dysenteric symptoms, and all made their appearance towards the close of the disease. The two remaining cases were

attacks of dysentery, one of which was very severe, the stools amounting to twenty in the day, while the other was much less so.

The intestinal complications may appear during the prodromic stage, or on the day of eruption, and if not at one of those periods, are most apt to occur during the decline of the rash. The slight cases, constituting the common diarrhœa of the disease, generally begin early, while the grave cases usually date from a later period of the disease. The *causes* of these complications seem to be various exciting agents acting upon a mucous membrane predisposed, by the nature of the disease, to inflammatory action. These agents are said to be generally improper food, giving rise to indigestions; and the too early use of purgative remedies, and laxatives. In the cases observed by myself, it was impossible to detect the causes.

The *symptoms* are more or less abundant diarrhœa, and in some, but not all the cases, sensibility with tumidity and tension of the abdomen. This complication does not exert much influence upon the measles, which usually pursue their regular course. Sometimes, however, it occasions an aggravation of the febrile symptoms, and when of a grave character, may no doubt interfere with the regular progress of the eruptive disease.

According to Rilliet and Barthez, this complication was very seldom the only, or even chief cause of a fatal termination. Scarcely five or six of all that they observed, could be considered as of that kind. It increases very much, however, the danger of the pulmonic attacks, for the latter are much less serious, so long as they exist alone, while as soon as intestinal inflammation is added to them, they become almost necessarily fatal. The six cases that I met with recovered under simple treatment.

In a considerable number of cases, a slight diarrhœa, to which I have already referred as a common event in measles, occurred, but only in the six above mentioned did it amount to a serious complication.

There are several other disorders which sometimes complicate or follow measles, but as I have already given as much space to this subject as the limits of the work will allow, I shall be satisfied with a simple enumeration of them. They are otitis, ophthalmia,

hemorrhages, stomatitis, tubercles, other eruptions, anasarca, and different cerebral symptoms.

I may mention here that of the whole 137 cases that I have seen, 105 were simple, and 32 complicated. The complications were as follows: bronchitis, pneumonia, and broncho-pneumonia, 15; laryngitis, slight or severe, 7; entero-colitis, 6; pertussis, 7; scarlatina, 2; convulsions, 4; otitis, 3; erysipelas, 1; and meningitis, 1. In this enumeration, some of the cases are referred to twice, and one, that in which pertussis, broncho-pneumonia, and convulsions occurred, three times.

I will merely add, that measles are supposed by many observers to have a special tendency to develop tubercular disease in the system, and that it is necessary, therefore, to treat a child, showing any predisposition to that diathesis, or one born of tubercular parents, with particular caution, both at the time of the disease, and during the convalescence. It is not uncommon for measles to be conjoined with other eruptive diseases. I have known it to co-exist with scarlatina in two instances, and Dr. G. B. Wood has met with a fatal case of the same nature. It may be associated, likewise, with variola, or with erysipelas, of which I have met with one instance.

Anatomical lesions.—It is difficult to ascertain what are the characteristic lesions of measles, because of the fact that most of the fatal cases prove so in consequence of some complication. Some few fatal cases, however, of the regular form, and some in which the complication was so slight as not to be likely to change the autopsical appearances much, have led to the following conclusions.

The lesions peculiar to measles are general congestion of different organs, which are coloured red from the imbibition of blood and sometimes softened. The congestion affects the mucous membranes particularly, and imparts to them a reddish or slightly blackish colour. In some of the cases there is morbid development of the intestinal follicles. The most important lesion, however, is that of the blood, which presents the appearances common to the class pyrexiaë. These are normal proportion or diminution of the fibrinous, with increase of the globular element of

the blood. Dr. Copland (*Dict. Pract. Med.* vol. ii, p. 819), gives the appearances in a few fatal cases of malignant measles. They were softening of the tissues and the facility with which they were torn; the presence, in some of the cases, of a turbid or sanguineous serous fluid in the serous cavities; general congestion of the lungs; dark appearance, or livid, or purple ecchymoses of the bronchial mucous surface, fauces, stomach, and cæcum; engorgement with dark and semi-fluid blood of the veins and sinuses of the brain, and of the auricles and large veins; and finally a livid and mottled appearance of some parts of the body, with petechiæ of a dark colour.

Diagnosis.—It is impossible to diagnosticate measles in the first stage with any considerable certainty. The existence of the disease may be suspected in that period from the appearance of the eyes; the coryza and sneezing; the frequent, hoarse, scraping cough; and the fever, headache, and thirst. If, in connexion with these symptoms, it happens that an epidemic of measles be prevailing at the time, or that the child has been exposed to the contagion of the disease, the inference becomes still more plausible. Nevertheless, any opinion upon this point ought to be given with much reservation.

After the eruption has fully come out it is not likely to be mistaken for any other disease, unless it be roseola, the rash of which sometimes resembles that of measles very closely. It may be distinguished, however, by attention to the concomitant symptoms; by the slight degree of fever, the more rapid evolution of the rash, and the absence of the peculiar catarrhal symptoms in roseola. In the very early stage of the eruption of measles, it may be confounded with variola. A careful attention, however, to the size and shape of the papulæ, which are much larger, flatter, and less elevated in measles, and the presence of the catarrhal symptoms will usually suffice to show the difference even in the earliest stage. A little later, the appearance of vesicles on some of the papulæ about the face in variola, will show the difference still more strongly. The distinction between measles and scarlatina has already been drawn in the description of the latter disease. It rests chiefly on the much shorter duration of the prodromic stage, on the greater vio-

lence of the anginose symptoms, or the absence of the peculiar catarrhal symptoms, on the more rapid evolution of the eruption in the latter disease; and lastly, on the differences in the two eruptions, observable especially at their first appearance.

When measles are conjoined with some other eruption, the diagnosis is to be made out by careful study of the prodromes, and of the eruption on different parts of the body, for we can generally find well-marked patches of the rash peculiar to each on some portions of the surface. In one of the cases of measles and scarlatina that I saw, the latter disease was first developed. The eruption made its appearance in the usual form; on the second day of the eruption, the child was seized with hard, hoarse, laryngeal cough, and with redness of the eyes and lachrymation. These symptoms continued three days, at the end of which time the scarlatinous rash had disappeared from the face, but remained visible upon the trunk and extremities. Characteristic measly papulæ now made their appearance on the face, and pursued their regular course, while on the trunk and extremities, the measly eruption was never well defined, being mixed and disguised, as it were, by that of the scarlatina. In the other case, the measles appeared first, and went on regularly until the eruption was declining, and the general symptoms moderating, when suddenly the fever, heat of skin, restlessness, and irritability returned, and the child was very soon covered with the punctuated scarlet rash of scarlatina.

Prognosis.—The prognosis of simple, uncomplicated measles is very favourable; the cases almost always recover without difficulty. This is shown to be true by the following facts. Rilliet and Barthez report 36 cases of simple measles, of which all but one recovered. Of 105 cases that I have seen, all terminated favourably. When, on the contrary, complications occur, the disease always becomes more or less dangerous, the degree of danger depending on the nature of the intercurrent affection, and the hygienic conditions in which the patient is placed. Thus, of 131 cases observed by the above authors, in which some form of complication occurred, 89 or about two-thirds proved fatal, while of the 32 complicated cases that I have seen, 4 only were fatal. It

must be recollected that the cases of the French observers all occurred under the unfavourable hygienic conditions of a large hospital, in children of bad constitution from congenital or acquired causes, whilst mine were observed in private practice, where the hygienic conditions are favourable in the same degree as they are unfavourable in hospitals.

The four fatal cases that came under my observation, proved so from the circumstances I am about to mention. The first, occurred in a child, nine months old, who was labouring under pertussis when attacked with measles. Broncho-pneumonia supervened upon the measles, and proved fatal by convulsions, which came on during a paroxysm of hooping-cough, two weeks after the disappearance of the rubeola. The second case was that of a boy eighteen months old, who was prescribed for by an apothecary from behind his counter, until I saw him. The eruption made its appearance imperfectly, I was told, with a convulsion. After this, he was very restless, and had rapid and difficult respiration and much cough. On the morning of the fourth day of the eruption, this had almost entirely disappeared, and the child was again attacked with convulsions. I saw him shortly after this for the first time, and found him comatose, with convulsive movements of the limbs, extreme dyspnœa, and all the symptoms of extensive broncho-pneumonia of both lungs. He died 36 hours after this, as was to be expected. The third was also a case of pneumonia in a child between one and two years of age, in which the inflammation came on as the eruption was fading, and proved fatal in spite of all that could be done, on the eleventh day. The fourth occurred in a boy between four and five years old, who appeared to recover perfectly from the measles, but was attacked in ten days with meningitis, and died.

To conclude, we may state that the prognosis is always highly favourable under the following circumstances: when the disease is primary; when the prodromic stage is of the proper duration; when the eruption begins upon the face and extends gradually to the rest of the body; when the febrile movement is moderate; when the eruption, after increasing for one, two, or three days, gradually decreases; when the cough and other concomitant symptoms diminish with the fever; when the cutaneous surface, after

the fading of the rash, assumes a natural colour, and is neither flushed nor pale; when the appetite returns, the disposition to be amused and take notice continues, and lastly when the sleep is natural.

On the contrary, the prognosis becomes unfavourable under the following circumstances: when the prodromic stage lasts longer than usual, and when it is accompanied by violent symptoms of any kind, as extreme jactitation, irritability, dyspnœa, much stupor, coma, or convulsions; when the eruption is irregular in its appearance or course; when the fever does not disappear with the eruption, whether it remains violent or assume the form of hectic; when, after the eruption, the face continues deeply flushed or becomes very pale; when the cough, dyspnœa, or diarrhœa persist; and lastly, when the child remains weak, languid, dispirited, or irritable.

It may be stated in conclusion, that the prognosis of measles is always favourable in proportion to the health of the child at the time of the invasion, and the regularity with which the disease passes through its different phases; while it becomes unfavourable, though far less so in private practice amongst people in easy circumstances, than in hospitals or amongst the poor and wretched, whenever it attacks a child already labouring under some disease, and when it becomes complicated with any other malady, either local or general.

Treatment of the regular, simple form.—This form requires in the great majority of the cases little other treatment than strict attention to the hygienic condition of the patient, the use of simple diaphoretics, of mild cathartics occasionally, and the palliation of any of the symptoms which may chance to become somewhat more troublesome than usual.

Hygienic treatment.—The child ought to be confined as much as possible to bed in a large, well-ventilated chamber. Every precaution should be observed to prevent chilliness, while at the same time it is nearly, if not quite as important, to avoid over-heating the patient, either by excessive clothing or by keeping the temperature of the room too high. In winter, it is well to direct the temperature to be maintained at between 68° and 70° F., night and

day. If this be done, the child is not apt to take cold, even though it be uncovered at times, and yet the warmth is not oppressive. I have often remarked that this temperature is just what it ought to be when the room is well ventilated, either by means of an open fire-place, or by communication with adjoining rooms ; but when, on the contrary, the room is heated by a furnace flue, and not ventilated at all or very imperfectly, the same temperature as indicated by the thermometer becomes extremely close and oppressive. Under such circumstances, a door into an adjoining room, or if this cannot be, one into the entry, ought to be kept more or less open, with a screen of some kind between it and the child, in order to secure a good ventilation, which is assuredly of the very highest importance, and yet to prevent by the screen a current of cool air from chilling the patient. The diet during the febrile period ought to be very light. It may consist of milk and water, of arrow-root, sago, or tapioca, prepared with milk or water ; or of crackers soaked in water with salt, or some similar food. When the eruption and fever have in great measure disappeared, some light broth, either vegetable or animal, with dry toast or bread ; plain boiled rice ; a roasted potato ; or ice cream, may be added ; and after all the symptoms have ceased, the usual diet can be gradually resumed. The drinks may consist of simple water, of lemonade, orangeade, gum water, or flax-seed tea, with the addition of a little sweet nitre ; or of weak infusions of balm, sweet-marjoram, or saffron. They may be given in any reasonable quantity, at the temperature of the room. Some persons have a great dread of cold water in the disease. I have never seen small quantities (half a wineglassful to a wineglassful at a time,) of the coldest water do any harm, and believe it to be useful when the fever is violent, and the heat very great. I once, however, saw a boy nine years old, attacked with violent colic and partial retrocession of the eruption, after swallowing suddenly a tumbler full of iced water. The unpleasant symptoms passed off in a few hours, and he had no difficulty afterwards.

The child should not be permitted to leave the room until a few days after the entire disappearance of the disease. It ought to be kept in the house until it has regained in some measure its strength

and healthful looks, as it will scarcely be able to resist exposure before.

Therapeutical treatment.—The therapeutical management of the regular form ought to be very simple. When the bowels have not been open naturally for one or two days, it is proper to direct an enema to be used, or, if the fever and restlessness are considerable, some mild laxative, as a teaspoonful or dessert-spoonful of castor-oil, a dessert or tablespoonful of syrup of rhubarb, half a teaspoonful of Henry's magnesia to older children, or less to younger, or some similar remedy, always selecting those which are mild, and giving them in small doses, lest they irritate the gastro-intestinal mucous membrane. It is better to give a small dose and repeat it in four or six hours, or assist it by an enema, than to give such a quantity as might produce over-purging, and thus perhaps disturb the regular progress of the eruption. The laxative may be repeated from time to time throughout the disease, if the bowels are not opened naturally. After the laxative we may either do nothing, when the case is mild and progresses favourably, or give one of the infusions above mentioned, or a little sweet spirits of nitre. If the reaction, however, be considerable, with much headache, restlessness, and dry, hot skin, I would give small doses of antimonial wine and sweet spirits of nitre, (half a drop to three or four drops of the former, with five or ten of the latter,) every two hours, and direct a warm mustard foot-bath to be given twice a day. If the fever be violent, with frequent, strong, full pulse, intense heat of skin, severe headache, and much restlessness, even without any present sign of local disease, it would undoubtedly be correct to resort to moderate depletion, in order to prevent the formation of any local affection, or to relieve any which may be in process of formation, though not as yet indicated by local symptoms. Of the 105 regular cases that I have seen, depletion was employed only in 2; in one a venesection of four ounces in a boy seven years old, in consequence of the great violence of the reaction, and not from any discoverable local affection; and in the other, the application of leeches to the temples, for intense headache, in a girl nine years old. Under the same circumstances a warm bath, given with care, and continued for fifteen or twenty minutes, will be found of great service; or,

a simple foot-bath may be used and repeated three or four times in the course of a day.

If any of the local symptoms become particularly troublesome, they should be palliated by simple treatment. When the cough is very frequent and hard, it is most effectually moderated by some anodyne, which may be given in most cases without any detriment. The only contra-indication to its use is the presence of severe headache or some other cerebral symptom. A mild counter-irritant application to the outside of the throat is also useful; I have generally used sweet oil and spirits of hartshorn. When the conjunctival inflammation is acute and painful, it may be relieved by lotions with simple warm water, milk and water, or sassafras-pith mucilage, alone or mixed with rose water. If the headache be very violent it can generally be relieved by the use of a laxative, by the occasional use of a mustard pediluvium, or a sinapism to the nucha. When very severe and attended with much fever, it is safest to direct an application of leeches to the temples.

The *malignant form* of the disease must be treated chiefly with stimulants and tonics. The most useful are wine and brandy, quinine, ammonia, capsicum, etc. Camphor and opium would be proper, were the case attended with severe nervous symptoms. The diet ought to be nutritious and digestible, and may consist of milk and bread, light broths, and beef tea or essence of beef.

When local inflammations occur, they may be treated by a small venesection if it can be borne, by a few cups or leeches, or by means of counter-irritants, of which the most suitable are mustard, spirits of turpentine, or ammonia. Blisters ought to be avoided, as they are very apt to occasion dangerous and even fatal sloughing.

Treatment of the complications.—*Broncho-pneumonia, pneumonia, and bronchitis.*—The treatment of these complications must depend upon the stage at which they are developed, and upon the age and constitution of the subject. When they occur during the first stage, one of the most important points in the treatment is to endeavour to favour the appearance of the eruption, and when in the second stage, and the eruption has retroceded wholly or in part, the same indication applies with equal force.

When they appear during the third stage, they are to be treated without any regard to the eruption, but always with reference to the fact that the patient has just passed through an acute febrile disease, which must have weakened in some degree the vital powers.

It may be stated in general terms, that the treatment proper for these local inflammations when they occur as primary affections, is proper also, with some reservations, under the circumstances we are now considering. Thus, bloodletting ought to be, resorted to in many of the cases, but always with caution, since it is perfectly true that it cannot be used safely with the same freedom in secondary as in primary phlegmasiæ. In children under two years of age I have generally employed leeches, while in those over that age, I have resorted to venesection, and in one case to venesection and leeching both. In all such cases I have used depletion with greater moderation than in primary cases, rarely applying more than a dozen American leeches at once, or taking more than four ounces of blood from the arm. Purgatives may be used in conjunction with the depletion, always, however bearing in mind in the choice of them, and the doses, the disposition to gastro-intestinal irritation which is inherent to the malady. The antimonial preparations are also useful, given however with greater care than usual. I generally employ antimonial wine with sweet nitre, or a solution of tartar emetic in simple water. Of the latter the thirtieth or fortieth of a grain for very young children, and the twentieth or thirtieth for those who are older, given every half hour or hour, is enough. If the quantity first given produces either sickness or diarrhœa, it should be instantly suspended or very much reduced in strength. For children within the year, the syrup of ipecacuanha, in doses of two to five drops every hour or two, is, perhaps preferable to antimonials. When in these cases the skin is at all coolish, or bathed with too considerable a perspiration, I have found the liquor ammoniæ acetatis a very useful remedy.

It is universally acknowledged to be exceedingly important to assist nature in throwing out the rash, whenever these complications either prevent its formation, or cause its retrocession. The true mode of doing this is to cure or alleviate the internal inflam-

mation, which is the cause of the difficulty. With this end the above plan of treatment ought to be instituted at once. At the same time, we may greatly assist the appearance of the eruption by a persevering employment of counter-irritants. The best of these is, I believe, mustard, and in some cases a warm bath. The mustard may be used in the form of plasters, poultices, or baths. My own plan in moderately severe cases, is to direct a mustard poultice to the interscapular space, and a mustard pediluvium, to be employed two or three times a day, while in severe and urgent attacks I direct the cataplasm and bath to be renewed every two or three hours, taking care, however, to apply the former alternately to the front and back of the chest, in order to avoid all possibility of too violent an action upon the skin; the feet and limbs also ought to be carefully watched, to avoid the same danger. I have had occasion to observe the great efficacy of this unremitting employment of revulsives, in several severe cases of broncho-pneumonia in young children. In some I have depended solely upon this treatment, and the use of small doses of ipecacuanha, and spiritus Mindereri. In one particularly, which occurred in a child eight months old, the attack came on in the first stage. On the fourth, fifth, and sixth days, the dyspnœa was excessive, the respiration running up to 70 and 80; the pulse was frequent and small; the skin pale and rather cool; and the irritability and restlessness very great. For a period of twenty-four hours, I used the poultices and foot-baths every two hours regularly, and gave internally the spiritus Mindereri at the same intervals. Nothing else was done. On the sixth day, when one of the poultices was removed from the interscapular space, the integument beneath was observed to be covered with the measly stigmata, whilst there were none as yet on any other part of the surface. From this time the eruption came out freely, and the child recovered rapidly.

The warm bath may be used under the same circumstances. It should be given with great care, the child being wrapped in a warm blanket the moment it is removed from the water, to prevent the least sensation of chilliness. It may either lie for a short time in the blanket, or be wiped dry beneath it, and then dressed.

The cases of bronchitis have seemed to me to require less de-

pletion than those of pneumonia or broncho-pneumonia, and the latter less than those of pure pneumonia. In some of the cases of bronchitis, there has been profuse secretion attended with extensive sub-crepitant and mucous râles. In such instances I have found the internal use of the syrup or infusion of polygala seneka, with an occasional revulsive, very effectual.

The *diarrhœa* which occurs so frequently, seldom requires any treatment. Indeed, unless it indicates evident entero-colitis, or is accompanied by frequent mucous or bloody stools, pain and tenesmus, it is better not to interfere with it, beyond paying strict attention to the diet. When attended, however, with the symptoms just mentioned, it must be treated by astringents, by opium and ipecacuanha, and by the application of poultices to the abdomen. The six cases that occurred to myself recovered under the use of laudanum enemata, given twice or three times a day, the strictest diet, and very small doses of Dover's powder.

Laryngitis, as it occurs in most of the cases, needs but little treatment beyond careful avoidance of cold, the use of some mild nauseant, and revulsives to the neck. It is very seldom of a dangerous character. When, however, it assumes the character of pseudo-membranous croup, it must be treated with all activity, in the manner described in our article upon that disease. In only two of the seven cases that I have seen, did it appear at all threatening. One of these occurred in a boy ten years old, and came on in the first stage. The voice was very hoarse and difficult, the cough frequent, hoarse, and croupal, and preceded and followed by loud stridulous respiration. Fearing the formation of false membrane, though none was visible in the fauces, I ordered a venesection of four ounces, and doses of hive syrup every two hours, and finding at the end of six hours that there was no improvement, I had between three and four more ounces of blood taken from the throat by leeches. This was followed by slow but steady amendment of the symptoms; the eruption came out well, and no further difficulty occurred. The second serious case occurred in a boy between one and two years old, also in the first stage. The symptoms were like those of the first case. They were treated by an application of leeches to the throat, and by an

emetic of alum, which relieved them very much, and they disappeared gradually. The eruption pursued its regular course.

The *cerebral symptoms* which sometimes occur, must be treated differently in different periods of the disease. In the early stage, when they last but a short time and do not recur, they require nothing more than a warm bath, and the use of revulsives. If they continue or recur, or are followed by stupor or other cerebral symptoms, more energetic treatment becomes necessary. If the child is strong and hearty, it would be proper to resort to depletion, either by venesection, or by cups or leeches to the back of the neck, or temples, and to purgatives, revulsives, and cold applications to the head. When it does not seem proper to bleed, and when the heat is intense, it has been proposed to use cold lotions in the manner recommended in scarlatina. The evidence upon this point is not very conclusive, and as I have never used them, nor seen them used, nor indeed seen any necessity for a resort to them, I can offer no opinion in regard to their use.

I have met with two cases of convulsions in the first stage. One occurred in a boy five years old; the convulsions were slight, lasted not more than ten or fifteen minutes, and were followed by no bad symptoms. The intelligence of the child returned very soon afterwards. The only remedy used was a warm bath. The other case has already been described.

When convulsions occur in the second or third stages, it is very important to ascertain whether they are not the result of some local disease. The only two cases that came under my notice accompanied very violent attacks of broncho-pneumonia. Here the treatment must be directed against the local disease, if that can be detected. When, on the contrary, the convulsions seem to depend on nervous irritation, they may be treated with baths, revulsives, purgatives, and the careful administration of opium, as recommended by Sydenham, Copland, Rilliet and Barthez, and other authors; or of camphor, assafœtida, musk, or hyoscyamus. If accompanied by intense heat and great dryness of the skin, without local complications, the cold or tepid lotions might also be tried.

ARTICLE III.

VARIOLA OR SMALL-POX.

Definition ; frequency ; forms.—Variola is an epidemic and contagious disease, characterized by an initial fever, lasting from three to four days, and followed by an eruption at first papular, then vesicular, and afterwards pustular ; the eruption attains maturity in from six to nine days, after which the pustules are converted by desiccation into scabs, which fall off between the fifteenth and twenty-fifth days.

The *frequency* of the disease varies greatly in different years, because of its epidemic nature. It is far less common in childhood amongst the middle and upper classes of the community, than either measles or scarlatina, in consequence, no doubt, of the attention paid to vaccination. I have seen but two cases of the disease under fifteen years of age, in upwards of seven years, whilst I have met with 82 of scarlatina, and upwards of 137 of measles. It prevails to a greater extent amongst the poor and destitute classes, who neglect the attention to vaccination necessary to preserve children from the disease. Dr. Condie (*Dis. of Children*, note, p. 86) states that 587 deaths under fifteen years of age, occurred from this disease in the ten years preceding 1845, while in the same period, there were 574 from measles, and 2154 from scarlatina.

I shall describe two *forms*, the *regular*, including the distinct or discrete, and confluent varieties of most writers, and the *modified form* or varioloid. I shall afterwards treat of the *irregularities* and *complications* of the malady.

Causes.—The principal cause of variola is universally acknowledged to be contagion. It is generally admitted also that it is propagated at certain periods by epidemic influence.

It is not clearly ascertained at what period of its course the disease first becomes contagious. Some assert that it is not until after suppuration is established. This is, however, to say the least, doubtful, and it is best, therefore, to take any precaution that may

be necessary to prevent the extension of the disease from the moment that its real nature becomes apparent. There can be no doubt that the body may still impart the disease after death, and that clothes worn by the patient retain the contagious principle, unless freely exposed to the air, for days, months, and, it is said, even for years.

One attack protects the constitution, in the great majority of cases, against subsequent contagion. When persons who have once had the disease contract it again, it almost always assumes a milder and much less dangerous form.

The period of incubation, or time elapsing between the reception of the poison and beginning of the malady, varies generally between nine and twelve days. It may, however, be more or less than the periods just mentioned.

Symptoms ; course ; duration.—*Regular form of the disease.*—I shall describe three stages of the disease : 1. That of the initial or eruptive fever ; 2. That of progress and maturation of the eruption ; and, 3. That of decline or desiccation. In addition to these some writers make another stage, that of incubation, which includes the period between the introduction of the poison into the system, and the appearance of the first symptoms. This stage is seldom marked by symptoms sufficiently characteristic to enable us to detect the approaching disease, and in many instances is probably entirely unnoticed by the patient.

The *first stage*, or that of initiatory fever, commences generally in children with pains in the bones and loins, and sometimes with rigors or chilliness, accompanied with headache, and soon followed by fever. Nausea and vomiting often exist from the first, or come on soon after the appearance of fever and headache. At the same time there is loss of appetite, thirst, and more or less obstinate constipation. The tongue is red at the point and edges ; one of the characteristic symptoms of this stage is pain in the loins, which generally dates from the first or second day, and though varying much in degree, is usually severe. The patients often complain also of abdominal pains, which seem to be colicky, and are referred either to the epigastric or umbilical region.

Fever and headache are the most constant of all the prodromic

symptoms. The chilliness and rigors which frequently exist in adults, are not easily ascertained in the cases of children, and are therefore much less important. The fever varies greatly as to degree; the heat of skin is generally considerable; and may be accompanied either with dryness or moisture. The pulse is commonly full and frequent. The headache is usually frontal and often very severe. In some cases there are strongly marked cerebral symptoms, consisting of excessive restlessness and irritability, insomnia or somnolence, delirium and even convulsions.

The various symptoms just enumerated continue up to the moment when the eruption begins to make its appearance, which happens generally in the course of the third day, though it may occur as early as the second, or as late as the fifth, sixth, or even seventh. In severe and confluent attacks, the eruption, as a general rule, begins earlier than in mild and distinct cases.

Second stage, or that of eruption.—Some time in the course of the third day after the invasion of the attack, the eruption usually begins to make its appearance in the form of small, isolated, and rounded red specks, which soon become projecting and solid, or in other words are converted into papules. The papules are from a third to two-thirds of a line in diameter, of a more or less vivid red colour, and disappear under pressure, to return immediately when the pressure is removed. The eruption shows itself first on the face, and generally about the chin and mouth, and then extends to the rest of the face, to the neck, trunk, limbs, feet, and hands. It sometimes happens, particularly in very young children, that the eruption appears first about the genital organs, whilst in other cases it is first observed on the lower part of the loins, or upon the thighs. The papules increase gradually in size and prominence for one, two, or three days, and, as a general rule, some time in the course of the second day of the eruption, undergo a change into vesicles. This change takes place by the formation on the top of each papule, of a little transparent elevation of the cuticle, beneath which is deposited a drop of serosity. The conversion of the papules into vesicles occurs first on the face, and then on the neck, trunk, and extremities. The vesicles are at first smaller than the papules, and acuminate in

shape, but as they grow larger, become gradually flattened and depressed in the centre; after a time they cover the whole papule, and before long exceed it in size. As these changes take place, the fluid they contain loses its transparency, becomes opaline, and by degrees the vesicles are transformed into pustules, which constitutes the third stage of the eruption or that of suppuration.

The pocks are more or less numerous, according to the extent and severity of the eruption. When scattered over the surface so as not to touch at their edges, the disease is said to be *distinct*; when, on the contrary, so numerous as to come into contact, and run together, it is called *confluent*. Of these two varieties, the latter is necessarily more severe and dangerous than the former, in consequence of the great extent of tegumentary surface inflamed. During the various changes that the vesicles undergo, they are surrounded by small, inflamed areolæ, which differ in appearance according to the number of the vesicles. In cases of the distinct form, in which the eruption is sparse, so that the pocks are widely separated, the areolæ fade gradually into the natural colour of the skin, at the distance of a third or two-thirds of a line or more from the base of the vesicles, whilst in those in which the eruption is more abundant, they run together, so that the spaces between the pocks are of a more or less bright red colour. In confluent attacks, again, the areolæ are more or less imperfect, according to the manner in which the vesicles are grouped together.

The change of the vesicles into pustules takes place generally from the fourth to the sixth day of the eruption. During this process the fluid of the pocks becomes more and more opaque, whitish, and at length assumes a yellowish colour, being in fact converted from serosity into pus. At the same time the pocks become larger, begin to distend, and as they approach complete maturation, gradually lose their umbilicated shape and become convex on the surface. The formation of the pustules follows the same course as did the vesicles, beginning on the face and extending thence to the neck, trunk and extremities. The areolæ that have just been described as existing during the vesicular stage of the disease, continue during the early part of the stage of pustulation, but de-

cline towards its termination, assuming as they disappear a purple tint. The number of pustules is in proportion of course to that of the vesicles, but from the increase in size of the pocks during the changes from papules into vesicles and pustules, the eruption, when at its height, seems to be greatly more extensive than would have seemed probable at the beginning of the first stage. As a general rule the pocks are most numerous on the face, and after that part on the neck and limbs. On the trunk the eruption is always much less abundant than on other parts of the body, and even when confluent in the highest degree on the face and neck, it is generally so only in patches on the limbs, while it is distinct on the thorax and abdomen.

Simultaneously with the eruption upon the skin, there occurs one also upon the mucous membranes, particularly those of the mouth, nasal passages, fauces, eyelids, and sometimes of the prepuce and vulva. It begins with more or less vivid redness of the membrane followed by the production of little elevations, the real nature of which, whether papular or vesicular, does not seem to be clearly determined. About the second or third day these red elevations assume the appearance of small, whitish, rounded, not umbilicated pseudo-membranous points, which last generally about five days, and are then detached, leaving usually a little ulceration or erosion, which heals without leaving a cicatrix.

A short time after the appearance of the pustules in the mouth and throat, a true inflammation of the mucous membrane of those parts take place. When the gums are inflamed they become swelled, red, and spongy, and are dotted over with white pseudo-membranous points of a rounded shape. Sometimes the velum pendulum, and more rarely the tongue, present the same white points, with redness and injection of the membrane between. In most of the cases there is also partial or general inflammation of the pharynx, which occurs subsequently to the formation of the variolous pustules. The existence of this inflammation is denoted by more or less severe sore throat, attended with difficulty of swallowing, and with swelling and tenderness of the sub-maxillary glands. When the mucous eruption extends to the larynx, as often happens, there is pain in that part; the voice becomes hoarse

or whispering, and there is hoarse, laryngeal, smothered cough. The pharyngo-laryngitis just described occurs generally between the third and sixth days of the eruption, and ceases about the eighth or thirteenth. In some instances it does not exist at all or to a very slight extent.

During the eruption there is more or less inflammation and swelling of the subcutaneous cellular tissue, the degree of which depends on the extent of the eruption. The skin becomes tense, red, shining and elastic under the finger, and more or less hot and painful. The swelling is greatest upon the face, where it commences about the fourth or fifth day of the eruption, and goes on increasing for five or six days, occasioning much pain, stiffness, and inconvenience to the child. The swelling diminishes when desiccation begins, and ceases entirely as the latter is accomplished.

It is important to study carefully the general symptoms of the second stage. The fever which existed during the initial stage, generally continues during the first day or two or three days of the eruption. When, however, the papules are fully thrown out, the fever subsides or disappears entirely, so that the pulse falls from 100, 120, or 140 beats, to 100, 80, 76, or 74, and the heat of skin diminishes at the same time. The child remains without fever usually throughout the vesicular period of the eruption, that is to say, until the fourth, fifth, or sixth day; during which time the appetite sometimes returns, sleep is tranquil and quiet, and the patient is in most respects well and comfortable.

About the fifth or sixth day of the eruption, at which time the maturation of the pustules is nearly completed on the face, and that process is commencing on the extremities, a new fever, to which the technical term *secondary fever* is applied, makes its appearance. The pulse rises again to 88, 100, 120, and 140, and becomes strong, hard, and full, whilst the skin is hot and dry. After continuing for some days the secondary fever diminishes when the suppuration is fully established, and disappears about the time that desiccation is nearly completed on the face, and has commenced upon the limbs. It ceases generally, therefore, about the ninth or eleventh day, having lasted between four and six days.

This attack of fever is evidently the consequence of the suppurative stage of the disease, or of the conversion of the vesicles into pustules.

Towards the termination of the second stage, at the very height of the disease, when the pustules begin to break and discharge their contents, the patient exhales a peculiar, disagreeable, fetid odour, which is somewhat characteristic of the disease.

The *third* or *declining stage*, is that of the desiccation or drying of the pustules and their desquamation. The desiccation commences generally between the sixth and ninth days, and terminates between the tenth and fourteenth. The formation of the crusts begins upon the face and extends thence to the neck and limbs. It does not reach the limbs usually until about two or four days after it had commenced on the face. The mode in which the drying of the pustules takes place is not the same in all. In some a dark point is formed in the centre which gradually extends and converts the whole pustule into a hard crust; in others the whole surface dries at the same time; whilst in others again, the epidermis gives way and allows the contained fluid to escape, which then hardens into yellowish, irregular crusts, which become brown before they fall off. Some of the pustules, particularly those upon the arms and legs, do not form scabs at all, but shrink away from the absorption of their fluid, leaving behind nothing but pellicles of cuticle which fall off by desquamation.

The desquamation or falling of the crusts begins from the eleventh to the sixteenth, and ends somewhere between the nineteenth, twenty-fifth, and even fortieth days of the eruption. When the scabs fall off the appearances presented by the skin beneath vary in different cases. In some a true ulceration and loss of substance of the derm has taken place, which presents all the characters of a suppurating ulcer when desquamation occurs early in the disease, or, when that process occurs at a later period, the ulcer is found to be dry and cicatrized. In both these forms of desquamation, the cicatrices form little pits or depressions, which remain during life. In other instances the fall of the scabs leaves red, excoriated surfaces on a level with the surrounding skin, which soon dry, leaving blotches of a reddish-brown colour, that do not disappear entirely for months. No cicatrices remain when des-

quamation takes place in this manner. In a third series of cases the crusts do not fall until the surfaces beneath have entirely cicatrized, and the only traces left behind are more or less deeply tinted reddish spots, with occasional slight furfuraceous exfoliation of the cuticle, all of which disappear entirely after a time without leaving pits or cicatrices.

To conclude the account of the symptoms of the disease, I have a few words to say in regard to the condition of some of the important organs throughout the course of the malady.

The *tongue* presents no appearances peculiar to the disease, other than the eruption already described. It is generally moist, more or less furred, and either pale or red in colour. The *abdomen* usually remains soft and undistended, though in some instances it is slightly tumid and heated, with occasional pains in the epigastric, umbilical, or iliac regions; in simple cases, the latter symptoms rarely last more than a short time, and when otherwise they are almost always the sign of some complication. The *constipation* which exists during the initiatory stage generally continues throughout the disease, though in some instances a slight diarrhœa occurs about the end of the first or second week, after which the bowels return to their natural condition. If severe diarrhœa should make its appearance, it is almost always the sign of a dangerous complication. The *nausea and vomiting* which are so often present during the prodromic stage, cease after the appearance of the eruption, and recur only in rare cases, or in consequence of some complication. The *appetite* is almost always lost during the course of the disease, though it sometimes returns in the period between the termination of the initial and commencement of the secondary fever; *thirst* is acute as a general rule, and more or less so, according to the violence of the fever.

The *strength* of the child is not, as a general rule, greatly diminished, except in severe and dangerous cases. *Restlessness, irritability, crying, and delirium*, which are of such frequent occurrence in the febrile diseases of children, are not usually very strongly marked in regular cases of variola. They exist, but it is to a moderate extent only. In severe, irregular, confluent cases, on the contrary, restlessness, crying, and delirium, are present in

a very high degree, either towards the termination of the attack, or throughout its course, and they are then of very bad augury.

I shall here conclude the history of the symptoms of the regular form of the disease. I have not attempted a separate account of the distinct and confluent cases, believing them to be merely different degrees of the same affection; the latter being much the most severe and dangerous, from its greater intensity, than the former. I will merely remark that all the symptoms are more severe in confluent cases, particularly the fever, and those which indicate disorder of the nervous system.

I shall proceed next to a description of some of the *irregularities* of the disease, or as expressed by some writers, of *irregular* or *anormal* variola. I would remark in the first place that a large number of the cases that have been called confluent, ought rather to be called irregular, since many of the symptoms detailed as belonging to that form of the affection, depend, not upon the confluent nature of the eruption, but upon the existence of some irregularities in its characters, entirely independent of confluence or running together of the pustules.

The first or initial stage of irregular variola may be either longer or shorter than the regular form. As a general rule, the symptoms of this stage resemble very closely those of the regular form, when the attack occurs in a child previously in good health; whilst in secondary attacks they present differences which are more or less strongly marked. The most important of these are the greater infrequency of headache, vomiting, and of the lumbar pains; the presence of diarrhoea rather than constipation; the greater frequency of sleeplessness, oppression, and restlessness; and, as a general rule, the earlier appearance of the eruption.

The second or eruptive stage generally passes through its periods with much greater rapidity, so that the conversion of the papules into vesicles occurs as early as the first or second day, and that of the vesicles into pustules, between the second and fourth days. In some few cases, on the contrary, the eruption is retarded, and the papules may remain unchanged as late even as the fifth or sixth day. The progress of the eruption is so irregular some-

times that there may exist, upon the same surface, papules, vesicles, pustules, and scabs.

The appearances presented by the eruption often differ widely from those which have been traced as characteristic of the regular disease. The papules may be pale, irregular, uneven, and destitute of areolæ, and when this happens, the vesicles and pustules which succeed usually present the same peculiarities. In other instances the papules and areolæ are of a purple-red colour, and the vesicles, instead of being transparent or whitish, are also reddish, and appear to be filled with a bloody serum. The pustules in these cases also contain a sanguinolent fluid, and when broken their contents escape, and form bloody scabs. In this variety of the disease, which is called hemorrhagic, the papules and vesicles are very small, are developed slowly, and remain flat and undistended, as a general rule, whilst in a few cases, they are of a larger size, but remain almost always flattened in shape and unfilled. The scabs, when they form, are thin, soft, easily detached, and leave beneath bleeding surfaces and scarred pits.

The fever of the initial stage rarely subsides in irregular variola, upon the appearance of the eruption, as it does in the regular disease; but, on the contrary, usually goes on augmenting. The distinction, therefore, into primary and secondary fever does not properly exist. Sometimes, however, a notable increase of fever does take place, at the period when the vesicular passes into the pustular stage of the eruption. The fever is usually more violent in the form of the disease under consideration, than in regular attacks, the pulse being full and large, and rising as high as 160. In fatal cases it becomes small towards the termination. The skin is generally very hot and dry.

The appearances of the tongue, condition of the abdomen, appetite, thirst, and nervous symptoms, are of the same character as in the regular form, except that the signs which they present are more severe and unfavourable, particularly the delirium, agitation, and cries.

Varioloid, or modified small-pox.—This is a term now usually applied to the modified form of the disease, as it occurs in indivi-

duals who have been vaccinated, or who have already had the natural or inoculated disease.

The symptoms of this form of variola are, in general, the same as those of the regular disease, the only difference being in their greater mildness and shorter duration. The attack usually begins with slight fever, headache, languor, and sometimes constipation, which are followed, in two or three days, by the eruption. The vomiting, lumbar pains, and different nervous symptoms which exist in regular variola are not often present, or, if so, in a very slight degree. The eruption consists of papules like those of true small-pox, but usually few in number, and entirely distinct in their arrangement. The prodromic fever and other symptoms subside completely upon the appearance of the eruption, and the child often seems perfectly well.

The progress and characters of the eruption are very similar to those of the regular form of the disease, with the exception that the changes are more rapidly effected, and, as a consequence, the duration of the attack rendered by so much shorter. The papules are converted into vesicles at a much earlier period,—as early as the first or second day. The vesicles soon assume a whitish, opaline appearance, become umbilicated, and in the course of the second or third day began to change into pustules. The suppurative stage of the eruption, or maturation, is seldom accompanied by the same marked secondary fever as in the regular disease. When it does take place, it is generally very moderate, consisting merely in slight acceleration of the pulse, and a little increased heat of skin, and in one or two days disappears entirely. The pustules do not usually fill so well as in regular variola, and not unfrequently their contents are rather sero-purulent, than purulent in the proper sense of the term. The third stage occurs earlier, and goes through its periods more rapidly than in true small-pox; desiccation soon takes place, is speedily finished, and the falling of the scabs, which begins as early as the eighth day of the eruption, is usually completed about the twelfth or fourteenth. After desquamation is completed, the only traces of the disease left are reddish spots or blotches, which disappear after a time without

leaving cicatrices. The whole duration of the attack is generally from ten to twenty days.

Complications.—The most frequent and important complications of variola in children, are inflammations of the mucous membrane of the lower half of the intestinal tube, ophthalmia, otitis, and different hemorrhages. In a smaller number of cases, attacks of bronchitis, pneumonia, anasarca, articular inflammations, subcutaneous abscesses, simple and pseudo-membranous coryza, angina, and laryngitis, and other eruptive diseases, occur at different periods of the malady.

Meningitis and encephalitis are very rare, so much so, that not a single instance occurred out of 112 fatal cases of the disease in the Children's Hospital, at Paris.

It is impossible for me, for want of space, to attempt a description of the various symptoms of the different complications just enumerated. Having mentioned the possibility, and probability of their occurrence, I must leave the reader with the advice always to suspect the existence or approach of some one of them, when the symptoms, in any case, differ much from those which have been described as characteristic of the regular form.

Anatomical Lesions.—The characteristic lesions of small-pox are a certain deteriorated state of the blood, congestion of all the organs, and the inflammation of the skin and mucous membranes constituting the eruption. The blood is found to be entirely liquid and serous, and of a dark colour; or if coagula exist, they are small, soft, and very dark in colour. The exceptions to this rule are those in which some acute and severe inflammation exists, under which circumstances the dissolved state of the blood is less marked, and fully formed coagula are more abundant. The congestion referred to affects almost the whole system. The muscles are firm and of a deep red colour; the membranes of the brain are strongly injected; the sinuses filled with blood, and the cerebral substance presents numerous red points or dots. The vessels of the lungs contain a large quantity of blood, and the liver, spleen, and kidneys, are all deeply congested.

The condition of the mucous membranes is important. The pharynx, larynx, and trachea, present the appearances of an erup-

tion, or of simple inflammation without eruption. The eruption exists under the aspect of small, circular, thin, and whitish pseudo-membranous points, scattered over the mucous tissue, and slightly adherent to it, beneath which that tissue is often observed to be red and inflamed. At a more advanced degree, and in severer cases, the false membranes have disappeared, and in their places we find circular ulcerations, which are either superficial, or penetrate the tissue of the mucous coat and rest upon the muscular, or even pierce that and reach to the cartilaginous tissue beneath. In addition to these lesions are found inflammation of the mucous tissue with its consequences, redness, softening, thickening, and extensive deposits of false membranes, quite distinct from the appearances above described as characteristic of the eruption upon these tissues.

It has been a contested point whether a true vesicular or pustular eruption ever exists upon the mucous lining of the stomach and intestines. The general opinion appears now to be, however, that the changes observed in these organs cannot be ascribed to the formation either of vesicles or pustules. The appearances that have led some observers to consider them as the result of a proper eruption are the following. The follicles at the commencement and termination of the small intestines, and in rarer cases, of the large intestine also, present an abnormal degree of development, appearing in the form of small, hemispherical or pointed, and sometimes flattened projections, on which there often exists a dark, and sometimes depressed central point. At the same time the plaques of Peyer are often enlarged, more projecting than usual, softened and red.

The *anatomy of the variolous pock* is important and interesting. When a vesicle is opened soon after its formation, it is found to contain nothing but a little serosity which is perfectly limpid and alkaline, while the skin beneath is red, softened, and moist. The umbilicated character depends on a filiform adhesion between the centre of the pock and the surface of the skin beneath. This adhesion is broken, when, at a later period, the pustule becomes globose in shape. About the period of the conversion of the vesicles into pustules, or very soon after the formation of the latter, the cavity of the pock will be found to contain a false membrane,

which is of an opaque white colour, soft and friable in its texture, and seated upon the derm in small isolated points. After a time these points enlarge, and meeting, unite, and form a soft pseudo-membranous disc, uneven upon its surface, and which either fills the pock completely, or is covered at first with serosity and afterwards with pus. This false membrane is secreted originally by the true skin. At a somewhat later period it forms a strong adhesion to the inner surface of the cuticle, while still later in the progress of the pock, it becomes detached from the cuticle, and remains loose and free in the cavity of the pustule, surrounded by the fluid contents of the latter.

Diagnosis.—The most important point in the diagnosis of variola, is its recognition during the prodromic or initial stage. The only symptoms that can be depended upon as indicating with any considerable probability the approach of the disease, are the simultaneous existence of fever, constipation, bilious vomiting, and severe pains in the back, in a child not previously vaccinated, and in whom there is no more probable mode of accounting for the symptoms enumerated. If, in addition to these circumstances, the disease be extensively prevalent at the time, and still more, if the child has been exposed to the contagion of the malady, the diagnosis becomes almost certain. After the eruption makes its appearance the diagnosis is seldom doubtful. There may be some doubt for the first few hours, but soon the enlargement of the papules, the subsidence of the fever, and then the change into vesicles, remove all uncertainty as to its real nature.

Prognosis.—The prognosis of variola must depend very much upon the form which it assumes. The regular form of the disease generally terminates favourably unless some complication happens to occur, in which case the danger to life is greatly augmented. It is generally stated also that the distinct is much more favourable than the confluent form of the affection. Rilliet and Barthez say, however, that all the cases of the simple (uncomplicated) confluent disease which they met with recovered. Irregular variola, on the contrary, is fatal in a large proportion of the cases. The authors just quoted state that only three recovered out of thirty-nine that came under their observation.

The varioloid disease is very rarely fatal.

The favourable symptoms in any case of variola are the occurrence of the disease in children previously in good health; the absence of any violent nervous symptoms during the initial stage; a proper duration of the first stage; and subsidence of the fever after the appearance of the eruption. When, in addition to these circumstances, the secondary fever is not too violent, and no complication arises, there is but little doubt of the recovery of the patient.

The unfavourable symptoms are the existence of severe nervous symptoms during the first stage; the occurrence of a thick and abundant eruption upon the face, indicating a probably confluent case; continuation of the fever after the appearance of the eruption, or a merely slight subsidence of it; delirium and other nervous symptoms during the secondary fever; any irregularity in the appearance of the eruption, as paleness instead of the usual red colour, a livid or purplish colour of the pustule, imperfect development of the pocks, or their sudden shrinking without diminution of the general symptoms. It is scarcely necessary to say that many of these symptoms are indicative of the existence or threatened production of some complication, upon the nature of which must depend, after all, in a great measure, our prognosis. The complications most apt to occur have already been considered in a previous article.

Treatment.—I shall begin my remarks upon the treatment of the disease with the following quotation from Dr. Gregory (*Tweddle's Lib. of Pract. Med.* Am. ed., vol. i, p. 332.) “Before entering on the curative treatment of small-pox, therefore, it will be proper to recall to remembrance the peculiar nature of the disorder. It is a fever which *relieves itself* by superficial eruption. That eruption, even when too copious, cannot be diminished or checked in its progress by any effort of art; when moderate it requires not the interference of the physician.” “*Heroic* remedies are here wholly inapplicable and the great object of art is simply to place the system under the most favourable circumstances for effecting what the old physicians called the concoction and elimination of the morbid humours.”

The treatment of simple, uncomplicated small-pox, ought, unless

the attack be confluent, to be of the mildest character. Rest in bed, low diet, cooling drinks, some gentle laxative, an occasional foot-bath during the first stage, are all that is required in most cases. When, however, the fever is considerable, and the child restless and complaining, we may add to these means some diaphoretic, as the saline or effervescing mixture, with small doses of sweet spirits of nitre, or spiritus Mindereri; or we may direct very minute doses of tartar emetic, from $\frac{1}{30}$ to $\frac{1}{60}$ of a grain for a child four years old, to be repeated every hour or two hours, or from one to three drops of the antimonial wine, with five or ten of sweet nitre, for a child of the same age, every two hours. Should either of these produce much vomiting, or any action upon the bowels, they must be suspended. If the fever be violent, either during the initial stage, or later in the attack, with a full strong pulse, great heat and swelling of the skin, severe headache, or signs of congestion of the internal organs, it will be proper to bleed, either generally or locally. General bleeding is preferable as a general rule, unless there be some local determination, in which event local depletion may be substituted; but even here venesection had better be resorted to in many cases, as more effectual and less annoying to the child than either cups or leeches. The amount of blood to be taken must depend on the age, constitution, and present strength of the patient. Having regard to the nature of the disease, and its future course, it is best always to bleed less freely than in acute local affections. Under the circumstances just supposed, we are advised by Dr. Gregory to make use of purgative medicines every day. Rilliet and Barthez, on the contrary, oppose their employment as likely to occasion some serious intestinal lesion, and advise the use merely of mild laxatives or enemata to an extent sufficient to keep the bowels soluble.

When the eruption comes out slowly and tardily, remaining for an unusual length of time in the papular state, or forming small and flattened vesicles, the pulse being at the same time frequent and undeveloped, we may hasten its appearance by the use of some warm diaphoretic infusion, as balm or sweet-marjoram tea, with spiritus Mindereri, by putting additional covering upon the child,

and by the employment of warm baths, of mustard pediluvia, and of mustard poultices to the epigastrium.

Dr. Gregory advises the employment of nourishing diet and gently cordial medicines, when the pustulation is profuse over the whole body. When the period of secondary fever is accompanied with symptoms of extreme debility, as feeble pulse, brownish tongue, coldness of the skin, typhoid expression of the countenance, subsultus tendinum, and general tremors, the treatment must consist in the use of nutritious diet, and of stimulants, as wine and brandy, carbonate of ammonia and quinine, or compound infusion of cinchona. Camphor, administered in doses sufficient to allay the disturbance of the nervous system, is an excellent adjuvant to the stimulants mentioned. In cases of hemorrhagic variola, the above stimulating treatment must be employed, in connexion with the use of bark or quinine in large doses, and of some of the mineral acids. The quinine ought to be given in doses of a grain every hour, so that from six to ten grains may be taken every day.

Treatment of the complications.—It may be stated, in general terms, that the treatment for the different complications is the same as that which is proper for the diseases constituting them when they exist as idiopathic affections, with, however, the modifications rendered necessary by the nature of the general disorder. Thus, acute inflammation must be treated by antiphlogistics, used, however, with great care and reserve, in consideration of the length of time during which the patient must be sick, and the necessity there is for preserving his strength and maintaining a proper crasis of the blood, in order that he may be enabled to carry on the various changes in the disease requisite to effect a return to health. These remarks apply particularly to angina, laryngitis, bronchitis, pneumonia, enterocolitis, and ophthalmia. When the acute affection is only of moderate extent and severity, it is best, except in the case of intestinal inflammations, to depend upon a moderate employment of cathartics, of small doses of the antimonials in conjunction with diaphoretics, of gentle counter-irritants, and, when necessary, of small detractions of blood by leeches. Nevertheless, it is undoubtedly proper, when the acute disease is severe and extensive, the child strong and vigorous in constitution and present health,

the pulse full and strong, and the skin hot and red, to make use of general bleeding.

The treatment of the ophthalmia which so often threatens, and sometimes occasions great or irreparable injury to the eye, must be of the kind just recommended. In this complication the local treatment is exceedingly important. When ulcerations occur upon the cornea, they ought to be touched if this be practicable, with solid nitrate of silver, sharpened to a point, or with a fine camel's hair pencil which has been moistened and rubbed over the caustic to insure a caustic solution. When it is impossible to apply the solid caustic or the brush, we must resort to some collyrium. This may consist of a solution of nitrate of silver, a grain to the ounce, or of one or two grains of sulphate of zinc, with twenty or thirty drops of wine of opium, in an ounce of rose water, of either of which two or three drops are to be introduced into the eye morning and evening. When the first solution is used, its strength should be increased after a few days to a grain and a half, two grains, or even more, to the ounce of water.

The complication of entero-colitis must be treated by the most careful attention to diet, the use of warm poultices to the abdomen, of emollient and anodyne injections, the internal administration of astringents and small doses of opiates, and when absolutely necessary, by small detractions of blood by leeches. When the diarrhœa is severe, and the stools mucous or bloody, we may use with advantage the nitrate of silver internally or by enema, in the manner directed in the article upon entero-colitis.

The treatment of the convalescence from variola is important. The same rules apply to it as to other infantile and children's diseases.

Before terminating my remarks upon the subject of small-pox, it will be proper to give some account of the treatment of the eruption which has been recommended and practised, with a view to prevent the scarring and disfiguration which so often result from the ravages of the disease. Of the different means which have been employed with this view, there are two which are almost exclusively relied upon at present. One is to cauterize the pustules with nitrate of silver, and the other to make a mercurial

application upon the part where it is desirable to cause the abortion of the eruption. The cauterization has been performed in two modes; by the application of the caustic to each pustule separately, or to masses of the eruption. It appears, however, that the first named method is much the most preferable. To succeed perfectly, it is necessary to touch the derm forming the base of the pustule, so that the best plan is to remove or lift up a portion of the top of the vesicle with a lancet, and then to introduce into its interior the sharpened point of a stick of caustic. This operation is only certainly successful when performed on the first or second day of the eruption, though Rilliet and Barthez have known it to answer as late as the third and fourth, or even fifth day. The process of cauterization is productive of acute pain, but does not increase the local inflammation, according to the authors just quoted, at least when applied to a small number of the pocks. They state that when applied to the pustules seated upon the edges of the eyelids, it is almost incredible to behold how great is the diminution of the œdema of those parts in a single day. The conclusion of these gentlemen is, that it is certain that individual cauterization of the pustules with nitrate of silver causes them, as well as the surrounding tumefaction, to abort, and prevents them from leaving cicatrices.

The other method which has been employed to cause the abortion of the pustules, and thus prevent disfiguration is, as has been stated, the application of some mercurial preparation. The effects of this treatment are said to be an almost certain arrest of the development of the eruption, when it is used from the first or second, or not after the third day; the vesicles and pustules remaining small and isolated, and not assuming, or soon losing, the umbilicated character. When applied early, while there are as yet but few vesicles formed, it prevents the development of new ones, and diminishes the accompanying swelling and soreness. When the application is removed on the seventh or eighth day, it is found that desiccation has occurred imperfectly, the surface presenting small soft scabs, or little whitish, soft elevations, consisting of the pseudo-membranous substance situated between the true skin and the new epidermis, the old cuticle having generally peeled off with

the plaster. In some places a light rose-coloured surface alone remains.

In regard to the success of this treatment in preventing disfiguration, I may quote the statement of Rilliet and Barthez, that none of the patients upon whom they saw it tried, presented any cicatrices, though several had had confluent-pox which pursued its usual course on the parts not covered by the application. Dr. Stewardson, of this city, made a considerable number of trials of this treatment at the small-pox hospital of this city in 1841-42. He gives his conclusions in the following words, (*Am. Journ. Med. Sc.* January, 1843, p. 86-7.) "From these experiments, it seems pretty evident that the mercurial plaster has a decided influence upon the small-pox pustules, preventing more or less completely their perfect maturation, and diminishing the concomitant swelling and soreness, the process of desiccation being completed without the formation of thick scabs, and the resulting cicatrices less marked than when the process of suppuration was left to pursue its natural course." "That by its use pitting may be entirely prevented, or the mortality from small-pox materially lessened, seems to me very doubtful, although had all the precautions above-mentioned been taken, it is not improbable that the effects would have been still more decided."

The use of the mercurial application is attended with some inconvenience. In the first place it is difficult to keep it accurately applied, particularly in children, in consequence of the unpleasant sensations it occasions. In the second place, it not very unfrequently, according to Rilliet and Barthez, produces an eruption of hydrargyriasis, or mercurial roseola, in about eight or fourteen days after the variolous eruption, or four or ten after the application of the remedy. Rayer, however, states this effect to be a rare one.

Dr. Stewardson says that he thinks no apprehension need be felt as to constitutional affection from the mercury, for scarcely ever were the gums even touched. I may state, however, that when in Paris, in 1840, I saw this effect produced in a young girl at the Children's Hospital.

The method of its application is different in different hands.

The French generally employ the *emplastrum de Vigo cum mercurio*. Dr. Stewardson prefers the strong mercurial ointment, either pure or rubbed down with an equal bulk of lard, spread upon a piece of thick muslin. The muslin is to be cut into the shape of a mask, with apertures for the eyes, nose, and mouth. It is secured upon the face by means of strings attached to its margin, and tied across the back of the head and neck. It is important always for the success of the measure, that the application should be kept in close contact with the skin. To insure this, Dr. S. employed a separate piece of muslin for the nose, which is the part most difficult to fit. With the same view the French authors recommend that the plaster should be cut into pieces to suit the different portions of the face, making one for the forehead, and others for the cheeks, sides and back of the nose, and upper and lower lips. Any spaces that may remain are to be covered with other portions of the plaster, and the whole secured with strips of diachylon. On account of the difficulty of applying the mercurial plaster, the following ointment was composed by the apothecary of the Children's Hospital at Paris, and has been found to answer very well: Mercurial ointment 24 parts; yellow wax 10 parts; black pitch 6 parts.—Mix.

The application ought to be confined to the face, as that is the part which it is most important to save from disfiguration, and as it is better not to use it upon a larger surface than necessary, lest it might occasion the mercurial roseola, or possibly salivation. As a general rule, four or five days are sufficient, according to Guersent and Blache, to leave it in contact with the skin, in order to avoid the bad effects just referred to.

ARTICLE IV.

REVACCINATION.

I deem it unnecessary, in consequence of my restricted limits, and particularly as the subject may be found fully discussed in any of the standard works on medicine, to attempt a description of

either the history, phenomena, or mode of performance of vaccination. I desire merely to make a few remarks upon the subject of revaccination, a matter about which there is much difference of opinion in this country, and the exceeding importance of which is not, I think, properly appreciated by some practitioners, and still less by a considerable portion of the public.

It seems to me that the diminution of the protective power of vaccination by the progress of time has been most positively and clearly shown by the observations of latter years. That this is true, is proved, I think, by the fact that almost all recent writers on vaccination recommend a recourse to revaccination some years after the first operation. With the view of bringing this matter fairly before the reader, I will quote the opinions expressed by some of the leading authorities of the day.

Dr. Gregory (*Loc. cit.* p. 346) says: "The practice may be recommended for its safety, even if it be much less serviceable than the Germans contend for. We have sufficient facts before us to state that it need never be recommended prior to the tenth year of life, and that the age best fitted for it is from the period of puberty to that of confirmed manhood." Guersent and Blache (*Dict. de Med.* deux. ed. t. xxx, p. 435) have revoked their first opinion that revaccination was unnecessary, and state that they now believe firmly "that its protective power becomes enfeebled and does not preserve the individual from contracting variola in a more or less favourably modified form; and that in consequence revaccination ought to be zealously recommended and propagated." The Academy of Medicine of Paris, consulted by government upon this question, some years since, determined that revaccination was unnecessary. In February, 1845, however, the same learned body, after reconsideration of the matter, arrived at different conclusions. Two of these I shall quote. "Revaccination is the only method of proof which science possesses of distinguishing persons who have been definitely protected by vaccination from those who are so only in various degrees."

"The trial by revaccination does not constitute a certain proof that those of the vaccinated in whom it succeeds were liable to contract variola, but only a tolerably strong presumption that it

was particularly amongst them that the disease was apt to occur. In ordinary periods revaccination ought to be performed after the fourteenth year of life; when the disease is epidemic, it is prudent to resort to it earlier." (Guersent and Blache, *Loc. cit.* p. 436.)

Rilliet and Barthez say (t. ii, p. 538): "The diminution of the protective power of vaccination, after a certain number of years, seems to be positively proved, but it is proved also that this diminution is almost nothing during the period of life which concerns us." Dr. Condie says (*Dis. of Children*, 2d ed. p. 466): "If, therefore, the facts upon record are perfectly accurate, and there is no reason for suspecting them to be otherwise, they afford conclusive evidence of the necessity and importance of revaccination, in all cases in which persons are liable to be exposed to the infection of small-pox." It is scarcely necessary to remark that all individuals residing in a district in which the disease is prevailing, are exposed to the infection, and, therefore, according to the above quotation, all ought to be revaccinated, which is what I am seeking to establish. Dr. Geo. B. Wood, to whose work on medicine I would refer the reader for a very accurate and full account of vaccination and revaccination, terminates his remarks on the latter subject with the following paragraph. "In concluding the subject, I would again strongly urge the propriety of universal revaccination, as the means not only of promoting the comfort and possibly of saving the life of the individual, but also of preventing the spread of small-pox, and of ultimately eradicating it, if not from the globe, at least from extensive communities."

I might quote, in further proof of the propriety and necessity of revaccination, many other evidences emanating from various sources, but with the following short account of my own experience in regard to it, I shall bring my remarks to a close. In the year 1845 I revaccinated 63 persons, of whom 9 had the disease with every appearance of regularity, that is to say, the puncture did not become irritated until the third or fourth day, the vesicle was perfect on the ninth, with the umbilicated centre, hard base, and scarlet areola, and after that period the inflammation subsided rapidly. Of these 9 all but one had characteristic cicatrices of previous vaccinations on the arm. The ninth was doubtful, but the

individual insisted that he had been properly vaccinated. Of the remaining 54 cases, the great majority presented more or less strongly marked signs of the disease. In nearly all a yellowish pustule was formed some time during the second day, which was surrounded by an irregular patch of redness of small extent, presenting often a dotted or marbled look. In some the appearances promised a regular vaccine vesicle for several days, but terminated suddenly by the drying up of the vesicle, and the formation of an ill-shaped acuminate scab, which soon fell off, leaving a slight scar quite different from that of a primary vaccination.

The only remaining point for consideration is the period of life at which revaccination ought to be performed. The prevailing opinion seems to be that somewhere about puberty is the most suitable time, unless in the cases of children exposed immediately to the infection of the disease, when it may and ought to be resorted to at a much earlier period.

CLASS V.

WORMS IN THE ALIMENTARY CANAL.

GENERAL REMARKS.

THERE are five different species of worms found in the alimentary canal. They are the *Ascaris lumbricoides*, or round worm ; *Ascaris vermicularis*, thread-worm, seat-worm, or as it is popularly called, ascarides ; *Tricocephalus dispar*, or long thread-worm ; *Tænia solium*, common tape-worm, or long tape-worm ; and the *Bothrioccephalus latus*, *tænia lata* or broad tape-worm.

I shall not attempt to discuss the question of the mode of origin of human entozoa, about which much difference of opinion still prevails, some asserting that their ova or germs are introduced from the exterior, while others, embarrassed by the difficulty of accounting for their existence in organs enclosed in shut cavities, advocate the opinion that they are the result of spontaneous generation.

I shall give a short description of each of the intestinal entozoa, in order that they may be readily distinguished, but will treat of the causes, symptoms, and treatment only of the two first, inasmuch as the *tænia*s very rarely exist during infancy or childhood, and the *tricocephalus* is much less frequent than the round and seat-worms, and gives rise to symptoms of the same kind as the former.

Description.—The *Ascaris lumbricoides*, or, as it is commonly called, *lumbricoides*, *lumbricus*, or round worm, is shaped not unlike the common earth-worm, having a cylindrical body, which is attenuated towards either extremity, but particularly the anterior. It varies in length generally between six and twelve inches, and is usually about two or three lines in thickness. The young worm,

about an inch and a half long, is rarely met with. The head of the animal is at the smallest extremity, and may be distinguished by a circular depression, around which may be seen three tubercles. When recently voided, the worms are somewhat transparent, so that the viscera may sometimes be seen through the parietes. The integument is marked by circular fibres, and by four lines extending at equal distances from the head to the tail, the former of which indicate the course of the muscles, while the latter indicate that of the vessels and nerves.

The colour of the worm is whitish, yellowish, or of a more or less deep rosy tint, according to the nature of the aliment they contain; they are, as already stated, somewhat transparent when first voided. The alimentary canal, which may be distinguished by its brownish colour, terminates by a transverse opening or anus, situated on the inferior surface of the animal, just in front of its posterior extremity.

The two sexes are in different individuals. The male may be known by its tail, which is shortly curved, while that of the female is straighter and thicker. The genitals of the male consist of a double penis which may sometimes be seen to protrude just in front of the caudal extremity; those of the female may be distinguished by the vulva, seated at a constricted point of the body, about a third of the distance from the head to the tail. The male is smaller and much less abundant than the female.

The *Ascaris* or *Oxyuris vermicularis*, thread-worm, seat-worm, or maw-worm, is the smallest of the intestinal worms, and is generally distinguished in popular language by the title of ascarides. The sexes are in separate individuals.

The male is generally about two lines in length; its body is elastic, of a whitish colour, very slender, and looks not unlike a piece of cotton thread, whence one of its names was derived. The female is larger than the male, reaching a length of four or five lines. The anterior part of the body is of the same shape in both sexes. It is obtuse, and surrounded by a transparent membrane, through which may be seen a straight tube, forming a kind of bladder, which is the œsophagus, and which terminates in a globular stomach. The head is provided with three tubercles, as

in the lumbricoides. The intestinal tube in the male continues the whole length of the body, which becomes somewhat thicker towards the end, and is arranged into a spiral shape at the tail. The body of the female is shaped like that of the male as far back as the stomach, and increases in size in the first third of its length, after which it diminishes, and becomes so small at the end as to be seen with difficulty by the naked eye.

The *Tricocephalus dispar* or long thread-worm is generally about an inch and a half or two inches long, and consists, as it were, of two portions, of which the anterior, constituting about two-thirds of the length, is exceedingly slender, scarcely thicker than a horse-hair, while the posterior third suddenly swells out so as to become much thicker and larger. The sexes are in different individuals. The worm is provided with an alimentary canal, which, commencing at an orbicular mouth placed in the small extremity, runs through the animal to the anus, placed at the caudal extremity. The male is smaller than the female, and is, usually, found convoluted. This worm is met with chiefly in the cæcum and colon, particularly the former. It usually exists in very small numbers, and often but a single one is found. The symptoms which it occasions are the same as those produced by the lumbricoides.

The *Tænia solium*, common or long tape-worm, as well as the *Tænia lata* are of rare occurrence in children. Of 206 cases observed by M. Wavrch, only twenty-two occurred in subjects under fifteen years of age, and of them the youngest was three years and a half old. (*Bib. du Med. Prat.* t. v, p. 626.) These worms have however been met with at an earlier age, but as they are rare, I deem it unnecessary to do more than describe their appearances, in order that the reader may be able to distinguish between them and the varieties which generally exist in children, the *Ascaris lumbricoides*, and *vermicularis*. For a full account of the symptoms produced by the two varieties of the *tænia*, and their treatment, the reader is referred to any of the standard works on the practice of medicine.

The *Tænia solium* is usually of a whitish colour, flat in form, and varies in length from five to ten feet, its ordinary length, to

sixty, or even, according to the assertion of some writers, upwards of a hundred. It is uneven in shape, being thick and rounded behind, and measuring three or four lines at its widest part, while it tapers gradually towards the anterior extremity, where it becomes slender and thread-like. The head is minute in size, and flattish in shape, with a projecting papilla in the centre, furnished with a double circle of hooks, and surrounded by four cylindrical apertures, which seem to be the mouths of the animal. The body is composed of numerous segments, which are longer than broad at the posterior part of the worm, and resemble, when separated, the seeds of a gourd, and have hence been called cucurbitani. In this worm the two sexes exist in the same individual.

The *Bothriocephalus latus*, *Tænia lata*, or *broad tape-worm* is long and flat like the preceding variety, but it is generally thinner and broader, measuring from four to ten lines in breadth. It sometimes attains, like the common tape-worm, to a very great length. It is usually of a dirty-white colour, and rather less opaque than the *Tænia solium*. It is distinguished also, says Dr. Wood, from the other *tænia*, by the shape of the segments, which are broader than they are long; by the form of the head, which is small, elongated, without spines, and divided into two lobes by a longitudinal fossa on each side; and by having, instead of the four mouths of the *tænia*, a single minute pore in the centre between the fossæ, or else two pores, one at the extremity of each lobe.

The *frequency* of intestinal worms, and their *importance* as a cause of disease, have certainly been, and are still by many physicians, and especially by the public, very greatly exaggerated. There can be no doubt that they do, when they exist in large quantities, and particularly in certain countries, give rise to great disturbance of the digestive organs, and even occasion death; but such instances are, it seems to me, extremely rare in this city at least. I am quite sure that I have never as yet met with a case in my own experience, in which the constitution was at all seriously endangered by their existence,—though I have seen numerous instances in which slight disorders of the digestive apparatus, and various nervous symptoms, generally of very moderate severity, have disappeared after the administration of

anthelmintics, sometimes followed, and in an equal number of cases probably, not followed, by the expulsion of worms.

To show the truth of the above remarks, as to the importance of worms as a cause of disease, I make the following quotations. Dr. Rush (*Med. Inquiries and Observations*, vol. i, p. 205), remarks: "When we consider how universally worms are found in all young animals, and how frequently they exist in the human body, without producing disease of any kind, it is natural to conclude, that they serve some useful and necessary purposes in the animal economy." M. Guersent says, (*Dict. de Med.* t. xxx, 669): "It has always been the custom to assign to entozoa much too important an influence upon the diseases of childhood. In proportion as this part of pathology is perfected, it becomes evident that the greater number of children dying after having discharged worms, or even while having them still, are affected with acute or chronic diseases, which leave after death incontestable traces of their effects, and which are of themselves necessarily fatal." M. Barrier (*Mal de l'Enf.* t. ii, p. 100), quotes M. Trousseau as making the following remarks. "For sixteen years we have not met with a single child who has presented any verminous symptoms; never or almost never does a child born and reared in Paris discharge worms, while just the contrary is true as to the provinces. Young children, to be sure, are sometimes met with in our hospitals, who discharge worms, but they are those who have been born in the country, and have lived in the capital only for a short time." Dr. Condie, (*Dis. of Child.* 2d ed. p. 226,) remarks: "Worms are of very common occurrence in the intestines of children, and may unquestionably, under certain circumstances, become a cause of severe irritation;—but much less frequently than is generally supposed."

I believe we may conclude, therefore, that though these parasites are of very common occurrence, and productive of grave disorders in some countries, they are rarely met with in quantities sufficient to do serious injury to the health, in other places, as for instance, Paris, and probably in this country, or at least in the northern parts of it.

That intestinal worms do, however, not unfrequently in some

countries, and occasionally in all, produce dangerous and even fatal disturbances of the health, cannot be doubted after careful perusal of the evidence brought forward by different authorities. M. Guersent, amongst others, remarks (*Loc. cit.* p. 670): "It is nevertheless incontestable, that the development of these animals in the gastro-intestinal and abdominal cavities do sometimes give rise to very varied morbid phenomena, which are in some instances grave enough to cause death." Nevertheless, I am disposed to believe, as stated above, that fatal, or even dangerous results from the existence of these parasites, are of rare occurrence in this city, and probably throughout our northern states. Dr. Dewees, however, mentions several cases in which they produced alarming symptoms, and one in particular (*Dis. of Child.* p. 492), in which the subject, a child twenty months old, was extremely emaciated, and whose abdomen was "enormously distended, and semi-transparent," who recovered rapidly after ninety-six lumbricoides, from six to ten inches long each, had been expelled under the use of pink-root in infusion.

ARTICLE I.

ASCARIS LUMBRICOIDES.

The *description* of this worm has already been given at page 543.

Causes.—Under this head I shall not pretend to consider the question of the origin of worms, but only the causes which predispose to their production, or favour their growth.

Age has no doubt a considerable influence upon the predisposition to lumbricoides. According to M. Guersent (*Loc. cit.* p. 685), infants at the breast under six months of age are very rarely affected with them. Instances occasionally occur, but are altogether exceptions to the general rule. Above six months of age, they begin to be met with, but still very rarely, so that scarcely one or two will be found in several hundred children of a very early age; while from three to ten years of age they will be

observed in about a twentieth, or in some seasons perhaps in a larger proportion. M. Valleix states that he has never met with them in new-born children. Dr. Dewees says (*Loc. cit.* p. 481), that he has never seen worms in children under ten months old; and only two instances at that age. I do not recollect myself ever to have seen them in subjects younger than eighteen months, and very rarely in those under three or four years.

There can be little doubt that the disposition to worms is *hereditary* in some families. It is generally believed that the species under consideration is more common in *girls* than *boys*; that it is most common in children of *lymphatic* and *scrofulous* constitution; and that a too exclusively vegetable or milk *diet*, and an abuse of *fruits*, strongly predispose to their production. The *habitation* of a cold and damp, or warm and damp climate, and the *seasons* of summer and autumn, are supposed by many also to favour their production and growth. It is a general belief, and I should suppose from personal experience, a well-founded one, that a feeble and disordered state of the digestive function from any cause, often acts as a predisposing cause of worms, and particularly of lumbricoides.

Seat.—The small intestine is in a very large majority of the cases the seat of the ascaris lumbricoides. They are met with, however, in other parts of the digestive tube, particularly the stomach and large intestine, and more rarely in the œsophagus or pharynx. In some instances they are found to have migrated to other organs, as to the liver, gall-bladder, and in still rarer cases, they have passed into the peritoneal cavity, bladder, larynx, trachea, bronchia, and even into the nasal passages and frontal sinuses. They have also been met with occasionally in the walls of the abdomen, forming verminous abscesses, whence they have escaped on the opening of the abscess.

The *number* of ascarides is exceedingly variable; there may be only two or three, ten or twenty, or several hundred. When very numerous, they are apt to be rolled or twisted into knots or balls, which have been seen as large as the fist, so as to block up completely the canal of the intestine. In a case cited by Rilliet and Barthez, from M. Daquin, the duodenum was so filled with

worms as to be distended and to have acquired a considerably larger size than natural, while at the same time it was hard and elastic. The jejunum, ileum, and cæcum were filled, so that it seemed as though the worms must have been pushed in by force. They were found also, but in smaller quantity, in the colon. Dr. Condie (*Loc. cit.* p. 230), states that he has known one hundred and twenty lumbricoides to be voided in a single day, by a child five years old. It ought, however, to be remarked, that the instances in which such large numbers are met with are altogether exceptional, especially in our northern states. I have never myself known more than six, eight, or ten to be expelled, within a few days' time, and very generally there have not been more than three, four or five.

Anatomical lesions.—When the number of lumbricoides is small, the mucous membrane has been found in a state of perfect health, while, on the contrary, when they were numerous, and especially when collected together into knots, the membrane has been observed to present a fine injection like that which exists in erythematous enteritis; in some very rare instances on record, in which the quantity of worms has been very great, the mucous membrane has been found deeply injected, thickened, granulated, and in a smaller proportion of cases softened, and even eroded. Not unfrequently the intestine presents all the characters of well-marked enteritis, or entero-colitis, though the number of worms may be very small. In such cases it is reasonable to suppose that the inflammatory affection has been an accidental complication of the verminous disorder.

Much discussion has arisen in regard to the manner in which *perforation* of the intestine as an accompaniment of worms takes place. It is necessary to suppose, in subjects in whom worms are found in the peritoneal cavity, or in abscesses formed in the abdominal parietes, that perforation of the bowel has taken place, and yet in some instances no trace of the opening is left, no inflammation of the serous membrane is met with, nor has there been any escape of the contents of the digestive canal into the abdominal cavity. In others, however, and much the most numerous cases, it is evident from the anatomical appearances

presented, that the perforation has taken place in consequence of previous ulceration of the coats of the bowel, and that the worms have escaped with the other contents of the intestine. It is in regard to the former class, therefore, that discussion has principally taken place; some asserting that the parasite itself makes the opening, by an active process, while others deny the possibility of this occurrence, and maintain a previous ulceration or softening in all cases. Amongst those who advocate the possibility of perforation independent of previous change in the intestinal coats by disease, are MM. Mondière and Charcelay, the former of whom has examined the subject with a great deal of care, quoted by Rilliet and Barthez; Rilliet and Barthez themselves; the authors of the *Bibliot. du Méd. Prat.*, and M. Guersent; while amongst those opposed to this opinion may be cited, MM. Cruveilhier, Barrier, Dr. Arthur Farre, who greatly doubts the possibility of the accident, and Dr. Condie. I confess myself inclined to believe from facts stated by different authors, and from the history of two cases which occurred to M. Guersent in 1841, at the Children's Hospital of Paris, (*Loc. cit.* p. 680,) that worms may in some instances cause a perforation independently of previous disease of the coats of the intestines. In one of these, two lumbrici were found engaged in an opening in the appendix vermiformis, half the bodies of the animals being in the appendix, and half in the peritoneal sac; while in the other, an opening of the same kind as in the previous case was found in the appendix, and though the three worms which were found lying in the abdominal cavity might have escaped through an ulcerated perforation of the colon, it is not the less true that the opening in the appendix presented the same characters exactly as in the first case, in which the animals were, as the author remarks, "taken in the act." In both instances, the perforation of the appendage was at the extremity of that canal, and in the form of a narrow opening of a conical shape; the membranes were smooth, thinned, and the edges of the orifice sloped off from within outwards; no trace of anterior ulceration was perceptible.

In regard to the *verminous abscesses* already referred to, I shall make but few remarks, referring the reader to more extensive

treatises for fuller information. These abscesses have been in very rare instances met with in the pharynx and nasal passages, but much more frequently they exist in the abdomen. The latter may be of two kinds, *stercoraceous* and *non-stercoraceous*. In the former, the abscess which forms upon some portion of the walls of the abdomen, gives issue not only to the worm or worms and pus, but also to faecal and even alimentary substances, and leaves behind a fistula connecting with the cavity of the intestine which may cicatrize after a short time, or remain open during life. In the other form of abscess, the opening through the coats of the intestine has been closed immediately after the passage of the worm, so that the abscess gives issue only to the animal and pus, after which it heals up without giving rise to a fistula.

The verminous abscesses are said to be found generally about the inguinal and umbilical regions; to occur most frequently between the ages of seven and fourteen years, and not to be, as a general rule, very dangerous to life.

Symptoms indicative of the presence of worms.—I believe it is nearly universally acknowledged by later writers, that there is no single symptom, nor group of symptoms, other than the expulsion of the worms, and their detection, which indicate with certainty their existence in the digestive tube. This is the expressed opinion, amongst others, of MM. Guersent, Rilliet and Barthez, Barrier, and Valleix, and Drs. Eberle and Condie, and it is also the opinion which I have myself been led to form from some experience amongst children.

Another point worthy of remark, is, that even though one or several worms may have been expelled, it is not always fair to conclude that the symptoms under which the child labours, are the result of the presence of others of these animals, as there may be no more in the bowels, or they may be so few in number as not to produce injurious effects; while, on the contrary, various disorders of the digestive tube, as chronic indigestion and simple diarrhoea, and inflammatory diseases of the gastro-intestinal mucous membrane, may and do exist simultaneously with, and yet independently of, the presence of these parasites.

The *symptoms* generally enumerated as indicative of the pre-

sence of worms are the following. The child presents various signs of disturbed health. The stomach is more or less deranged, as shown by furred tongue, eructations, variable appetite, which is sometimes diminished, and sometimes increased, thirst, acid or heavy breath, and nausea. The abdomen may be enlarged or retracted, generally the former, and is often more or less hard and painful to the touch; the condition of the bowels varies in different cases, as they are sometimes costive, and sometimes affected with diarrhœa. According to M. Guersent, the stools often contain glairy substances, and are sometimes streaked with blood and of a yellowish-green colour; the patient often suffers from colics, which may be either dull or acute, though more generally the latter, and are generally felt at the umbilical region. Children affected with lumbricoides are said to present a peculiar physiognomy; the face is usually paler than natural, and sometimes has a leaden tint; the eyes are surrounded by bluish rings, and have at the same time a dull and languid expression; the inferior eyelids are often swelled and puffy; the sclerotic coat of the eye assumes a bilious tint; the nostrils are said to be sometimes swelled, and the child complains much of irritation and itching of those parts, and is constantly picking at them with the fingers. In some instances epistaxis takes place. The child is generally pale and thin, indolent and languid, or irritable and unhappy. The sleep is almost always disturbed. This indeed, is, it seems to me, one of the most important signs both of worms and of chronic functional disorders of the stomach and bowels. The nights are almost always restless, the patient either waking often and wanting to drink, or waking in fright and alarm from dreams, or else it is constantly tossing and turning in its sleep, and moaning or grinding the teeth.

Other symptoms mentioned by different observers, and by some very much depended upon, are acceleration with irregularity of the pulse, and dilatation, especially unequal dilatation of the pupils. I may cite also strabismus, and occasional cough.

In children in whom the number of lumbricoides is very large, the constitution suffers to a dangerous degree. The symptoms above enumerated are very marked, and at the same time the child is very pale or sallow, emaciated, weak and without appetite; the ab-

domen is hard and tumid; the nervous symptoms are severe, and some of the symptoms which I shall describe presently, under the head of disorders occasioned by worms, are also observed.

It should be remarked, however, again, that all or any of the symptoms just described may exist independently of the presence of worms, the only certain sign of which is their expulsion from the patient.

Morbid effects occasioned by worms.—MM. Rilliet and Barthez divide the accidents or effects produced by the existence of lumbricoides into two groups; those which result from the mechanical influence of the entozoa, as their accumulation or displacement; and those which appear to be the consequences of a purely sympathetic action on the different systems of the body, and particularly the nervous system.

Mechanical effects.—Under this head are included perforation and hemorrhage of the intestine, enteritis, and abscesses, and the symptoms determined by the displacement or migration of the worms into the ductus communis choledochus, liver, or air-passages.

Of perforation and abscesses I have already treated under the head of anatomical lesions. Hemorrhage is a very rare event, but occurred in one instance cited by Rilliet and Barthez, and Guersent, from M. Charcelay, in consequence of the rupture of an arteriole in a small rounded ulceration in the duodenum, apparently occasioned by the presence of a large number of lumbrici. Enteritis, as an effect of the presence of worms, has also been referred to under the head of the anatomical lesions. In many instances, it is no doubt a mere accidental complication, in no way connected with the presence of entozoa; probably this is true of a large majority of the cases. When, however, the number of the parasites is very great, and particularly when they are collected into large and firm knots or bundles, they may, no doubt, occasion by their mechanical irritation, inflammation, thickening, softening, and even destruction of the mucous tissue, as in cases cited by M. Guersent, from MM. Bretonneau and Charcelay, and in one which occurred to himself. It should be remarked, however, that the cases on record, in which ulcerations evidently depended upon the presence of worms, are, so to speak,

infinitely few in comparison with those in which no such alteration existed, or in which it was evidently independent of any influence exerted by the worms.

Effects caused by the displacement or migration of worms.—*Lumbricoides* have been found, as we have already seen, in the walls of the abdomen, giving rise to abscesses. They have been discovered also in the ductus communis choledochus, in the gall-bladder, hepatic ducts, in the substance of the liver forming abscesses, and in the pancreatic canal. The symptoms occasioned by the latter class of cases are very obscure. In one instance, M. Guersent supposed that an attack of convulsions depended upon the presence of worms in the common duct.

More numerous examples are on record, in which violent dyspnœa and cough or fatal asphyxia have occurred in consequence of the pressure of *lumbricoides*, which had passed into the œsophagus, or from their introduction into the larynx, trachea, or bronchia. The symptoms occasioned by these accidents are a sudden attack of dyspnœa, anxiety, agitation, threatened suffocation, dry, spasmodic cough, acute, painful cries, pain in the larynx or trachea, and unless relief be obtained in a few hours, death. This kind of attack may depend on the rising of a worm or bundle of worms into the œsophagus, causing pressure on the larynx and trachea, as in a case reported by M. Tonnellé, in which the symptoms disappeared after the expulsion of a large number of worms. I met with an instance of this nature myself. It occurred in a boy fifteen years old, presenting every mark of strong and vigorous health, but who for three or four weeks before I was consulted in regard to him, had been subject to sudden and apparently causeless attacks of suffocation, which seized him without the least warning. When the attack came on, he would for some instants cease to breathe, or breathe with much difficulty. He always seemed to suffer from the greatest anxiety; the countenance became altered and distressed; he was unable to speak, but made signs for water, and when able to swallow a mouthful, which was always exceedingly difficult, was at once relieved. His mother told me that he always appeared to be in the greatest distress, so that on several occasions, she feared for his life. Striking him violently on the

back, which she always did, when she was present, sometimes relieved him, but generally the difficulty continued until he could swallow a little fluid of some kind. These attacks were unattended at the time by cough, nor was there the least sign of disorder of the respiratory system in the intervals between them. Suspecting that the difficulty must depend on the rising of a worm or worms into the œsophagus, or upon sympathetic irritation from the presence of those parasites in the stomach, and learning that he had been troubled with worms some years previously, I gave him worm-seed oil, which caused the expulsion of a few large lumbricoides, after which he had no return of the symptoms.

The attacks of dyspnœa may depend also, as already stated, on the introduction of worms into the air-passages. Under these circumstances death is very apt to be the result. In one instance, however, reported by M. Arronssohn, after the difficulty had lasted two hours, the patient, a little girl eight years old, after violent efforts of coughing, threw up a living lumbricus.

We have next to consider the *sympathetic effects*, and particularly the *nervous symptoms*, occasioned by worms. We may include amongst the nervous symptoms produced by worms the headache, languor, irritability, restless and disturbed sleep, and grinding of the teeth, so frequently observed. These, however, are of but slight importance in comparison with certain other disorders of the nervous system, which do undoubtedly occur sometimes, though I should suppose *very rarely*, in proportion to the whole number of subjects affected with the parasites. The disorders to which I allude are partial or general convulsions, chorea, hysteria, catalepsy, and epilepsy, which are the most frequent, though, as so often stated already, extremely rare in comparison with the number of cases in which the presence of the worms produces no such effects. Other disorders cited by the authors of the *Bib. du Méd. Prat.*, with cases to prove their authenticity, are insanity, paralysis, coma, palpitations, strabismus, cough, hyperæsthesia of the skin, amaurosis, and aphonia.

Diagnosis.—It has already been stated that there are no certain signs of the presence of worms in an individual except their expulsion. The symptoms which have seemed to me most

strongly to indicate their presence are a chronic disordered state of the digestive apparatus, producing irregular appetite, which is sometimes good and at others bad; slight emaciation; paleness or unhealthy tint of the complexion; languid expression of the face; some irritability of the temper or a want of the gayety and activity of disposition natural to childhood; picking at the nose; often some tumidity of the abdomen, which may be at the same time either hard or merely tympanitic; and what seems to me more important than any that I have named, very restless and broken sleep at night, with frequent grinding of the teeth.

M. Valleix remarks that in a case presenting nervous symptoms simulating disease of the brain, we may suspect the existence of worms, if we learn upon inquiry that symptoms of marked intestinal disorder, the various signs cited above as indicative of the presence of worms, and different derangements of digestion, had preceded for some time the appearance of the nervous symptoms; chiefly for the reason that in most diseases of the brain, the digestive tube is at the invasion in a state of integrity, with the exception of sympathetic vomiting. If we can learn, upon inquiry, that the child has discharged worms on some previous occasion, the probability of the dependence of the symptoms upon them becomes still stronger.

It is sometimes difficult to determine positively whether certain substances discharged at stool are fragments of worms, or whether they are portions of imperfectly digested aliment, or foreign bodies. The things which most resemble lumbricoides, are the remains of tendons, ligaments, vessels, fibres of plants, etc. To make the distinction with certainty, the doubtful substance ought to be placed in water, so that it may be thoroughly cleansed, after which it must be carefully examined as to its structure, arrangement, consistence, etc., with the eye, and with the microscope, if necessary. M. Guersent has suggested a very easy method of ascertaining whether the substance be animal or vegetable, which is to subject it to heat, after it has been carefully washed, when the odour will at once inform us of its real nature.

Prognosis.—It is no doubt a very rare event, at least in the northern parts of our country, for life to be endangered by the pre-

sence of worms. I have never, myself, met with an instance in which the general health was more than moderately disturbed by this cause. That verminous affections are sometimes, however, dangerous to life in this city, is shown by three cases related by Dr. Dewees, in which very severe and threatening symptoms were instantly relieved upon the expulsion of lumbrici after the exhibition of vermifuges.

Worms become dangerous to life when they migrate from their original seat to neighbouring and important organs, particularly the air-passages and liver. The prognosis is unfavourable also when they accumulate in very large numbers, and give rise to the different nervous symptoms above described.

Treatment.—Before commencing my remarks upon the particular remedies employed for the destruction and expulsion of worms from the alimentary canal, I would call the attention of the reader to the fact that most of the recognised anthelmintics are more or less irritating to the gastro-intestinal mucous membrane, and some of them to the nervous system also, producing in over doses severe and even dangerous nervous symptoms. It is evident, therefore, that remedies of this class ought not to be exhibited unless they are manifestly called for, and not at all when symptoms of severe gastro-intestinal irritation, and particularly of inflammation, are present, unless there be the very strongest reasons for supposing that those symptoms depend upon accumulations of worms. I am quite sure that I have, in a considerable number of instances, met with children whose digestive organs had been injured, in whom slight functional derangement had been converted into severe indigestion, and even inflammatory disorder, by the too frequent or long-continued use, or the administration in excessive quantities of different vermifuges, and of various quack nostrums, which are sold to an amazing extent in this city, at least, and no doubt all over the country.

As the diagnosis of worms is always doubtful, it is best never to risk the administration of any of the irritating vermifuges, unless convinced, by the previous expulsion of worms, that they are almost certainly present; and, indeed, I myself rarely give any other remedy than small quantities of the *wormseed oil* in slight, and espe-

cially in doubtful cases, unless this has already been tried and failed. From my own experience I believe that this remedy is all sufficient in a large majority of the cases that occur in this city, as these are almost always of a mild character, and as it not only produces the expulsion of the parasites when they exist, but also acts beneficially upon the form of digestive irritation which simulates so closely the symptoms produced by worms. I am persuaded, indeed, that of all the cases that have come under my notice, in which it seemed probable that worms might be present, none were expelled in nearly half, and yet the signs of disturbed health have passed away under the use of the remedy. The oil of wormseed may be given in doses of four drops to children of two years of age, and of six or eight to those above that age, three times a day for three days, to be followed on the morning of the fourth day by a moderately active, but not irritating cathartic dose, the best of which is castor oil or syrup of rhubarb. The objection to the remedy is its nauseous taste and smell; these, however, may be partially concealed by making it into a mixture with yolk of egg, powdered gum, and syrup of ginger. Some children take it very well dropped upon a lump of white sugar, while others take it best mixed with common brown sugar. If one course of the oil, as it is called, fail to relieve the symptoms, another should be administered. It ought to be recollected that when given in large doses, the wormseed oil is irritating to the digestive mucous membrane, and produces dangerous nervous symptoms. I know of one case in which a girl six or seven years of age was made exceedingly ill, and suffered for years afterwards from the effects of a teaspoonful of the oil given by mistake.

The wormseed may be given also in powder, in the dose of from twenty to forty grains.

The remedies most frequently employed in this country besides the wormseed, are pink-root or spigelia, oil of turpentine, calomel, and the bristles of cowhage.

I believe that the *pink-root* is more depended upon amongst us than any other single remedy. It is given either in substance or infusion. The dose of the powder is from ten to twenty grains for a child three or four years old, to be repeated every morning

and evening for several days, and followed by an active cathartic. It is seldom used, however, in this way, but almost always in infusion. I believe that the best and safest mode of administering it is in combination with cathartic substances. Thus, half an ounce each of pink-root and senna, may be infused for a few hours in a pint of boiling water, and a tablespoonful given two or three times a day, to children two or three years old, for three, four, or five days, when it should be suspended for a time, and resumed, if necessary. A preparation much used in this city under the title of worm tea, and which I have given myself with very good success, consists of the spigelia mixed with senna, manna, and savine, in different proportions, made into an infusion and sweetened with brown sugar. Dr. G. B. Wood (*Pract. of Med.*, vol. i, p. 626), recommends the following formula: **R.**—Sennæ, Spigeliæ, āā ʒss; Magnesiæ Sulphat. ʒii; Mannæ ʒi; Fœniculi ʒii; Aquæ fervent Oj. These are to be macerated for two hours in a covered vessel, and a tablespoonful given to a child two years old once or twice a day, or every other day, so as to procure two or three evacuations in the twenty-four hours. The remedy is continued for a few days, or for one or two weeks, if necessary, and if it do not debilitate the child.

The *spirits of turpentine* are highly recommended as an efficient remedy for worms by several authorities, and particularly by Dr. Joseph Klapp and Dr. Condie of this city. Dr. Condie states that it is the article from which he has derived the most decidedly beneficial effects, and remarks that it may be given when there exists considerable irritation of the alimentary canal, or even sub-acute inflammation, without any fear of its increasing either. He gives the rectified spirits in sweetened milk, in molasses, or in the following mixture: **R.**—Mucil. G. Acaciæ ʒii; Sacch. alb. ʒx; Spir. Æther. nitr. ʒiii; Spir. Terebenth. rec. ʒiii; Magnes. Calcinat. ʒi; Aquæ Menthæ ʒi.—**M.** Of this mixture a dessert spoonful is given every three hours. I have used the spirits of turpentine but once, on account of its extremely disagreeable taste, having up to this time always succeeded perfectly well with the wormseed oil, or infusion of pink-root with cathartics.

Calomel is also highly thought of by many persons as a vermi-

fuge, and, no doubt, when used in combination with, or followed by cathartics, or given in full purgative doses, it is very effectual. I can only repeat what I have already said on several occasions, that it is a remedy which, from the powerful influence it exerts upon the constitution, ought not to be given except when really called for; and as we can almost always succeed in verminous affections by milder drugs, I see no occasion for resorting to this, except in exceptional cases. When used it is given alone in considerable doses, and followed by some cathartic, or in combination with rhubarb and jalap, or jalap and scammony.

The bristles or down of *cowhage* are also used by some practitioners, and no doubt sometimes with success. I have never used them, and can give no opinion, therefore, from personal experience, as to their efficacy. They are administered by making them into an electuary with honey, syrup, or molasses, a teaspoonful of which is given every morning for three days, and then followed by an active cathartic.

The following *electuary*, recommended by Bremser, is very much employed in Europe, and is highly spoken of by Dr. Eberle: **R.**—Semin. Santonicæ (semen-contræ of the French writers), Semin. Tanaceti rude contus., āā ʒss; Valerian. pulv. ʒii; Jalapæ pulv. ʒiss—ii; Potass. Sulphat. ʒiss—ii; Oxymel. Scillæ, q. s., ut ft. electuarium. A teaspoonful of this is given morning and evening for three or four days, when the dejections generally become more copious and liquid. If it does not produce this effect, Bremser advises that the dose be increased. Dr. Eberle gave it for six or seven days, and says it does far less good when it produces frequent and watery evacuations, than when it causes only three or four consistent stools a day. This preparation has a very disagreeable taste, and children sometimes refuse to take it on that account. When this is the case it may be made into pills.

Rilliet and Barthez recommend the following *syrup*, which was proposed and highly thought of by M. Cruveilhier: **R.**—Follicul. Sennæ, Rhei, Semin. Santonic., Artem. Abrotan., Helminthocort., Tanaceti, Artemis. Pontic. āā ʒi. To be infused in half a pint of cold water, strained, and made into a syrup with sugar, of which a tablespoonful is to be given every morning for three days. M. Cruveilhier states that this syrup has been very successful in his

hands. The *empyreumatic oil* of Chabert is also highly spoken of by some European authorities. It is made by mixing one part of the empyreumatic oil or fetid spirits of hartshorn, with three parts of spirits of turpentine, and suffering them to digest for four days. The mixture is then put into a glass retort, and distilled in a sand-bath until three-fourths of the whole have passed over into the receiver. The product should be kept in small and tightly-closed phials. The dose is about fifteen or twenty drops three or four times a day, for children between two and seven years old. This is recommended highly by Bremser and other authorities. The great objection to it is its exceedingly nauseous taste. Dr. Eberle speaks in very favourable terms of a strong decoction of *helminthocorton* or Corsican moss, which he has found "not only valuable as a vermifuge, but particularly so, as a corrective of that deranged and debilitated condition of the alimentary canal favouring the production of worms." An ounce of helminthocorton, with a drachm of valerian, are to be boiled in a pint of water down to a gill, and a teaspoonful of the decoction given morning, noon, and evening. It is particularly beneficial in cases attended with the usual symptoms of worms, connected with want of appetite and mucous diarrhœa, and arising from debility of the digestive organs and vitiated condition of the intestinal secretions.

In all cases of deranged health supposed, either by the nature of the symptoms, or proved by the previous expulsion of worms, to depend on the presence of those animals in the alimentary canal, it is exceedingly important to attend to the *hygienic treatment* of the child, and in some instances to administer *tonics* and *stimulants*. In not a few cases that have come under my notice, in which many of the symptoms supposed to indicate the presence of worms have been extremely well marked, I have succeeded in removing them all without a resort to any vermifuge, by the treatment proper for the chronic indigestion or dyspepsia of children. The method of treatment to be employed in such cases has already been laid down in the article on indigestion, to which the reader is referred for full information. It should consist chiefly in strict attention to exercise and diet, and in the use of tonics, as quinine and iron, and small quantities of fine port wine.

Whenever any complication exists in connexion with worms, the treatment must be modified according to the nature of the complication. If it consist in inflammation of any part of the digestive tube, the inflammation ought to be attended to first, and the verminous disorder for the time neglected. If the inflammation be very slight, or, if the symptoms indicate only severe irritation rather than positive inflammatory action, we may exhibit the milder and least injurious vermifuges, as very small doses of wormseed oil, which I have never known to do harm, the decoction of helminthocorton and valerian, recommended by Dr. Eberle, or according to Dr. Condie, the spirits of turpentine. If the verminous affection coexist with any of the acute local inflammations of the thorax, the former ought to be, as a general rule, neglected, until the latter has been relieved by appropriate treatment. In doubtful cases, in which it is impossible to ascertain with certainty whether the symptoms depend on worms, or upon a simple dyspeptic condition of the digestive organs, it is most prudent to give only the simplest and least irritating vermifuges, to regulate the hygienic conditions of the patient, and afterwards to resort to tonics, if necessary.

Various writers, and particularly M. Guersent, advise that we should forbid, in verminous cases, the use of relaxing food, especially of milk preparations, fruits, and of fatty and farinaceous substances; and that, after the expulsion of the worms, we should direct a tonic and strengthening regimen. The diet should consist of boiled and roasted meats, of wine, and of bitters. The author just quoted, states that a change of food alone will often suffice to procure the expulsion of the worms. He says (*Dict. de Méd.* t. xxx, p. 689), "I have met with children who had been tormented with *ascarides lumbricoides* while residing in the country and living upon milk and fruits, and who, upon being brought to the city, and put upon the use of broths and soups, passed considerable quantities of worms, and after that got entirely rid of them."

ARTICLE II.

ASCARIS VERMICULARIS.

The *description* of this worm has already been given at page 544.

Seat.—The ascaris vermicularis is found almost exclusively in the large intestine, and in a large majority of the cases is confined to the rectum. It is said to have been found in the vagina in the female, having no doubt passed from the rectum into that canal.

The *causes* of this worm are not at all understood.

Symptoms.—The characteristic, and often the only symptom indicative of their presence, is violent itching about the anus, which is sometimes almost insupportable, and which is generally most troublesome and most apt to occur at night, when the child is in bed. In some instances they give rise to acute and violent pains in the region of the anus, and sometimes to tenesmus and mucous or bloody stools. When the last named severe symptoms exist, the worms may occasion dangerous nervous disorders, and even give rise to general convulsions. The worms not unfrequently escape from the rectum and are found upon the bed-clothes, or upon the clothes which the child has worn through the day. Sometimes they are discharged in considerable numbers, and are found in that case, either mixed with the *fæces*, or with mucus, or collected into balls or knots.

The *diagnosis* of the seat-worm, like that of the lumbricoides, cannot be regarded as positive, unless some have been expelled, or unless they can be seen by examination of the rectum. This can generally be done when they are present in any number, by pressing the nates apart so as to open the anus, and bring the folds of the mucous coats of the bowel into view. The only other symptom which indicates their presence with any certainty, is the existence of severe itching about the anus, not to be explained upon any more reasonable supposition.

Prognosis.—These worms do not, as a general rule, produce the

same disturbances of the general health, as lumbricoides, and in not a few instances, are entirely innocuous, with the exception of the pain and inconvenience which they occasion.

They are, however, exceedingly troublesome, because of the difficulty of removing them entirely by any treatment. No matter how many are discharged, some almost always remain concealed in the folds of the mucous membrane, and as they are propagated with great rapidity, the same train of symptoms is very apt to return soon after they may have seemingly been dislodged.

Treatment.—It has been found by long experience that the common vermifuges given by the mouth, exert much less influence in the expulsion of these worms than of the lumbricoides. For this reason enemata are generally resorted to in the treatment instead of remedies given per orem. Dr. Dewees, however, recommends the elixir proprietatis (tinct. aloes et myrrhæ), in small and often-repeated doses, continued for some time, and followed by enemata of lime-water, camphor, or aloes. He gave twenty drops of the elixir three times a day, in a little sweetened milk, to children from two to four years old, and thirty drops to those between five and seven years.

The plan I have generally resorted to has been to give small doses of the wormseed oil, as directed in the article on lumbricoides, and to direct an injection of from four to six grains of powdered aloes, suspended in a gill of warm milk, for children four years old, to be repeated once in three, four, or five days, according to the necessity of the case.

Lime-water by injection is recommended by several different authorities. It may be given of its ordinary strength, or mixed with an equal quantity of warm milk, or flaxseed mucilage. Other enemata recommended are spirits of turpentine in milk, a teaspoonful of the former to a gill of the latter; decoction of helminthocorton; an injection made by infusing two drachms of fresh garlic-cloves in three ounces and a half of boiling water, and adding to the infusion, after it has been poured off, a scruple of assafœtida rubbed up with the yolk of an egg; a solution of from six to twelve grains of sulphuret of potassium in half a pint of water; injections of sweet oil, or of lard beaten up with water

until it becomes fluid, and even of cold water. The three last-mentioned substances have the advantage of calming the itching and irritation of the rectum almost immediately. Again, it has been recommended to pass a bougie smeared with mercurial ointment into the rectum. I should much prefer the method of using this ointment which succeeded in the hands of M. Cruveilhier in a very severe case. This was to place a little of the ointment on the anus, which relieved the patient entirely after a few days. M. Valleix states that he has obtained the same results by causing the anus to be anointed with the following preparation, a small quantity of which was introduced at the same time into the inferior extremity of the intestine: **R.**—Hydrarg. Chlor. Mitis Div; Axung. 3vi.—**M.**

Dr. Wood states that a dose of sulphur taken every morning before breakfast has been found very useful.

The *diet* and *general health* ought always to be strictly inquired after, and attended to by the physician. For information upon these points the reader is referred to the remarks upon hygienic treatment in the last article.

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ALFRED STILLÉ, M. D.

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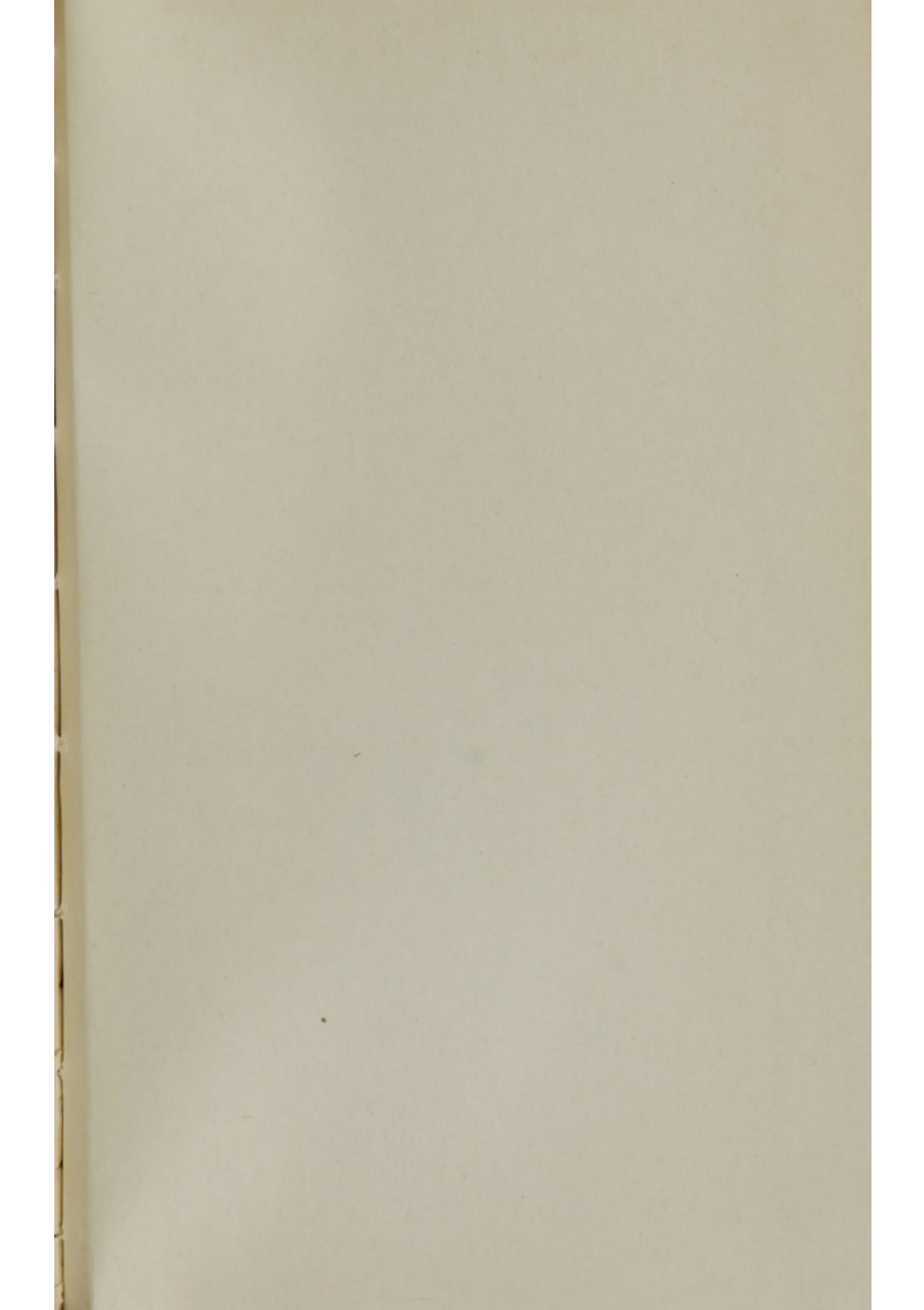
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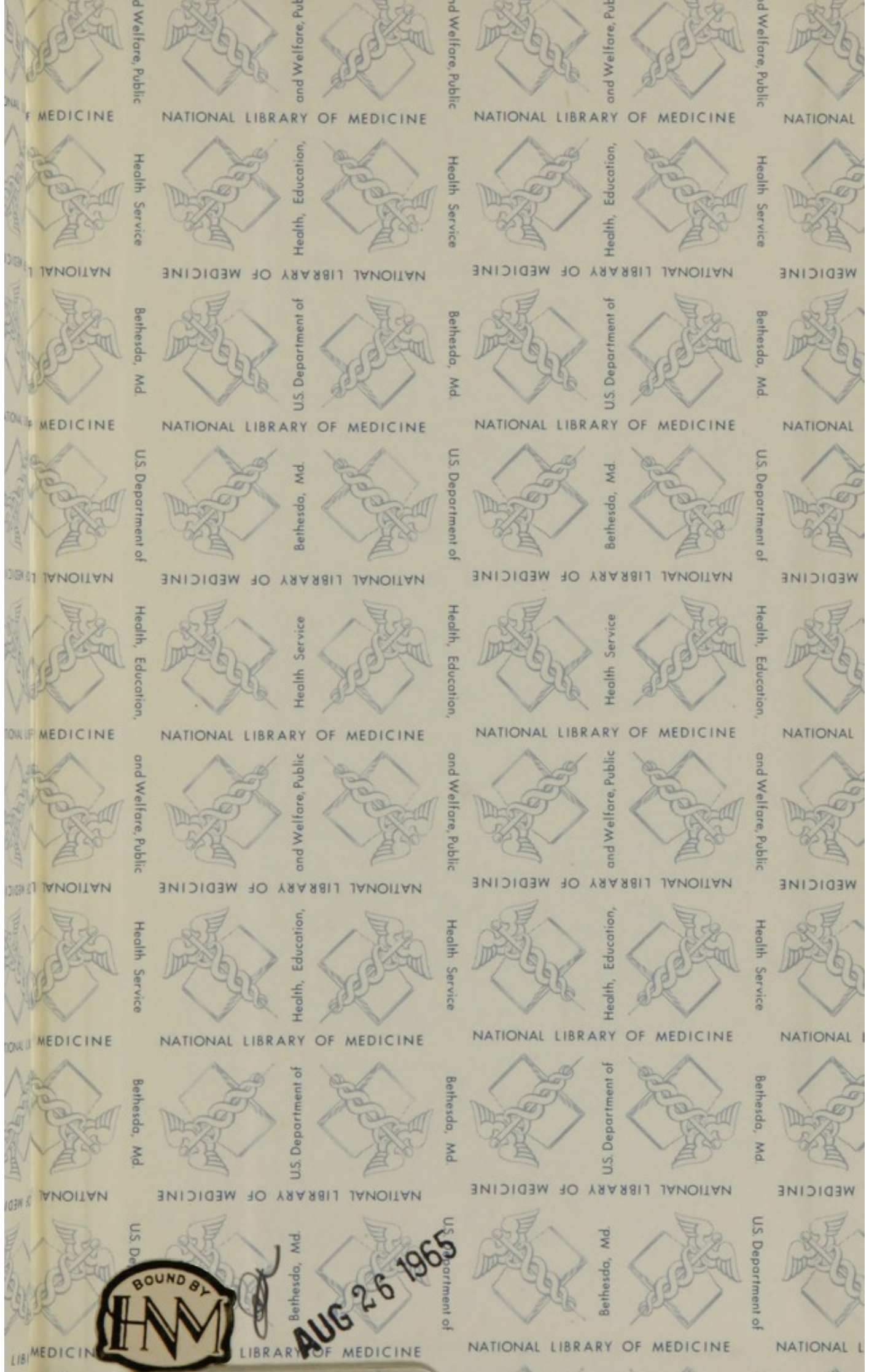
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