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TREATISE

ON

THERAPEUTICS

TRANSLATED BY D. F. LINCOLN, M.D., FROM FRENCH OF

A. TROUSSEAU AND H. PIDOUX

Professor of Therapeutics in the Faculty of Medicine of Paris; Physician to the Hôtel Dieu; Member of the Academy of Medicine; Commander of the Legion of Honor; Ex-representative of the People in the Constituent Assembly, etc.

Member of the Academy of Medicine; Honorary Physician to the Hospitals; Inspector of Eaux-Bonnes; Honorary President of the Société de Thérapeutique; Honorary Member of the Royal Belgian Academy of Medicine, etc.

NINTH EDITION

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VOLUME II.

18819
4. 3. 24

NEW YORK
WILLIAM WOOD & COMPANY
27 GREAT JONES STREET
1880

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WILLIAM WOOD & COMPANY.

TROW'S
PRINTING AND BOOKBINDING COMPANY,
205-213 *East 12th St.*,
NEW YORK.

TRANSLATOR'S PREFACE.

THE work, of which the main portion is here presented in translation, may be said to have a historic, as well as a practical interest.

The first edition was published in 1836–8; and the independence and originality of its views, and the genius, erudition, and tact of their presentation, gave it at once the position of a classic in medical literature.

Armand Trousseau, the leading author of this work, commenced life as a teacher of rhetoric, but was soon induced by Bretonneau to enter upon a medical career. He was appointed physician at the Hôtel-Dieu in 1832; Professor of Therapeutics and Materia Medica in 1839, and Professor of Clinical Medicine in 1852. He died in 1867, aged sixty-five, having for the latter half of his life enjoyed the reputation of one of the most brilliant of medical orators. This reputation, however, should not be allowed to overshadow his more solid excellences as a shrewd observer and a skilful therapeutician. He was a leader in the modern movement in the direction of medical scepticism, which has produced such remarkable fruits. As a souvenir of those times, we may be allowed to point to Jacob Bigelow's "Essay on Self-limited Diseases," read to the Massachusetts Medical Society in 1835, the year in which Trousseau was preparing to print his great work, and which led the reform in our own country.

Trousseau's discussions of fundamental principles may possibly seem to some extent unnecessary, from the reader's own modern point of view. This question of antiphlogistic treatment, for example, is argued with a refinement which may seem superfluous, as addressed to an age which has almost banished bleeding from its practice. It

should, however, be borne in mind that the principles argued are not obsolete, and can never become so.

A considerable portion has been left out in this translation, amounting to 980 of the original 2,196 pages (exclusive of indexes). This omission was necessary, in order to bring the work within suitable limits for publication in this library. The omitted portions are as follows:

1. The pharmaceutical details.

2. Descriptions of the physiological action of drugs.

3. Articles on Milk, Raw Meat, and Pepsin; on Magnetism, Electricity, Acupuncture, Massage, Gymnastics, and Flagellation; on Hydro-therapeutics and Caloric; and a small number of drugs of little importance.

4. The Introduction, 110 pages in length, containing a historical account of the progress of medicine from the earliest ages.

The translation is made from the latest (ninth) edition of the original, published in 1875 and 1877, under the direction of Professor Pidoux. This edition and the preceding one (eighth) were revised by M. Constantin Paul, who, however, has carefully avoided making any change which should alter "its original character and the stamp of the times when it was written."

Some errors of the pen have been corrected by the translator—such as "plus" for "moins," "efficacité" for "inefficacité," "tonic" for "toxic," and the more obvious mis-spellings of English and German names. Such other liberties as have been taken have been entirely in the interest of the reader; and it is hoped that the present text is not an unfaithful reproduction of the original.

D. F. LINCOLN.

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THERAPEUTICS.

CHAPTER V.

ANTIPHLOGISTIC TREATMENT.

SECTION I.

General Idea of Antiphlogistic Treatment and of the Diseases in which it is Specially Indicated.

USAGE and imprescriptible convention determine, better than any definition, the sense of the expression "antiphlogistic treatment." Without forming a precise limitation, every physician connects these words with the modification which may be produced in the system by bloodletting, diet, drinks, emollient and temperant applications, when used for the relief of diseases which are characterized by morbid superexcitation of the whole or a part of the vascular system (fever and inflammation).

Other remedies than those we have just named are no doubt capable of producing this effect. Who is ignorant of the potent antiphlogistic action of the antimonials, the mercurials, alkalines, purgatives, etc.? But these agents have special powers, which do not act immediately upon the circulation and the animal heat, but indirectly, through a primitive action upon nutrition, the secretions, the nervous system, etc. The antiphlogistics proper, on the other hand, merit their special denomination by acting primarily upon the apparatus for the circulation of the blood, from which action all their other effects are derived. They are such *par excellence*, and no order of therapeutic agents better deserves to be so termed.

It seems to us wholly superfluous to study here the effects of antiphlogistic treatment upon the healthy man. Who does not know these effects? Besides, they have already been described under the list of disorders produced in the system by diet, bloodletting, and hæmorrhage, and those morbid conditions called anæmias and cachexias.

There are, then, certain morbid states—those, for example, which we have recalled—which may sometimes be produced beneficially; just as an

artificial plethora must be produced in the cases where the effects which antiphlogistic treatment produces constitute the disease.

But the important point is, to determine the cases in which the physiological effects of bloodletting and the accursory methods of antiphlogistic treatment are particularly indicated.

The acute diseases furnish the greatest number of such indications. If they occur in chronic diseases, it is almost always owing to the intervention of acute symptoms of morbid superexcitation of the circulation, forming an apparently active fever or inflammation, sanguine congestions, hæmorrhages, etc. There is then an opposition between the nature of the primitive disease and that of the accidental symptoms; while in acute diseases proper, the symptoms and the affection to which they belong are harmonious in type and nature. In this opposition and this harmony is found the reason for the different relations in which these two classes stand to antiphlogistic treatment.

Finally, in addition to these two great classes, bloodletting is often indicated in a great variety of pathological circumstances which are called accidents rather than developed diseases.

We shall study this treatment—

1. In acute diseases.
2. In chronic diseases.
3. In the third order of morbid conditions just mentioned, which we designate generally as *morbid disturbances of circulation*, including plethora, congestions, and hæmorrhages.

We ought, perhaps, to begin our study with an examination of the indications for antiphlogistic treatment in the latter order of morbid phenomena, inasmuch as they are more simple, more akin to the physiological state than diseases properly so called, and usually constitute predispositions to acute disease, complications of such disease, or transitions from the physiological state to chronic disorders.

To treat these three subjects fully, would involve an entire course on the pathology and treatment of all the affections of the circulatory system, considered as the seat of fevers, inflammations, congestions, and hæmorrhages. We must limit ourselves, however; and the best way to do this seems to be, to select a few examples from each of our divisions, leaving to the reader the task of making wider applications. Whatever difference there may be between the indications for bleeding in two species of disease of one genus, the difference is no greater than what must often be observed in the use of one remedy for two persons with the same disease.

We shall pay most attention to the indications for bloodletting in acute disease. In order to be faithful to our plan, we shall multiply the examples for this class, and shall indicate, in a merely general manner, the principles upon which this powerful treatment should be used for chronic diseases, and for those morbid accidents which reveal an idiopathic disturbance of circulation, but cannot be strictly classified.

Before entering on details, we must state, in a few pages, the distinctive characteristics of fevers and inflammations, both in acute and chronic disease, from the point of view of antiphlogistic treatment.

We know of no acute disease, outside of the two classes of affections which nosologists of all times have called pyrexiæ and phlegmasiæ; and every one knows the difference between fever and *a* pyrexia, between inflammation and *a* phlegmasia.

Fevers or pyrexiæ are acute diseases forming distinct species, in which the fever is the common and dominant symptom; they are not hereditary, do not appear to depend on a constitutional vice, are often reproduced by contagion or infection, attack all persons without distinction (although each species affects more especially a certain age), and many occur only once in the same subject. They are, further, usually produced by influences which at present are so far above man's prevision and power, that when they exist they are said to "reign," and seem to be diseases of populations rather than of individuals.

A great many of these characteristics belong to the phlegmasiæ also. But the latter seem, much more frequently than fevers, to be produced by accidental causes, atmospheric vicissitudes, the influence of hygienic agents, etc. This difference will by and by furnish us with a special subdivision of acute diseases. But we may say that when phlegmasiæ present the general features, which have been noted in pyrexiæ, they do not essentially differ from the latter. This is the more intelligible, as fevers themselves rarely finish their whole course without the development of phlegmasiæ, which represent in all their phenomena the general properties of the species of pyrexia of which they are the particular forms.

The principal point of distinction between fevers and phlegmasiæ is, that in the latter the local inflammation is the primitive and important fact from which all the rest must be judged. The other determinations of the disease, especially the fever, are subordinate to it; they generally increase, diminish, and cease with it. In fevers the relation is altered; it is then the fever which dominates, and unites all the other morbid determinations, even the phlegmasiæ. In the latter, the general affection of which the fever is a special manifestation, is secondary to the inflammation. In fevers, local affections, if any exist, manifest themselves especially by inflammations, which are secondary to the fever; the fever forming the primitive disturbance and representing the disease more particularly.

Several distinctive points of a high therapeutic interest depend on these mutual relations.

The most remarkable of these differences is the latency of the phlegmasiæ that develop during pyrexiæ. Multiple and disseminated inflammations, of the gravest sort, originate without the patient's knowledge; and even to the physician they are not revealed by any immediate symptoms referable to the organ affected. Anatomical facts, physical

signs, sometimes morbid products, are the only indices of these local lesions.

It is otherwise with symptomatic fever in primitive inflammations. It causes pain, discomfort, derangement of functions, very painful morbid modifications of sensibility. In phlegmasias, also, the inflammation generally produces graver local symptoms; while the patient feels his disorder much more sensibly, and the physician marks it much more distinctly, than is the case in pyrexiæ. Examples easily occur to every one. Free primary pneumonia, compared with secondary pneumonia developed during the course of pyrexias, presents distinctly typical differences.

This latence or obscurity of symptoms in one case, compared with their easy development in the other, can be easily understood. In primitive inflammations the part threatened is in its normal state; it possesses all its sensibility and power of reaction when the morbid stimulus attacks it. It is but natural that the functions of the part should be disturbed, that its sensibility, its proper movements, and its sympathies should be aroused, that the patient should have acute suffering, and that the physician should observe immediate external changes which of themselves betray the seat of disease.

In the pyrexiæ the conditions are different, and the explanation of the latency of inflammation must also be different.

When these secondary inflammations are developing, all the parts and all the tissues are already in a morbid state, which modifies their susceptibility. They are diseased, in a certain way; for the expression *morbi totius substantiæ* is applicable to the fevers. The capillary vessels, especially those of the part which is to be the seat of inflammation, are very closely related to the great vessels, and share in the disease more than any other part does; so that, when they become inflamed, the whole process is shut up in them, and is performed vegetatively, without arousing *consensus*, or painful sensations, or remote sympathies, or any of the special synergies of the organ. The morbid state extends, also, to the other parts, and none of them react as they did when excited under conditions of health; while the morbid sympathies, which might be evoked by nascent phlegmasiæ, lose themselves in the general phenomena of the disease.

Let us also remark that the secondary inflammations of pyrexiæ have a much greater tendency to scatter, to breed like the exanthemata, than have the primitive phlegmasiæ. They end in suppuration much less easily, and generally affect the character of bastard inflammations (we except the case of a purulent fever). This is why the inflammation in primitive phlegmasiæ is very dangerous, as compared with secondary phlegmasiæ, in fevers.

Another capital difference between the fevers and the phlegmasiæ, is that, in the latter, the symptom of fever offers many more curative indications than the same symptom in pyrexiæ. The physician pays much more attention to the fever in treating phlegmasiæ than in pyrexiæ. The

latter are generally developed in a preordained manner. We may simplify and moderate them, but not stop them; and art does not usually profess to do so. It is otherwise in the frank phlegmasiæ, especially when they occupy an important organ. We may seek to cut them short; and if we are in season, and the patient is sound and vigorous, we may succeed. In these diseases the fever is the therapeutist's chief guide, because (excepting a circumstance of which we will speak later) it is a pretty exact index of the severity of the phlegmasia.

In the pyrexiæ, when not ataxic or malignant, the fever forms the most certain and valuable index to the morbid condition and the state of the forces. But in respect to prognosis and treatment its signification is quite different. A physician who should draw from a given degree of fever in a pyrexia and in a phlegmasia the same indications as regards bleeding, would fall into dangerous excesses. The treatment of primitive phlegmasiæ is and ought to be much more active than that of pyrexiæ, and in particular, more active than that of the phlegmasiæ which appear in the course of pyrexiæ, upon the progress of which art has but a very limited action.

The number, extent, and intensity of phlegmasiæ in fevers form a better test of the gravity of the latter than the intensity of the fever affords of the severity of phlegmasiæ. This is owing to the fact that there exist certain individual susceptibilities to fever which sometimes make this symptom seem grave in trifling affections, and *vice versa*. But in the presence of phlegmasiæ accompanying a fever, to whatever cause they may be due, we should always see a proof of unusual severity. This double consideration is of great importance in relation to bloodletting; it may restrict its use in the former case, and permit a more liberal employment in the latter.

The phlegmasiæ which develop during the course of fevers do not all possess the latency which we have above noted. Some are heralded by pain, by special functional disturbances, by symptoms; pneumonias, by cough and stitch in the side, enteritis by pain in the bowels upon pressure, colics, tenesmus, etc. These intercurrent phlegmasiæ are not the true phlegmasiæ of these fevers, but rather complications depending on the existence of pre-existing inflammatory tendency. The blood which is then drawn always has an excess of fibrin, an inflammatory cast which does not exist in the blood of those who have only the phlegmasiæ proper to their fevers. In these exceptional cases, bloodletting may be carried much further than usual, even if we suppose that the superinduced phlegmasiæ are less extended or less numerous than latent phlegmasiæ which belong to pyrexiæ.

It sometimes happens that grave phlegmasiæ, which are not frank in crisis, or which end unfavorably, are followed by a number of phlegmasiæ of various degrees of severity, with a fever which seems no longer symptomatic, but the leading feature. These consecutive phlegmasiæ, as regards the mode of their generation and the indication for

bloodletting, are classed with those which are allied to the pyrexiæ. Perhaps they require still more reserve in the use of this class of remedies.

The distinctions which we have just drawn between fevers and phlegmasiæ, in regard to their comparative prognosis, and their indications for antiphlogistic treatment are generally confirmed by comparing the condition of the blood. In phlegmasiæ the proportion of fibrin is increased, while in fevers, though sometimes at the normal standard, it generally has a marked tendency to diminish in quantity. This inverse proportion of one of the most important elements of the blood is connected with what we have previously said of the difference between these two great classes. It also aids in explaining some such points as the tendency to congestion rather than suppuration, the bastard rather than the free development, in inflammations supervening upon fevers.

In regard to treatment, which is what most concerns us, we may say that the hæmatology of phlegmasiæ and of fevers is in accordance with medical tradition and modern clinical science. We should not make the excess of fibrin in the blood in phlegmasiæ, and its diminution in fevers, an absolute proof of the indication or the contraindication of bleeding. We shall give special attention to this double point when we speak of bloodletting in inflammatory rheumatism and severe fevers. We will here simply note that if the fibrin increases in phlegmasiæ, and is lessened in fevers, the proportion of globules, which form an equally important element, undergoes an inverse increase and diminution. Let us also note that the various congestions of the parenchymatous organs are more common in fevers than in phlegmasiæ, and that local bleedings, particularly wet cups, have a field for employment in fevers which they have not to the same extent in phlegmasiæ, as being a means of avoiding general bloodletting, which is sometimes dangerous.

The increase of fibrin is peculiar to one species of phlegmasiæ, those which are frank and frankly primary. In many classes, as erysipelas of the face, catarrhal angina, and many other phlegmasiæ of the mucous membranes, especially when epidemic, the proportion of fibrin in the blood is not increased. It is true that these affections form a sort of mean between fevers and phlegmasiæ. This has led certain pathologists to group them in an intermediate class, under the hybrid denomination of fibri-phlegmasiæ.

Erysipelas of the face, small-pox, erythema nodosum, scarlatina, and in general the eruptive fevers, belong to this class. We can find grouped there the marks which we assigned separately to fevers and phlegmasiæ, it is therefore inexact to say, as has been the custom lately, that "the proportion of fibrin is increased in phlegmasiæ, and essentially distinguishes them from fevers;" for this statement is true only of those called *frank* or *sane*. When, therefore, we have to deal with one of these phlegmasiæ which approach the character of pyrexiæ in several of the points on which we have touched, and like them indicate a grave morbid state

of the whole system, or which have a calculable and necessary evolution, terminating in recovery, we may be sure that bloodletting will only be applicable when their great intensity will interfere with the regular development of the affection. The blood will then also very often present the excess of fibrin which exists in frank phlegmasiæ. And, in fact, this increase of inflammation will often depend on the individual complication of an inflammatory condition properly so called.

Antiphlogistic treatment is not equally indicated in all these classes of fevers, or in these distinct sorts of irritation of the capillary blood-vessels.

In the phlegmasiæ and the fevers which have as their basis a primary affection of the common vital functions, antiphlogistic treatment may fulfil pressing indications, but only on condition that the general affection of which the fever or the inflammation is a sign does not possess from the outset an essential tendency to the dissolution of organic material.

Many fevers and phlegmasiæ reveal this antiplastic tendency primarily in the elementary vital functions. We ought, then, to distrust bloodletting; but we may place it in the first rank among remedies, when the fevers and phlegmasiæ belong to classes in which the morbid life has a marked plastic tendency, and stimulates the tissues and the blood to organic productions, vascular formations, etc. These general rules may have exceptions in cases of individual patients, or of medical or epidemic constitutions [special atmospheric states].

The morbid superexcitation, or the idiopathic irritation of the capillary blood-vessels, and that of the great circulatory system, form, each in connection with its special causes, in the former case, fluxions, acute congestions, mobile, non-suppurative, inorganic or rheumatoid phlogoses; in the latter, angiotenic fevers, such as certain inflammatory fevers, gouty and rheumatic fevers, etc. These primitive morbid superexcitations of the capillaries and the great vessels, so common in practice, and susceptible of infinite individual shadings, the nature of which is constantly mistaken in our clinical teaching, giving rise to so many false prognoses and treatments, give indications for antiphlogistic treatment which are delicate and often very hard to seize. Of all fevers and local inflammatory affections, these seem, from the physiological point of view, to call the most imperiously for bloodletting, for the causes which produce them act directly on the vessels themselves.

But if we consider that the persons in whom we observe these affections are quite generally nervous, or subject to gout or rheumatism; that these fevers and false phlegmasiæ do not alter the tissues, nor engender organic lesions, etc.; that they are essentially chronic or constitutional and liable to relapse, we shall take care not to push the bloodletting as far as the febrile symptoms and the union of the four signs—heat, redness, swelling, and pain—might lead us to do.

We shall very soon see, by the degree of gravity of the general condition and the state of the strength, by the mobility of the local affec-

tions, the good aspect of the mucous membranes, the normal character of the natural secretions and functions, the rapid development of morbid bruits in the vessels, etc., that in such cases antiphlogistic treatment ought to be kept far within the limits which a superficial appreciation of the symptoms and the nature of the disease might seem to exact.

At the end of this chapter, in connection with plethora, will be given many therapeutic precepts, which may complete the preceding statement.

We shall say nothing of antiphlogistic treatment in the acute fevers and congestions which occur in neuroses under the influence of morbid superexcitations of the nervous system. In such affections this treatment is applicable only very exceptionally. We must refer the reader to *Antispasmodic Treatment.*

The above are the generalized considerations in regard to antiphlogistic treatment in fevers and phlegmasiæ, which we desire to present before entering upon a closer study of its application to each of the chief classes of acute disease.

In concluding these necessary preliminaries, we have a few words to add in regard to the fundamental distinction between acute and chronic diseases, the importance of which, in antiphlogistic treatment, is of the first order.

Acute diseases, as we think, form an order quite apart and without any natural relation to chronic diseases. Their difference depends much more on this than on their duration or type, etc. The latter may depend on circumstances capable of modifying acute and chronic diseases, but incapable of making them such, as the school of systematic nosologists persists in allowing them to do.

Until now, the difference between acute and chronic diseases has only been sought in characteristics of the second order. Therefore, as everything which is unessential may be removed without destroying a thing, the foundations for general notions and classifications have differed.

Sydenham marked the difference between acute and chronic disease most profoundly, and as broadly as possible, in the words, *Morbos acutos qui Deum habent auctorem, sicut chronici ipsos nos.* It is impossible to go further in the distinction ; but it is also impossible to stop short of this, without running the risk of arbitrary and formal distinctions. Sydenham's is the only one that is founded on the nature of things. By God as the author of acute disease, as opposed to man the author of chronic disease, Sydenham means that the causes of acute diseases are outside of us, residing in invisible influences, placed above the power of individuals; and that we can no more produce them complete, prevent them, or arrest them by private hygiene, than we can by the resistance of strong health or a robust constitution ; whereas the individual is the artisan of his own chronic diseases. The latter, in fact, have their roots in the constitution of each individual—in that which is fixed, universal, permanent in each organism, and for this reason are hereditary. Acute diseases, on

the other hand, point to transitory morbid dispositions of the system, which the fact of the disease exhausts and brings to an end.

If the known agents of hygiene ought to be regarded as assuredly incapable by themselves of producing acute diseases, whether specific, or of a common order, this is especially true of them when the latter assume an epidemic type. The power of assuming this type forms an essential mark of true acute disease, which separates it radically from chronic. We would go so far as to say that a disease of which the cause is external without being physical, and without proceeding from an alteration or misuse of hygiene agencies, cannot be a chronic disease; and reciprocally, that a disease of which the cause is constitutional, peculiar to the individual, hereditary, can be neither an acute disease nor an epidemic; so true do Sydenham's words seem to us.

Now, since epidemics are dependent on exterior causes, but do not proceed from faultiness or ill-use of physical and hygienic agents, we ought not to be surprised that the old observers could not understand the development of an epidemic without supposing that the atmosphere possessed some vital quality, which might experience alteration or disease as our own life does.

Is this principle accidental or essential to our atmosphere? Has it a normal state and modifications of that state, and does it thus rule over the health and the diseases of populations? Do those great movements of public health depend on it, which we call *epidemic constitutions, stationary or accidental medical constitutions*, etc., and which have the very remarkable characteristic of acting like an individual disease, which, like the latter, have their opportunity, their invasion, their status, their decline, their transformations, crises, anomalies, etc., and which seem thus to indicate that one single cause governs their development and progress, etc.? These questions are reserved for the future to answer; but they should be stated, and should receive the beginning of a reply now. In any case these medical constitutions are no abstraction; they are no more the result of the mere aggregation of all individual cases which arise under their influence than an individual disease is itself the result of the aggregation of its characteristic lesions and symptoms. In this hypothesis, and in others which might be proposed, this place would be filled by the *quid divinum* of the old pathologists. Although unknown, this cause is neither occult nor mysterious. We now suppose it, to explain facts which without it are inexplicable; it will one day be recognized and studied positively, as electricity and magnetism now are, after a long night passed among "occult" causes.

It would be greatly mistaking our view to suppose that we deny that the violent or irregular action of hygienic agencies may excite in us some acute diseases. We only say that, omitting their direct physical or chemical action, these agents produce these diseases only by exciting the explosion or modifying the phenomena of the real efficient cause, which always consists in a morbid disposition. Now this disposition is of two

sorts. We have characterized the former by saying that the diseases which it gives rise to are analogous to living species, and that they, like the latter, become extinct after a predetermined period. We stated that their essential character is the absence of chronicity, heredity, etc. It is not so with those of the second sort, which we would call *acute-chronic diseases.*

Their accessory phenomena have an acute type, in by far the greater number of cases; but their special nature makes them resemble chronic diseases, for, if we may say so, they are much more individual than the preceding, and are connected, much more than they, to conditions of temperament, hygiene, heredity, etc. They are, we repeat it, the acute-chronic, or hereditary, diseases. For a good example, we will name acute articular, or inflammatory, rheumatism. Whatever acuteness this affection may have, it certainly is more nearly connected with a chronic disorder than with the acute disorders of the preceding class, such as small-pox, or even influenza. Among the phlegmasiæ there are many diseases to be studied, acute in an accessory element, chronic in special nature, and thus forming, as we stated above, a very natural subdivision which holds a mean ground between acute and chronic diseases.

It is needless to complete the distinction by describing the essential signs of chronic disease in the spirit of Sydenham. They are such as we have excluded from the true acute diseases, and have partially admitted in the acute-chronic.

It follows from the above, that in applying antiphlogistic treatment to the first order of these diseases we should consult the general character of the disease much more than the individual physiological condition of the patient; if it be an epidemic, we should attend much more to the genius of its constitution than to that of the patient; while, on the contrary, in applying the treatment to chronic disease, we ought to consider the patient much more than the disease, and the temperament of the subject much more than the nature of the accidents observed in him.

In a word, in acute disease, indications for bleeding are drawn far more from the nature of the disease than from that of the symptoms. In chronic disease, on the contrary, the indications will be taken much more from the nature of the symptoms than from that of the disease. This distinction, taken from the therapeutic point of view, recalls and confirms what Sydenham so thoroughly established in regard to the respective nature of these two classes.

These differences required the more attention from us, as the symptoms which convert constitutional diseases into acute, are always those of fever and inflammation, which may naturally indicate bloodletting; and the case is similar when chronic diseases accidentally present the same indication.

Section II.

On the Use of Antiphlogistic Treatment in Special Acute Diseases.

The acute diseases might be fairly well classified, in a very general manner, according to the more or less distinct indications for antiphlogistic treatment which they present.

At the head of such a list would stand the phlegmasiæ and the inflammatory fevers *par excellence*, or those in which there is no evidence of an essentially destructive morbid principle, a disorganizing force which directly attacks life, or even a constitutional cause, behind the symptoms and the lesions of the inflammatory act. It is this first class of acute diseases that Hunter called healthy, and Stoll designated by the perfectly correct term natural phlegmasiæ, natural inflammatory fevers, *inflammationes genuinæ, febres inflammatoriæ genuinæ*. What is the meaning of these favorite expressions of his? The illustrious clinicist doubtless means that of all diseases these possess a principle which is in itself the least harmful, the most natural, and the least remote from the state of health; they are the diseases which least disorganize the parts, whose products have the greatest tendency to become organized, and whose symptoms, progress, etc., have the greatest resemblance to the performance of natural functions. Everything that we see in these diseases, the febrile reaction, various inflammations, etc., is legitimate, and does not mask a specific affection; in other terms, the basis of the disease is related to the symptoms. It is then, in short, that we can say that the disease manifests itself by its natural symptoms; for in combating these manifestations by the remedies which they physiologically require, that is, by their contraries, the entire disease is combated at once.

There are other diseases, which, while they manifest themselves by intense fever and phlegmasiæ, are internally caused by a specific, or rather an unhealthy principle. This principle is neither inflammatory, nor febrile, nor catarrhal, nor nervous, nor bilious, in itself, though it may produce any of these conditions, but it gives its name to the whole disease and its nature to all the symptoms. If there exist inflammatory and febrile symptoms, however intense, they obtain from their generative principle a specific quality which modifies their therapeutic sense, so that physiological indications become secondary, and subordinate to those which are furnished by our empirical knowledge of their efficient cause, whether the latter be called the variolous, morbillous, scarlatinous virus, or what not. If the symptoms and their lesions are attacked by the remedies which are physiologically indicated, or as we say, rationally, the nature and the root of the disease are not attacked. More than this, if we neglect the specific nature, and attempt to conquer the fever and phlegmasiæ as if they were frank and healthy, we deprive the system of the forces which it furnished to the morbid principle to enable it to develop

and exhaust itself, and the latter, deprived of the regular conditions of evolution and extinction which it had found in the fever and the inflammation, shows its power by the most incalculable phenomena, by effects which are always grave and often pernicious.

But between these two extremes, we may place phlegmasiæ and special fevers which we will term constitutional. In their relations to antiphlogistic treatment they stand midway, and form a transitorial link; such are the rheumatic fevers and phlegmasiæ.

We shall, therefore, study in succession the indications and the counter-indications for antiphlogistic treatment in some of these diseases, following, as far as possible, the order which we have indicated, as representing fairly well the relative importance of this treatment in the different cases.

We shall see clearly that the ideas we have just stated were indispensable preliminaries, for they will be found at the basis of all our views regarding the use of antiphlogistics.

Antiphlogistic Treatment in Frank Phlegmasia.—Pneumonia.

A young and robust person, whose constitution is vitiated by no hereditary or acquired diathesis, is placed under the regimen and the hygienic conditions most favorable for developing the sanguine plethora to which he is predisposed. In the midst of this state of health, which cannot become more florid without degenerating into a morbid condition, he exposes himself, at the vernal equinox, while heated and sweating, to a cause which chills and arrests perspiration: an intense inflammatory disease appears, and soon we see a frank pneumonia, or an acute pleurisy, or some other phlegmasia occupying some visceral serous membrane, etc. Such is the type of an acute, frank, simple, non-specific inflammation. Such is also the case in which, twenty-five years ago, blood was generally let *larga manu et iteratis vicibus.*

It does not follow that, even in a case so favorable to the success of a liberal antiphlogistic treatment, we ought, with closed eyes, in obedience to a fixed formula, to exceed the indications, and subordinate them to the demands of the formula. It is indispensable that the formula be subordinated to the indications; for the formula becomes almost mechanical, when it is not thus subordinated.

A patient appears with all the marks of the beginning of a frank pneumonia. Antiphlogistic treatment is clearly indicated. Must we apply systematically the formula which prescribes, for example, the letting of 2 kilogrammes (4 pounds) of blood in the space of forty-eight hours? No; for after the first bleeding, seconded by tepid pectoral drinks, the patient may fall asleep, and a general and salutary perspiration follow.

But the fever persists, though tempered by the bleeding and the

sweat, and so do the local symptoms. Shall we rudely interfere with a fresh bleeding? We must distinguish. If, in spite of the continuance of the febrile movement, and the local condition, indicative of the first degree of fluxion to the chest, an abundant perspiration coincides with a pulse which is softened and less frequent, though still developed (that is, the pulse which belongs to critical sweats and chiefly to those at the crisis of acute thoracic diseases, of which Borden says that it is "soft, full, dilated; the pulsations are equal; in each beat there is felt a sort of undulation, so that the artery dilates in two *temps*, but with an ease, a softness and a gentle oscillating force which clearly distinguish this pulse from others"); the patient breathes more freely; the cough is soft and mucous, the sputa, though bloody, easily discharged, the head free, the attitude natural and easy, the expression free from anxiety, the color of the face clear, well-blended, uniform, and without a tinge of jaundice, we must wait, and not interfere except to aid the process gently.

But if the sedation which immediately follows the bleeding (whatever be its remote effect) does not continue and confirm itself by the development of the critical series of symptoms above described; if the skin remains dry and the pulse high, frequent and hard; or if the sweat which covers it is distributed unequally and partially, as upon the hands and face alone, and if the sweat seems rather symptomatic than critical; if the pulse, weakened and concentrated, seems, in connection with the other symptoms, to denote oppression and fettering of the circulation rather than a real weakness, etc., nature awaits a second bleeding; we must hasten to perform it, and it may be done very soon after the first, in six or eight hours or less, according to the urgency of the indications.

Frank pneumonia, thus attacked at the outset, rarely resists. We may well say that no other treatment can or ought to rival it in this case, if it be directed from the first with intelligent energy. At this phase of the disease, antimonials alone could succeed so surely and rapidly; for we can affirm that in the conditions we have fixed—that is, when there is no element except the purely inflammatory one—we have a right to hope to arrest the pneumonia, if we can act during the first twenty-four hours of the characteristic symptoms. By this we mean not only the primary fever which sometimes precedes the invasion of the phlegmasia, but the stitch in the side, or the morbid respiratory bruits which indicate the first stage, as a pure dry crepitant râle beginning to appear in greater or less abundance in the midst of the normal vesicular bruit, or a certain brushing sound, or what is called the bruit de taffetas,* etc., or, finally, rusty sputa, or all these signs united.

A large number of cases of pneumonia are, unfortunately, still lost in the hospitals. This is certainly owing to the fact that they reach the

* A term applied by Grisolle to what he considered a peculiar form of bronchial respiration heard in the beginning of pneumonic consolidation; the sound resembles that produced by rubbing taffeta, a heavy kind of silk.—TRANSLATOR.

hospital at the close of the first stage, or during the second stage, or else because the disease is complicated by another special morbid state of which the pneumonia is but the incident. But in private practice, where the physician is usually called at the beginning, we can affirm that we have often moved perfectly marked pneumonias in the space of twelve or twenty-four hours, by means of two bleedings, often even one, sometimes followed by the application of fifteen or twenty leeches to the affected side.

When we are so fortunate as to see the birth of a frank pneumonia, as it were, ought we at the start to make a large bleeding, say four or five basins, or one of two or three basins only, in the expectation of repeating the same dose soon after?

In such a case, if the subject be a vigorous adult, we think that the treatment should be opened with a very copious bleeding, to a considerable reduction of the pulse and syncope if possible, in order to bring about an extreme sedation of the pulmonary tissue, and to insure that any fresh fluxion shall be as late and as weak as possible. Thus we may obtain the rapid resolution of which we spoke above. If the symptoms return in spite of this abundant and rapid loss of blood, subsequent bleedings must be smaller and at shorter intervals.

If the second stage of fluxion has developed before the physician is called, there may be two cases.

In the first case, the origin of the disease is very recent; the passage to the second stage has been very rapid, and the strength of the patient is still fresh. We may then begin with an abundant bleeding, though not quite so full as in the former case, with liberty to repeat it without loss of time

In the second case, a long time has been required to make the transition from first to second stage; after five or six days—as we have seen more than once—the second period is hardly marked; then the first bleeding must be less full, and those which follow must be performed sooner. In a word, they must be made smaller and more frequent in proportion as the disease is advanced, the patient's strength enfeebled, and his vital resistance less energetic, whatever may be the cause. It does not follow that we ought to neglect to repeat them often under contrary conditions, but only that we may then make them freer and at longer intervals.

It is certain that frank pneumonia is, of all diseases in general and of all inflammatory diseases in particular, the one in which most blood may be drawn, and the bleedings practised at the shortest intervals. We need not fear, especially during the early days, and when it has not yielded at once, to practise two or even three small general bleedings in the twenty-four hours; or better, two small general bleedings and between them one local bleeding by leeches or wet cups, if convenient. This method may even be recommended for the next day, and reiterated with advantage. We have seen it followed on the next day but one, also, and still later (subject to proper restrictions, owing to the diversity of cases), with

laudable vigor and complete success, at a period when we generally think it necessary to abandon the practice, and when the partial or entire failure of former attempts has led us to regard it as unsuitable. At the hospital of La Charité at Paris, in the clinical service of Professor Bouillaud, may be seen every day the immediate and very special effects of this bold practice, called by its author the method of bleeding *coup sur coup*.

We have a multitude of reservations to make concerning the employment of this method, which, while it may be heroic to cure, may be equally so to destroy. It is so easy to obtain equally certain results, with successes as numerous and less dangerous, at less cost, and with a greater economy of blood and strength, that while we recognize those of M. Bouillaud, we cannot advise the absolute use of his method or his formulæ. With a few centigrammes of kermes we may spare so much blood; blood which we only shed to cut short a disease which in reality can very rarely be cut short.

Frank pneumonia, true fluxion of the chest, in young, strong and healthy persons, is not a disease to be much feared. The least active treatment is then the best. The phlegmasia resolves itself. An application of wet cups to relieve the pain in the side, which is so troublesome at the beginning; 10 centigrammes (gr. 1½) of kermes or 5 of tartar emetic per diem to lessen the fever and aid expectoration, suffice to bring these pneumonias to a favorable state. With the intemperate and too ambitious antiphlogistic treatment of M. Bouillaud, we do not know what we are doing; we deprive ourselves of those crises—which hardly ever fail and are always salutary—the diuresis and sweats from the seventh to the eleventh day; and we lose the quiet circulation, the general soothed condition, the preservation of strength and the rapidity of convalescence which are observed when the natural method is followed, as just described.

There is no disease more similar to facial erysipelas than pneumonia, when we regard it in its progress and nature, and eliminate its local features. The importance and the function of the affected organ, however, constitute important differences. These differences form our only justification for interfering in pneumonia, while we confine ourselves, as a rule, to observing the course of erysipelas of the face. The difficulty consists in doing justice to the inevitable necessities of the disease and the indications furnished by its violence and its severity. With bleedings, one is very liable to depress the patient's strength without lessening the increasing force of the disease. When the aim is overshot, we have in our hands a debilitated patient, struggling with a disease which has lost less of its intensity than the patient has lost of his resisting power. This is especially the case in patients whom pneumonia has surprised in bad states of health, of vital equilibrium, or of age. And these are the only really dangerous cases, the only ones which require all the sagacity of an experienced physician, for pneumonia which is frank, or in frank subjects

—that is, those healthy and pure of all adynamic or typhoid conditions—is not in question, since in these patients the disease always terminates naturally and favorably.

How late may we bleed in frank pneumonia? The question has been asked a thousand times, and has not failed to receive absurd and dangerous replies. We can and may bleed as long as there is an indication for doing so.

Aretæus and Celsus, followed by Boerhaave, forbid the practice of bleeding after the fourth day in an acute disease. In this point they were unable to rest upon the authority of Hippocrates, who bled Anaxagoras on the eighth day of a pleurisy. Baillou, Sydenham, Stoll, Rivière, Baglivi, have imitated him. Triller and Huxham often bled on the eighth, ninth, or tenth day of a pneumonia. Guy Patin dared to bleed on the thirteenth day—an enormity which can only be explained by his enthusiasm for bleeding. We must therefore consider the disease and not the day, following the precept of Galen: *Quocumque die, mittendi sanguinis scopos in aegrotante inveneris, in eodem illud auxilium adhibeto, etiam si vel vigesimus ab initio is extiterit.*

But when in frank pneumonia there are unmistakable signs of the third stage, when the sputa are diffluent and of the color of prune-juice, when there are irregular chills, when the face becomes hectic and cadaverous, when diarrhœa appears, etc., it is far past the time for bleeding.

Not all pneumonias, then, are suitable for a pure and energetic antiphlogistic treatment.

In the first place, those of children are almost always unsuitable. They are rarely frank and lobar. In the immense majority of cases they are catarrhal and lobular. This is not the place for defining these two classes; we will only remark that this form, both in adults and in children, almost always has a special and more or less dangerous cause, from the mucous diathesis of children to the far graver causes which exist in measles, acute glanders, typhus, purulent fevers, etc. It is proper here to recall the general principle of treatment which was established at the beginning of the chapter.

To limit ourselves to the pneumonia of children, we will say that emetics and purges, especially tartar emetic, ipecac and calomel, deserve the preference above bloodletting. We may, and we almost always ought to, administer them *coup sur coup*, as we bleed in the frank pneumonia of adults, and the success is at least as certain. It is not absolutely necessary to forbid bleeding, but we may say that it is indicated only exceptionally. We have more than once seen unfortunate children devoured by leeches (that is the right word to use); thrown by general bleeding into a frightful state of anæmia, and existing, so to speak, only through a catarrhal pneumonia, which at last asphyxiated them. When they are robust and very full-blooded, especially during dentition, we may begin by applying leeches. But, we repeat, a few ounces of syrup of ipecac, or better, 2 centigrammes (gr. 0·3) of tartar emetic in a glass of infusion

of violets, renewed two or three days in succession; afterward calomel in purgative doses, and finally a blister to the chest; these are the surest and promptest means for treating the pneumonia which is characteristic of infancy. For irritable children kermes is preferable to tartar emetic.

The catarrhal, false, or capillary pneumonia of adults is scarcely more favorably affected by antiphlogistic treatment than that of children. Why then should we persist in treating it like frank pneumonia? In these cases, bleeding is hardly of use except to relieve the circulatory apparatus of a plethora *quoad spatium*. It certainly has very little effect on the disease, and we may apply to these grave morbid conditions what we said concerning infantile pneumonia, to wit, that it has an unfavorable tendency, in spite of bleeding; that bleeding, carried beyond a certain limit, aggravates the danger, and without doubt hastens its approach.

We have seen several cases of this sort in the clinical service of M. Bouillaud, and they surely had a hard experience of the formula for bleeding *coup sur coup*. Would other treatment have obtained more favorable results? It is possible; but it is certain that they could not have been more unsuccessful than those of the Professor.

M. Bouillaud knows nothing but his own method; and it is but little for him to say that he modifies it according to cases; the fact is, that he never *changes* it—which is what is often required. He thinks he makes a great concession when he draws a few ounces less of blood and removes a few of the leeches; but the treatment remains the same, the method is the same, and only the formula differs more or less.

His treatment consists in weakening the system and withdrawing directly some nutritive and stimulant principles.

His special method consists in making these spoliations at much shorter intervals than is usually the case.

His formula prescribes and specifies with distinctness the number of evacuations, the intervals to be set between them, and the amount of blood to be drawn in a given period of time.

When M. Bouillaud is forced to do so by weighty evidence or by one of those cases in which experience has assumed the form of an irrevocable verdict of common sense, he consents to modify his formula; but once more, the treatment and the method are often retained, when the method ought to be given up, and even the treatment sometimes abandoned.

What modifications in the antiphlogistic treatment of pneumonia should depend upon age?

To answer this question fairly, we must distinguish two sorts of simple pneumonia in advanced age. We will call the former *pneumonia in the aged*, and the other *pneumonia of the aged*.

Pneumonia in the aged scarcely differs from that in the adult, except in the age of the patient; that is, it does not differ in symptoms. It usually attacks vigorous old men, sound and well preserved.

We may then bleed, though very rarely, and taking care to do so *parca manu*, remembering that one bleeding too many is often irreparable in an old man. We even advise the concurrent employment of an antimoniated draught from the first day, in order to bring about a frank resolution as soon as possible. We should not forget that it is the more important to make a speedy cure of an old man, as, while the fever and the acute phlegmasia are readily brought down, there remains much to do after this result is reached. In adults, the first local and general signs of resolution are almost an earnest of cure, or at least of a convalescence which is always favorable. It is not so with an old person. We have very often observed that that which was thought to be convalescence was a more dangerous period of the disease than the acute stage. There is sometimes a diffuse catarrh. To this is added pulmonary œdema, a sign of imperfect resolution of the pneumonic engorgement; then points of lobular pneumonia appear here and there in the lungs, choked with catarrh and œdema. These peripneumonic points are very movable; they have sudden explosions and retrocessions. The rarefied vesicles of the old man make his lung resemble that of emphysema, so that it is not always easy to learn the precise existence of these partial and flying pneumonias through auscultation; the physician allows himself a fatal confidence; but soon the expectoration is suppressed, the face assumes a yellow, cadaverous and decrepit look, a tracheal râle upon inspiration is heard at a distance, and the latter sign is an indication of death, inevitable if not always directly impending.

We must, then, at the beginning, place bloodletting in front with caution, provided bloodletting be indicated by the previous temperament and habits; or rather, we should use tartar emetic with confidence, but in moderation; and as soon as a little improvement is seen, place blisters on the chest; afterward seize skilfully the opportunity for a light diet seasoned with a little rhubarb and aloes, in order that the digestive organs may soon bear soups, wine, and cinchona, to support the system through those pretended convalescences which are more fatal to the aged than pneumonia in its acute stage.

In their case we can hardly expect the critical sweats, which are so favorable to the adult; their skin is not suited to it. Tartrated antimony alone is able to excite this function; it has, furthermore, in the case of the aged, the inestimable advantage of aiding expectoration, the difficulty in effecting which is so often dangerous.

The other form, which we have called *pneumonia of the aged*, because it is special to very advanced age, has no concern with bloodletting. It is announced by none of the symptoms which belong to *pneumonia in the old*. There is neither cough, nor dyspnœa, nor pain of the chest, nor rusty sputa; in some cases there is no fever; in a word, it is latent pneumonia. There is a little confusion in the ideas or acts, a little anorexia and depression of force, or exaltation with loquacity; the cheek bones, especially that of the affected side, are of a strong brick-red on a subicteric back-

ground; there is some irregularity, or rather some intermittency, of the pulse, which is hard and high, and above all, dryness of the tongue. This is the symptomatic picture of this pneumonia, which very often is announced only by the last of these features, dryness of tongue. We shall not speak of the physical signs which may be furnished by auscultation and percussion.

This form of pneumonia is far more grave than the preceding; it is most always fatal. How many deaths are ascribed to old age, when the real cause is senile pneumonia!

We may begin with blisters on the thorax. As in chronic diseases, we must be more filled with the idea of the constitutional condition, and the patient's antecedents, than with the nature of his disease. Ipecac must take the place of tartar emetic; it is less weakening.

However heroic may be bleeding from the great vessels and the capillaries in pneumonia in general, the physician would often be reduced to impotence if he had only this remedy at command. Certain systematic physicians, when they have drawn up the rules for the use of bleeding in pneumonia, have exhausted all the resources of their art. But he who has once tried to employ other treatments, as those of Rasori and Laennec, will no longer have the courage to teach a sole reliance on bloodletting in pneumonia. He can no longer understand how one can willingly limit himself to this method, and can follow it till anæmia or death is produced. And nevertheless, one of these two effects must be encountered in certain pneumonias, which are too advanced to recede speedily, or which offer a singular resistance to therapeutic actions, and an almost invincible tendency to make progress and to spread.

The partisans of controstimulism claim that the simultaneous use of bleeding and of tartar emetic in high doses in pneumonia should be avoided, because (say they) these two classes of remedies are mutually destructive. They say that bleeding neutralizes or prevents the controstimulant effects of the emetic. The truth is that these two offer mutual aid and complement. Their efficacy, though identical in its ultimate effect—the cure of pneumonia—seems to us to reach that end by different actions.

The action of tartar emetic is more direct, that of bleeding more indirect. The former of these remedies seems to act not only on the existing fever and inflammation, but on the force which first produced them, which constantly maintains them, and will again develop them. Its controstimulant effects are produced primarily upon this morbid energy in which the entire affection is concentrated; this inflammatory disposition; this *stimulant diathesis*. It therefore attacks the disease as a unity.

Bleeding, on the contrary, like diet, but with more rapidity, takes from this internal force, which represents the unity of the disease, its aliment, the materials of inflammation.

It then acts only indirectly upon the dynamic element of pneumonia,

and directly on its plastic element. The case is the opposite with tartar emetic.

How, then, can these two modes of action be neutrally hostile? Who does not see that they aid one another, and concur to the same result by different roads?

It may certainly be affirmed that when tartar emetic acts well in pneumonia, it attacks it more profoundly than bleeding does; and that, if its physiological properties were not sometimes uncertain, if its action were not in danger of becoming exhausted or of failing to be developed, as is seen in some too tolerant subjects, it would have the advantage over bloodletting in respect to the rapidity and propriety of its immediate action.

This theory is but the statement of facts. The action of bleeding is naturally slow. We see that it only acts by removing from the phlegmasia its nutriment; that this is its special and direct action, and that consequently it attacks the inflammatory force only indirectly. Laennec had clearly observed the fact upon which this opinion is based. "By bleeding," said he, "we almost always lessen the fever, the oppression and the bloody expectoration, which makes the patient and his friends suppose that convalescence is about to commence; but in a few hours these symptoms acquire fresh intensity, and the same often happens five or six times in succession after as many bleedings performed *coup sur coup*. This is the very fact on which Bouillaud's method is founded. The essence of his plan is to bring the bleedings so near together that the second is performed before the occurrence of that febrile reaction and that sort of recrudescence, which appears soon after the sedation produced by the loss of blood, and so on with the third, the fourth, etc. Nothing shows more clearly how indirect is the action of bleeding in pneumonia. Doubtless it is an energetic remedy, but it imposes a considerable sacrifice upon the system; it is a last shift; and, however fortunate we may be in possessing it, we must confess that it exhausts the disease only by exhausting the patient.

Van Helmont has justly been reproached with his repugnance to bleeding; but it arose from a great idea. The bold vitalist sought everywhere the ideal of therapeutics, and this ideal is found in remedies which directly attack the principle of a disease. No remedy is more remote from this ideal than bleeding. It is found in sulphate of quinia in marsh fevers; mercury in syphilitic diseases; and, to return to our subject, tartar emetic in pneumonia.

Look at a pneumonia under the influence of this treatment; it is a very instructive sight. The patient, but lately devoured by the fever, harassed by dyspnœa, cough, stitch in the side, with a purple and congested face, etc., lies pale, covered with cold sweat, his pulse weak and slow, his breathing slow, almost in a state of syncope. What has brought him to this? He has taken two spoonfuls of an antimonial solution, and has had one or two nauseas, perhaps one or two stools; that is all. Do you

think this is a superficial and ephemeral change? A moment ago, the patient's tissues were swollen, his veins swollen and shining, his arteries full, hard, raised. What has become of this febrile plethora? Has the blood, leaving the exterior, become accumulated in the great vessels and the parenchyma? If that were the case, the patient should be a victim to considerable dyspnœa, apoplexies, etc.; but the fact is the contrary. More than this. We bled a person in pneumonia—his blood was very buffy. It is certain that if we had bled him again the same day, the blood would have given an equally large, if not a larger clot. Instead of this we gave the tartar emetic, and the patient experienced all its sedative effects. Six hours after the beginning of this treatment we drew 120 grammes (℥ iv.) of blood under physical conditions the most favorable to the formation of a buffy coat. There was not a trace of it, but the pneumonia was not banished, the stethoscopic signs remained, and, in order to obtain a full resolution, the treatment had to be continued. Laennec believed in expansions of the mass of the blood; from that point of view he was obliged to believe in the opposite state. We are inclined to apply this explanation to certain states which are otherwise inexplicable.

It is, nevertheless, impossible to refuse to admit that tartar emetic has a more direct antiphlogistic action than bleeding. The latter only aids the natural resolution of the phlegmasia; tartar emetic seems to produce it by an immediate virtue. This is doubtless a reason why it insures more fully against recrudescence. Laennec completes as follows the observation of which we quoted the first part: "I can affirm that I have never seen recrudescence of this sort under the influence of tartar emetic."

Let us conclude that, as bleeding and tartar emetic attack pneumonia, each in virtue of a property which, far from being opposed to the other, is in some sort only its coefficient; it is wise to use them together, from the outset, when the case is severe enough to require a vigorous treatment. The cases when bleeding alone satisfies the indications are those of pneumonias at the beginning of the first stage in young, healthy, and robust persons. Those in which we ought to use tartar emetic exclusively are quite rare; we must limit them to the case of a formal contraindication of bleeding in adults, due to idiosyncrasy, and to the case of pneumonia of the aged. Beyond this, it is wise to use both agents together. To reserve the use of tartar emetic for cases where, in spite of repeated bleedings, pneumonia has gone to the second or third stage, is a practice which deserves the severest condemnation. But what shall we say of those who deny any therapeutic action to tartar emetic in pneumonia, or who are afraid of its irritant effect on the digestive canal, when given methodically?

It is too commonly supposed that tartar emetic ought to be reserved for pneumonia in irritable and nervous persons, those for whom the debilitating action is feared. There is here a great danger to be avoided. These irritable subjects are very often dyspeptic, with weak stomachs, neuropathic, and the stomach is the source of this irritability and anæmia.

Tartar emetic ought generally to be avoided for this sort of stomachs, for two reasons: first, because in such patients it does not produce its powerful controstimulant effects; the latter are obtained with success in proportion as the organization is sound and robust. It produces excessive evacuations, violent contractions of the stomach, and develops a general irritability, with loss of strength and rapid emaciation, which do not arrest the course of pneumonia. The second reason is, because, after convalescence, the patient falls a victim to a series of dyspeptic troubles, anorexia, symptoms of nervous irritation of the digestive tract, which make his life one protracted illness. In these nervous and gastralgic patients bleeding is better borne than would be supposed, when the pneumonia is free, and ought to be preferred to tartar emetic.

In the pneumonia of the aged, tartar emetic has sometimes the serious disadvantage of acting too vigorously. It rapidly produces a collapse, which may lead to adynamia, a sort of poisoning from which aged persons do not always rise.

Antiphlogistic Treatment in Acute Articular Rheumatism.

After the frank and simple phlegmasiæ which constitute the ordinary acute diseases, and which, not being produced by a well-defined morbid principle, are the most nearly related to traumatic fevers and inflammations, there comes another class of acute diseases, characterized by a fever, and by phlegmasiæ, in no respect inferior in intensity to the preceding. This class, however, is distinguished by a special diathesis which, while retaining the general marks of acute phlegmasiæ and fevers of the same type, gives to them at the same time the mobility and irresolution of the neuroses.

We recognize by these traits our acute constitutional or acute-chronic class; acute in respect to symptoms, chronic, if not in the duration of the attacks, at least in the constitutional tendency which leads to their return, and which very often prolongs them in a sort of hectic form which of itself, as we shall see later, is enough to distinguish them essentially from true acute diseases.

The knowledge of articular rheumatism has gained much in our own times. The disease has been minutely dissected. Regarded anatomically, its study is as easy as possible; regarded medically, it offers an unbounded field full of unforeseen facts, of embarrassing shades, of innumerable affinities and transformations; and pathological anatomy has reaped a rich harvest, in proportion as medicine has abandoned the field to it.

The attempt has been made to answer, from the anatomy of the tissues and the blood, the question—"Is acute rheumatism a pure inflammation?"

Why ask if rheumatism be an inflammation, when its name is *rheumatism?* If it is nothing but an inflammation, why not call it by its right

name? Is it not obvious that this is like asking—"Is inflammation an inflammation?" The blindest partisans of the identity of rheumatism and inflammation recognize that rheumatism possesses peculiarities which justify a special denomination and history. These peculiarities, observed in the symptoms and the lesions, indicate the special character of the principle which gives birth to them. Nervous and muscular rheumatism, what are called rheumatic pains, and even, *par excellence, the pains*, as if this morbid manifestation were rheumatism itself, are they not the most common of affections, and the least inflammatory in their nature? An inflammatory series of troubles may be superadded at any moment, but this proves simply that the two conditions are neither inseparable nor mutually essential. We may receive the answer, that they have never been seen separate in acute articular rheumatism. We deny this. But if we granted it, we should yield nothing to our opponents, since we admit that the disease is merely an acute rheumatismal phlegmasia. Can we deny the community of nature between this phlegmasia and many other rheumatic diseases which have no inflammatory element? We have lately heard the statement that if the nature of these affections is wholly unknown, that of acute articular rheumatism is perfectly understood at the present day. . . . . In what does this knowledge, then, consist? It has been found that in acute articular rheumatism the irritated serous membranes form certain inflammatory products, and, in particular, the amount of fibrin is increased to a proportion which is only found in certain acute inflammations. This proves what we have no wish to deny, that acute articular rheumatism is manifested by a fever and phlegmasiæ of acute form; but this does not prove that these fevers and phlegmasiæ are their own cause; for while this affection often occurs under the influence of cold, acting on a heated and soft skin, it is often impossible to prove that such an influence existed. We must then admit a special spontaneity in the development of the disease, that is, a diathesis which forms the common ground of all rheumatic affections.

The rheumatismal phlegmasia, we admit, is the simplest and the least specific of spontaneous phlegmasiæ; but as soon as we perceive that it adds to the classic signs of inflammation in general, those which do not belong to this fictitious type; that our description of this classic type conveys no more idea of rheumatism than of any other phlegmasiæ; and that its cognate affections may exist without inflammation, no more is needed in order to convince us that its essence does not consist in inflammation.

Furthermore, we confess that we do not well understand what is claimed to be designated, in nosology, by the name of frank inflammation; for, outside of inflammation considered abstractly, and as one would treat it in a book of general pathology, we know little besides one or another sort of special inflammation; we do not know inflammation in general. The type of the latter has always been borrowed from surgery. It has also been sought in the spontaneous phlegmon, and in the phlegmasiæ

which, with Stoll, we formerly named frank and natural, *genuinæ;* but supposing for an instant (as we do not) that these phlegmasiæ possess no special principle, and resemble the ideal inflammations of the physiological school, still, the comparison between them and acute articular rheumatism would be very faulty. In fact, the chief marks of these phlegmasiæ are their fixity, and suppuration; those of rheumatism, non-fixity, and absence of suppuration. The former have a calculable progress, a short duration, a foreseen termination, led up to by a succession of periods and transformations which form a chain, like the successive stages of a function, etc.; the latter, on the contrary, do not pass through this regular progression. Mobile and irresolute by nature, they are so far from being identical with the phlegmon that they form a contrast with it, and are usually defined by denying to them the pathognomonic marks of this sort of inflammation. As to the sign inferred from the excess of fibrin, that may belong to one or another phlegmasiæ, but is by no means the essential attribute of every acute phlegmasia; if we assert that it is, we must refuse the name of phlegmasiæ to facial erysipelas and a crowd of other acute diseases, in which the inflammatory action is carried to its highest degree.

But there are other very grave considerations of a therapeutical sort, which ought, much more decidedly than the preceding, to forbid the physician's seeing a frank inflammation in acute articular rheumatism: we refer to the *constitutional* element. This is proved by the hereditary nature of the affection, its liability to relapses, and to pass into a chronic stage. None of these marks belong to the true acute diseases.

There is, in conclusion, another sign which equally proves that articular rheumatism is by nature more chronic than acute—however acute it may seem in the activity of its symptoms.

It has not been sufficiently remarked, how little the system is affected in the most intense cases of this disease. The pale and dull complexion, the perfectly physiological look of the tongue and the mucous membranes in general, and the general sense of health and comfort which they have (excepting the pain); the good appetite; in short, everything of this sort gives an impression resembling that of a chronic disease. An acute febrile disease of much less intensity gives a much severer shock to the strength, modifies much more strangely the general tact and the vital sense—in a word, it places the whole economy in a much more unusual situation, much more widely different from the physiological state, than is done by acute rheumatism. Of what consequence is the acuteness of the symptoms? The distinction between acute and chronic disease must be looked for elsewhere. Gout is not an acute disease, in spite of the excessive intensity of the phenomena which characterize one of its regular attacks.

But the excess of fibrin in the blood? some one will ask. This phenomenon has certainly less value than is supposed, in proving the purely inflammatory nature of acute articular rheumatism.

This affection seems to be to the white tissues (cellular, serous, and

fibrous) that which catarrhal fevers are to the mucous system. It is like a catarrhal fever of the serous tissues. Among these tissues, the internal membrane of the vascular system seems to us to play a very special part in acute rheumatism. We believe that in this disease the serous membrane in question exhales a great deal of serum, and that it is in special sympathy with the tissues of the same class which are under the influence of rheumatic inflammation. The white and serous parts of the blood are in excess; the vascular plethora, the arterial orgasm, and certain bellows-murmurs, are due much more to the formative activity of this serous element than to the increase of those elements of blood which possess a higher degree of life and organization. This condition, therefore, omitting the special inflammatory movement, is much more like the plethora of certain chlorotic persons than that of persons properly called plethoric, or that of an inflammatory fever in a very sanguine person. We know that the buffy coat is formed at the expense of the serum of the blood. The buffy aspect and consistency of the serum, in persons to whom blisters are applied during a frank febrile phlegmasia, leaves scarcely a doubt of this. The presence of a considerable proportion of fibrin in the blood of rheumatic patients proves only one thing, the existence of acute phlegmasias in a disease in which there is a tendency to increased formation of the serum of the blood. The proportion of fibrin and the volume of the buffy coat are never greater than in chlorotic persons suffering with an intercurrent acute phlegmasia. To rest on the existence of this buffy coat, its quantity, and its remarkable persistence in acute rheumatism, in order to draw blood and continue to draw blood until this state has disappeared, as many physicians make a rule to do, is to entertain the most false idea of the disease; the treatment is deplorable, for there are patients in rheumatism whose last drop of blood, if drawn, would form a buffy coat. It is certain that, even if the serous phlegmasia and the fever do not persist, the proportion of the buffy coat increases in proportion as we bleed. We have seen several chlorotic persons in acute rheumatism; their blood was richer in the buffy coat and in fibrin than that of much more sanguine persons; there was scarcely any red coagulum; the whole was one large, very firm white clot, overlying a thin layer of red clot of slight consistency.

The force of the pulse, the volume of the artery and its vibrant rigidity, aid in deceiving those who take the buffy coat as the basis of the indication for bleeding in acute rheumatism. The pulse is really much harder in this phlegmasia than in others which are certainly more frank and acute, such as pneumonia. This is in accord with what we said above of the special stimulus which acute rheumatism imparts to the arterial system. The frequency of phlegmasias of the endocardium and of arterial murmurs, which is certainly greater in acute rheumatism than in other inflammations (cæteris paribus), are further reasons for admitting that morbid excitement of the arterial system, doubtless produced by the act of morbid supersecretion from its inner membrane.

It very often happens in this case that the exhalation increases in the intra-vascular serous membrane in proportion as we evacuate the circulatory system. There then happens, in certain subjects, that which is very often observed in great hæmorrhages; a serous plethora which replaces and exceeds *quoad molem* the previous mass of blood. In this case, also, the pulse acquires a force, an elevation, and a vibrant quality which it never possesses in frank phlegmasias and in persons who are not anæmic. This inflammatory pseudo-fever being accompanied by a decided heat, by the persistence of articular phlegmasiæ and the presence of the buffy coat, seems thus to form a powerful indication for bleeding; and if we yield to the specious indication, it is almost always to the patient's harm, and at the risk of prolonging the symptoms indefinitely.

We have very often seen patients bled to excess, with the object of doing justice to the most acute portion of this inflammatory mask, regarded as the essence of the disease; and who, in spite of this injudicious treatment, and perhaps on account of it, retained the pains and the subacute inflammations of several joints, with an anæmia which seemed to be the condition of the persistence and the indefinite mobility of the disorder. The rheumatism was then still complete, but deprived of its inflammatory adjuncts, and reduced as far as possible to itself. How many reasons for not assimilating them to the frank inflammations and the true acute diseases! It is a great mistake to consider, in this affection, only the fever, the inflamed portions, the state of the blood, for in so doing we obey only the indications derived from these phenomena, and we know nothing but drawing blood. Singular contradiction! When a rheumatic patient has no inflammatory fluxion or fever we do not bleed him; if fever and fluxion are present, we think of nothing else!

When a patient has acute rheumatic pains without fever or phlogoses, we prescribe opium, sedatives, blisters, reputed purges. If he has a frankly inflammatory disease, we bleed exclusively. This is very well in each case. But if, along with this, a person is affected with rheumatic pains, with fever and phlegmasia, some physicians bleed exclusively, and others prescribe narcotics exclusively. Now, this is inconceivable.

We must continually bear this distinction in mind: rheumatism, and inflammatory state. Do the buffy coat, the false membranes of the pleura, the thickening of the endocardium, the exudation in the pericardium, constitute rheumatism? They are products of the inflammatory state, in which bloodletting may be indicated, but with the proviso that this condition does not engender any suppurative and disorganizing phlegmasiæ, and that above it there is a special element which indicates a refractory nature, subject to relapses, very mobile, and which subjects the inflammatory state to its caprices. One thing is certain: we control the disease more quickly by acting on the rheumatismal element, the genius of which is mobility, pain, and rapid fluxion, than by acting on the inflammatory state; but we ought to act on both at once or successively. We have remarked that the patients at La Charité were rather subject to

relapses; this signifies that when we had supposed them cured, we had only quenched the fever and the fluxions by repeated bleedings, while the basis of the disease remains and reappears under the form of articular pains without considerable fluxion or fever. They are recorded as cured, because they have no fever; but their convalescence is not very frank, and the return of pain, which we have noticed in many cases, proves that bleedings *coup sur coup* have not struck the root of the disease, but only interdicted the inflammatory state, as it were. We may well say, with Professor Lordat:

"Bleeding to pallor is the knout of therapeutists. It puts those whom it does not kill in a state where for some time they cannot exhibit symptoms; but as the Russian who has been scourged often falls back into the error which had deserved this punishment, so the affection for which bleeding was performed reproduces the same symptoms as soon as the system has strength to form them. Do not these castigators and these therapeutists seem to exercise nearly the same force?"

Nevertheless, M. Bouillaud has done a service in setting the example of energetic action at the outset of this cruel affection. We daily see physicians who, under the pretence that it is not a dangerous disease, wilfully let rheumatism run on forty or fifty days. It may be dangerous in its sequelæ, and in several ways, though it be not very painful.

To the skilful researches of Professor Bouillaud, made a few years ago, we owe certain very important facts in the history of acute rheumatism. We know that in a great many cases the serous lining of the cavities of the heart is susceptible of being inflamed, of thickening, and of all the changes which characterize the phlegmasiæ of serous and fibrous tissues.' This capital fact is more so as connected with prognosis than as related to the actual treatment of the disease and the part it plays in acute rheumatism. It does not momentarily increase the gravity of the prognosis, and hardly causes any functional troubles except contraction of the orifices of the heart from thickening of the tissues on the level of these orifices and the valves; it does not so impede circulation as to cause dyspnœic and asphyctic symptoms, or very rarely. In the great part of these cases, if it were not for the presence of the physical signs which the ear perceives, the patient, and even the physician, would fail to perceive the complication, unless occasionally by a certain vibration of the pulse.

When this dangerous lesion is once established, it is hard to relieve by bloodletting; in fact, if it is possible to lessen the inflammatory condition of the endocardium when a bellows-murmur is beginning to be heard, when we may infer that the membrane has not yet become the seat of those thickenings, those indurations, and that deposit of plastic lymph which form the anatomical marks of phlegmasias of the serous membranes, it is also true that these alterations are not very long in appearing, when the endocarditis is intense; and that when they exist, bleeding has but little effect on them. Having followed the treatment of a large number of

cases in the practice of Professor Bouillaud, we have always remarked that his treatment had least influence upon endocarditis. And although this inflammation be unquestionably the source of a multitude of consecutive and fatal lesions of the heart, it is often resolved spontaneously. But of all the effects of the rheumatic inflammatory state, this is the gravest and the most refractory.

In order to apply antiphlogistic treatment suitably in acute articular rheumatism, we must make a few clinical remarks and distinctions of great importance, which are too much neglected.

In a great many cases the disease exists under conditions not appreciably different from those under which frank and truly acute phlegmasias arise. A person exempt from all rheumatic or gouty inheritance contracts in the spring an acute articular rheumatism under the influence which we may call that of checked perspiration. The joints are greatly swollen, the fever very high, the artery full and undulating; the joint-affection is not very movable, and occupies the larger rather than the smaller joints; the pains are moderate, especially in repose; they do not excite spontaneous cries; the attack is the first one—in a word, the inflammatory element seems to be the leading one. Such patients are sometimes seen to recover in a few days, or a week at most, under the sole influence of general bloodletting, repeated *coup sur coup*, and seconded by the simultaneous application of leeches or wet cups to the large inflamed joints. All goes on as in pneumonia, for example; and the patient comes frankly out of his attack, without a subacute period, without sequelæ, without relapse. This fortunate and distinct result is sometimes obtained without much shedding of blood, by the use of a few grammes of sulphate of quinia, bicarbonate of sodium, etc.

We formerly called this affection a constitutional-acute, or chronic-acute disease. This character is hardly evident in the cases of which we have just spoken, and which recover so quickly and so completely under a simple and rapid treatment; but it is of the first importance in those patients of whom we are about to speak.

The latter are constitutionally predisposed to rheumatism, whether hereditarily or not. The influence of moist cold on the warm and sweating skin makes this internal cause burst forth suddenly in the form of a generalized acute arthritis; it is often impossible to trace this external cause. The small joints are seized in large numbers; the disease often begins with the toes or fingers. The arthritic fluxions change their seat very frequently; the spontaneous pains are unbearable; the skin is pale, the urine scanty and muddy, the sweat very abundant and of a pungent odor; the intestines, the stomach especially, are often meteoric. Such is the special form for which some reserve the name of acute gouty rheumatism.

Bleeding pushed to an extreme is less successful here than in the preceding case. This class is also much more liable to relapse, to pass into the chronic condition, and with age to be transformed into rheumatic and

gouty affections of many sorts. Far be from us the thought that bleeding is absolutely contraindicated in the commencement of acute rheumatism with these marks. But we think it more suitable at that period to attend especially to the rheumatic affections, the pains, etc. This is the time for moderate doses of sulphate of quinia, according to the method of M. Legroux. We will say no more of the other therapeutic agents which we have mentioned above.

Of one thing we are certain, as a result of our clinical experience, namely: that by sulphate of quinia we obtain a direct and instant sedation of the special symptoms, as pain and mobility; and especially, an immediate and almost specific sedation of the circulation. By bleeding, on the contrary, we obtain these effects more slowly, and by a less immediate and special action.

This incontestable effect of sulphate of quinia and several other controstimulants in acute articular rheumatism places a distance between this disease and the frank inflammations, in which such remedies are not always free from inconvenience.

It is the summit of art, in treating this disease, to distinguish well the cases in which it is more allied to frank acute diseases than to chronic and constitutional acute diseases, and inversely. Modern research has thrown light upon one of its aspects, but has left the others in greater obscurity.

A few years ago, fresh debates were held at the Academy of Medicine concerning the nature and treatment of acute articular rheumatism.

The facts and ideas which we shall present might have afforded food for discussion and carried it beyond tautology. The sterility of the debate, in spite of its official authority, the incertitude or the empiricism of the practitioners which must have been increased by it, the silence of the medical press, which appeared to accept the conclusions of that debate as the ultimatum of clinical science, all impose on us the duty of pursuing our developments, and of completing them by giving more precision to the principles which guide us in treating acute rheumatism.

Broussais, reacting against the medical ontology of the ancients and the nosologism of Pinel, had confounded all the natures of diseases, distinguishing them only by their seat and intensity. Reacting against Broussais, the moderns turn back systematically to the idea of specificity, whence has arisen an unsound tendency to establish species without foundations. Purely external signs, certain chemical differences between the morbid products, the presence or absence of a phenomenon, are, to the observer of the naturalist school, a warrant for establishing those artificial absolute species which fail to support the tests of pathology. Among these distinctions is the radical one which has been attempted between rheumatism and gout, or rather between rheumatic arthritis and gouty arthritis, as between two specific and incompatible diseases. This view only lacks the terms, formerly in honor, of "gouty virus" and "rheumatic virus."

The seat of the local affection, the state of the urine, the age, sex, certain quite personal morbid tendencies, susceptible of infinite gradations, shadings, and transformations, these form the base of such a profound demarcation. It is recognized to-day by advanced minds.

The excess of uric acid, urate of soda, and lime in the urine can never form a basis for an absolute distinction between gout and rheumatism, because this acid and these salts, being normal elements of the urine, cannot be called morbid products in the full sense of the term, and because an increase or diminution in their quantity can at most constitute a modification or a variety of the same disease. Besides, the excess of these elements is also a characteristic of acute articular rheumatism. In the latter, the urine is often scanty, painful, turbid, and sedimented. It contains an excess of uric acid and of urates, relatively to the other inflammatory diseases. Such is the most important characteristic on which the nosological distinction has been raised; it is obliterated by clinical observation, and is nought in the eyes of sound pathology. But, because we cannot make two distinct nosological species out of gout and rheumatism, does it follow that the terms express the same thing? By no means. Rheumatism, susceptible of association with many other morbid elements, is for this reason full of variations. Gouty rheumatism is a considerable variety of the rheumatic affection; it is rheumatism developed in persons of a special constitution, under hereditary, hygienic, and sometimes pathological conditions which are not those of all rheumatic persons.

Rheumatism, encountering in the system certain conditions which at first are rather physiological than morbid, easily produces the most common varieties of gouty disease; and the well-developed gouty tendency, a morbid exaggeration of a certain physiological state, does not usually become fixed or wandering, regular or irregular, nervous or inflammatory, articular, neuralgic, or muscular gout, unless associated with rheumatism, excited by the determining causes of the latter, and manifested with it, and by it, under the special forms which we are about to enumerate.

Gravel, hæmorrhoids, certain dyspepsias, a tendency to hypochondria, extreme irritability of character, acne rosacea, or a complexion resembling it, a susceptibility, and, if we may express it, a very great capacity for pain and spasm, etc., are some of the chief effects of the special disposition which favors the development of arthritic affections or gout. Without absolutely generating this sort of morbid temperament, it is certain that a sensual and sedentary life, agitated by the social passions, powerfully aids in producing the gouty condition in certain naturally irritable constitutions. Let the causes of rheumatism act on such persons, and you may get gouty rheumatism.

Like simple rheumatism, gouty rheumatism has a special affinity for the fibrous and serous tissues of the joints and the organs of the great circulatory system—the heart, arteries, and veins. All that characterizes rheumatism is found in gout—but not reciprocally. Rheumatism has many other associations. There is a simple rheumatism and a cold or

atonic gouty rheumatism, proper to lymphatic persons or those in whom the white tissues predominate. It is needless to speak of this here, for it is not concerned with antiphlogistic treatment. Who does not know blennorrhagic arthritis, which has been specifically distinguished from rheumatism, as if it had nothing in common but its location? Need we speak of the scarlatinal form? of that upon whose existence is based the rheumatic form of typhoid fever? of hysterical, choreic rheumatism, etc.?

What a difference, it will be said, between a young healthy person who gets a rheumatism by lying on the wet ground, and the constitutional, gravelly, hæmorrhoidal rheumatic subject who, toward the equinoxes, gets his pains at the fireside! It is true; but all this is brought about by age, temperament, hygienic habits, and whatever excites the gouty tendency.

Why is it that children, who are not free from rheumatism, are usually free from gouty rheumatism (though the contrary is seen in some hereditary cases), unless that they have not yet entered upon the conditions for forming this gouty disposition? May we not say the same of women, who are, compared with men, so seldom gouty (we refer only to regular and articular gout), and yet are very subject to rheumatism, chiefly of irregular form? But they have other varieties of rheumatism, for instance, the puerperal, and the lacteal or rheumatism of nurses. What shall we say to the case, noted above, of persons in whom we have noticed attacks of acute articular rheumatism with at first simple symptoms, who contract at each new attack some of the characteristics of regular gout, and at last present them in full development with all the diathetic symptoms which characterize the affection? Do we not frequently see, conversely, a regular gout which begins at one of the great toes, extends in following attacks to other joints, and then becomes generalized like acute articular rheumatism, producing, like the latter, the special affection of the great circulatory system of which we have already spoken?

We beg the partisans of the radical distinction between rheumatism and gout to tell us where the latter begins and where it ends. If it differs specifically from rheumatism, nothing should be easier than this definition.

Rheumatism and the gouty state are united in infinite variety of proportion and degree. If we take, for example, the extreme degrees, we triumph over the difference. Those who say that gout is without relations to rheumatism think they prove it by showing cases in which the gouty element dominates the rheumatismal. Those who uphold the opposite error, and maintain that there is no difference between simple and gouty rheumatism, base their view first upon the cases in which the rheumatic element is pure, and next upon those in which it is more or less dominant; and, as the cases where the gouty element predominates are only reached by a slow gradation, they succeed in rendering their opinion specious. Here there is an error on both sides. First, there is a simple rheumatism; next, a state of the system which has no specific character,

as its limits are very vague, and which, when fully developed and pathologically determined, is called the gouty diathesis. It has its own proper manifestations, we admit. Finally, there is a gouty rheumatism, formed of rheumatism and the gouty tendency which we have just described. The infinite and very individual degrees of determination of the gouty state give rise to infinite degrees and forms in its associations with rheumatism. The affinity between the two morbid states is so great that no person is more susceptible to rheumatism than the man with gouty diathesis—with gravel, for example—and that the rheumatic countries, England, Belgium, Holland, etc., abound in gouty and gravelly persons. The converse is no less true. A rheumatic person, placed in circumstances favorable to the development of the gouty diathesis, contracts it much more readily than another would, other things being equal. The rheumatic person of nervous and abdominal temperament, placed under the regimen which begets the gouty tendency, will have gouty rheumatism. The morbid constitution introduced by this hygienic regimen will make a gouty man of him who, thus predisposed, exposes himself to the external causes of rheumatism.

If, as cannot be doubted, no one is more liable than the gouty man to contract rheumatic affections, if no one more easily acquires the gouty constitution, where is the link which unites the two conditions?

The gouty state of the system seems to begin with the digestive tract, and tends finally to the kidneys. Rheumatism begins at the skin, the functions of which are very nearly connected with those of the kidneys. May not this be one of the points at which the rheumatic and the gouty state touch? The association of the two morbid elements is found in a plastic combination of their external characters; and the proof is, happily, of a nature to satisfy the anatomists and the chemists, consisting, as it does, in the affinity of rheumatism for the joints, and in that of the concretions of urates for the same parts, in persons who display the rheumatic habit previous to the formation of articular typhus, and the gouty habit afterward. The demonstration is completed by the excess of uric acid and of urates in gout and acute articular rheumatism; it is equally established by the very close analogy between gouty nephritis and rheumatismal nephritis.

Damp cold, the disturbances of cutaneous transpiration caused by atmospheric changes, are the most common determining causes of all diseases, however different they may be supposed to be from rheumatism; but they produce this disease more specially. A predisposition, however, is required. This general disposition is not a mere word, for it is sometimes sufficient of itself to produce rheumatism. Now the rheumatic diathesis is hereditary, and is admitted by all. In its presence the distinction between rheumatism and gout disappears, which has been based on the notion that one is always accidental or externally caused, and the other always diathetic and due to internal causes. This foundation being destroyed, we encounter one of the mysteries of pathology, and we seek for

differences, other than those due to constitution, such as temperament, and hygiene (especially alimentary hygiene), which by long-continued action may impress such remarkable differences upon the morbid products and excretions. The comparison is assisted by the infinite mobility and transmutability of the morbid determinations which enable gout and rheumatism to assume all nosologic forms and simulate all diseases; their metamorphoses under hereditary influence; their relations to the nervous system; their ability to assume the intermittent and periodical type; their common indisposition to suppuration, in spite of the extreme markedness of the inflammatory symptoms; the very special identity of their external determining cause (vicissitudes of weather, barometric state); the analogy between the methods of cure. Opinion, common medical belief, living tradition, are not science; but the science which is not in harmony with them, and does not, at the close of its researches, rise to meet them, is ordinarily on a false track. In the eyes of medical opinion and of practical good sense gout and rheumatism are united in the notion of one single disease with modifications, characterized as the least unwholesome of diseases; the one among all chronic affections which family self-love most readily admits as hereditary, in spite of its proverbial incurability, its painfulness, and its fruitfulness in severe accompaniments.

Nosologism has not yet furnished an argument in favor of the specific difference of rheumatism and gout, which can invalidate this.

That which the public continues to confound, has been identified by physicians down to Baillou. Between diseases with such vague limits, such personal modifications, are there not enough differences due to age, constitution, hereditary or acquired temperament, and finally, to the habits which so literally form a second nature?

We have always been struck with one fact. The subjects of acute articular rheumatism, whom we see in our hospitals, are much oftener from the city than from the country. They are usually workmen of some mental culture, whose professions give play to the nervous system and presuppose a certain development of mind. They have the manners, the tastes, the good and bad habits of civilized man. Acute articular rheumatism affects women less than men. Those who practise exclusively corporal professions, in the open air, with simpler manners, less refined tastes, less enervating habits, are more exempt. What an additional resemblance between gout and rheumatism! Thus inflammatory rheumatism is of all the varieties that which is most closely related to gout. We have long pointed out in this kind of rheumatism a very marked meteorism of the stomach, characterized by a gastric sound on percussion over a very large portion of the left hypochondrium, and over as far as the region below the heart, which is sometimes pushed back.

Those who know the frequency of flatulence of the stomach in the gouty, and the abundant secretions of gas which occurs during the attacks, will find, in this new fact which we offer, a new point of union between the two diseases.

There is a systematic objection to composite diseases. It is easier to give one's self up to absolute specificism. As soon as the disease is compared to a new species, whose prime cause is creation simply, and whose second cause the conservative procreation of an identical type, we are led by degrees by the force of the system to relinquish the etiology and the pathology. This might be predicted, and may be seen to-day by any one.

Empiricism being thus consecrated, and medicine founded on natural history, we end with a nominal diagnosis, without prognosis. This is the chief anti-medical error. It is the error of to-day.

The doctrine of morbid elements professed by the school of Montpellier is one of the greatest creations of pathology. This school has lost it in a sterile ontology. To free it from this sterility, by rooting it in the science of organization, would, perhaps, be the regeneration of medicine.

We could only allow an empiric to express surprise at the care we take in discussing the difficult problem of this interesting disease. The delicate matter of treatment is now abandoned to empiricism and coarse experimentation; now to the deplorable expectant plan of the scepticism which disguises itself under numerical severity; and again, to pathological doctrines which in their systematic narrowness are closely allied to empiricism.

Those who seek to prove that acute articular rheumatism is the type of inflammatory diseases, and have no resource except in repeated bleedings, are leading the younger physicians in a path which is fatal to their patients. We will presently explain why.

Let us remark, in passing, that the facts which are accumulated without pathological distinction, to prove the phlegmonous nature of acute rheumatism, could not be better chosen to prove the contrary; for we can always point back to previous or coexistent conditions of suppuration in the patient. In such a case, rheumatism plays the part of exciting cause of articular suppuration, as any other non-phlegmonous irritant cause might have done by itself. We do not deny this power to rheumatism, any more than we do that of producing white swelling in a predisposed subject.

Far from proscribing bleeding in acute rheumatism, we recommend it when needed; but we maintain that it answers to but few indications, and that there are some which contraindicate it.

Let us repeat, without ceasing: rheumatism, inflammatory and acute as it may be in one of its varieties and in relation to one of its elements, is in itself an essentially chronic disease. This is one leading reason for sparing blood. Another equally decisive is the following. We have already pointed it out, and we now return to it, as much on account of its importance as its novelty; for we do not think it has been stated before us, nor even since the last edition but one of this work, in which it is stated.

Acute articular rheumatism constantly affects the great circulatory system. It produces simultaneously, from the outset, modifications of the motor and alterant forces of this system, which give rise to 1, diminution of the blood-globules, with anæmia, serous plethora, and excess of fibrin; 2, morbid murmurs of the heart and vessels, and a special corresponding pulse, independently of any bloodletting, or of any positive inflammation of the endocardium or pericardium. It is true that this inflammation often coexists; but that is not the matter in question.

Rheumatism has many forms of manifesting itself, and the inflammatory is not the only one. Pain, spasm, contracture, paralysis, flux, congestion, etc., are more frequent symptoms than inflammatory fluxion. This is evident at a superficial glance. Why should it not be the same with the heart and vessels? The very peculiar fever which forms the most marked characteristic of acute articular rheumatism is not a symptomatic fever as that is understood in the school—that is, without any relation to the disease except that it is physiologically excited by the articular phlogoses. It often appears before the latter, and continues after their disappearance. It is a real angiotenic fever, produced by the direct or idiopathic rheumatismal stimulation of the great circulatory apparatus. Every kind of affection irritates this important apparatus in its own special way. Rheumatism irritates it by determining, in special inflammatory states of the system, the phenomena we have pointed out above—hypersecretion of serum, formation of fibrin in excess, disproportion between these elements and blood-globules, serous plethora, morbid energy of the contractile and expansive movements of the heart and blood-vessels with spasmodic vibration of their walls. This irritation, at first nervous and secretory, may increase, and often does increase insensibly till it produces inflammatory irritation of the endocardium. It is hard to define the moment when endocarditis begins.

M. Bouillaud says: In acute generalized rheumatism endocarditis is the rule, its absence the exception. We say, however: There is no acute articular rheumatism in which the rheumatismal irritation does not affect the heart and the vessels in some manner and degree. This irritation and the rheumatic angiotenic fever are as essential to acute rheumatism as the inflammatory fluxion of the joints.

Such characteristics, in connection with the rheumatic buffy-coat, form specious indications for bleeding, and it is this that compels us to devote such protracted study to antiphlogistic treatment in rheumatism. We now see within what limits these indications exist, and ought to be met. The inflammatory element, not being essential to rheumatism, may be associated with it in very various degrees, dominating the rheumatic element, as in some very inflammatory medical constitutions, or dominated by it, as when the patient is constitutionally rheumatic with predisposition to gout. In these various cases, bleeding will become a chief means or a secondary means. At present no one thinks of combining the treatment of the inflammatory symptoms and those of rheumatism proper.

The alternative offered to patients is that of being wasted by repeated bleedings, or exclusively poisoned with sulphate of quinia in large doses to the point of forced stupefaction of the fever and pain. Is there anything in these two treatments that is irreconcilable, except the excess?

We may unite them so that with one bleeding and a few grammes of sulphate of quinia, combined or not combined with small doses of calomel (for example, with from 1 to 1½ grammes (gr. 15—24) of quinia, and 10 or 20 centigrammes (gr. 1½—3) of calomel divided into 8 or 10 pills, given one every two hours), we may generally conquer the most intense acute rheumatisms, more surely and as promptly as by any other exclusive treatment.

It is almost always proper to begin with sulphate of quinia, and to reserve bleeding for a later period, for we frequently see the most acute cases rapidly yield to the action of the salt of cinchona, and able to do without any other treatment. But if, after a few days of the administration of sulphate of quinia with or without calomel, the articular pains being already quieted, the pulse, though slow, continues voluminous, vibrant and febrile, the tissues injected, the skin warm, the joints inflamed, etc., we shall be surprised at the marvellous effect of a bleeding at the arm in lessening the fever and the articular fluxions and putting an end to the disease. It then does what it could not have done before the sulphate of quinia had acted. The latter modifies the nervous phenomena of the disease, as bleeding and calomel do its plastic and inflammatory phenomena. It is very useful to suspend the quinine every two or three days, and in the interval to give a laxative, such as half an ounce of castor-oil. We shall not have to repeat the precaution often. To the benefits of bleeding to pallor, we thus add that of preventing saturation with quinia, and we impart to the precious remedy a new virtue, without having to make the doses too large. This treatment will be profitably aided by a ptisan, reinforced with 4 grammes (3 i.) of nitrate of potassium or bicarbonate of sodium in the 24 hours.

In simple common acute rheumatism, however intense it be, it can never be more than a slight injury to carry the bleeding to excess, or to limit it too much. But there are cases in which its extreme use, or the systematic obstruction from its use, may have immediately dangerous consequences: we mean in *grave* acute articular rheumatism. We do not mean *intense* when we say grave. However intense a simple acute case may be as respects the vehemence of its febrile action, the number and the activity of the ordinary local affections, we do not class it with grave rheumatisms. We employ the term in its nosological sense. A grave fever may have no intensity, and any pyrexia may have great intensity without being a grave fever. The word carries the idea of a peculiar variety of acute articular inflammation, a special modification of the rheumatic diathesis by the individual conditions of the patient.

We may class in this variety the following cases:

1. Those acute rheumatisms in which endocarditis develops, complicated with considerable nervous disorder in the action of the heart and a tendency to the formation of clots. We think that more than one endocarditis is required to produce this dreadful effect. It is accompanied by a deep depression of the nervous system, which checks and disturbs the cardiac movements. Endocarditis, morbid coagulability of the blood, plastic formations, at the level of the orifices and upon the valves, form the rest. But these conditions for developing clots in the heart would be impotent to produce their effects by themselves; it would not be impossible that a rheumatic fluxion of the heart itself, paralyzing to a certain point the contractions of the organ which regulates circulation, should also produce this result.

2. The acute rheumatisms in which considerable suffocating serous effusions in the pleura and pericardium occur; simple or double pneumonia with sero-sanguineous congestion, a species of acute œdema of the lung which has the suddenness of invasion of the rheumatic fluxions.

3. Rheumatisms with symptoms of meningitis which may be called rheumatismal, and which is distinguished from ordinary meningitis by being sometimes cured, and by its mode of attack, its symptoms, the form of its delirium, not being those of ordinary inflammation of the arachnoid.

It may be objected that these differences are not well grounded, since the number, intensity, and seat of these accidents are the only cause of their gravity. We think otherwise. We do not regard these local accidents as ordinary elements of rheumatism, but as complications. Their gravity is in our eyes inseparable from the grave morbid state which has produced them. We not seldom observe in them one or several of the symptoms belonging to grave fevers, as sordes of the tongue and teeth, the atonic look, rapid emaciation, stupor, etc.; dangerous even before the development of grave local symptoms, and which peremptorily show that their gravity depends as much on the evil morbid tendency which they betray as on the consecutive functional disturbances which they produce. Besides, the complications are not without a cause, which does not lie in simple rheumatism, but in individual conditions which, associated with the rheumatic diathesis, are manifested by these grave epiphenomena. The latter are doubtless inseparable from the particular case in which they are observed, but they are none the less distinct in themselves. It is the work of general pathology to differentiate them, as it is that of clinical medicine to integrate them (if we may so speak), and to treat the indivisible morbid unity which results, without neglecting the importance of its constituent elements. This is precisely the difficulty which interests us.

This difficulty is not easily resolved into general precepts, precisely on account of the very great generality of the principle, and because the perplexity of the practitioner must needs be extreme in view of such cases.

When we demonstrate the existence of signs which announce the formation of clots in the heart, we must suspend all remedies such as sulphate of quinine, belladonna, opium, etc., which stupefy the nervous system and weaken the heart's action. We must have recourse to blood-letting, to alterants, or antiplastics, to revulsives, and sometimes to diffusible stimulants. Wine and alcohol, in these cases, may render wonderful services.

The general bleedings ought to be weak in order to avoid syncope. It is better to repeat them in small amounts than to make them too large. But in particular, we must use wet cups over the region of the heart, at the base of the chest, or even in places more remote from the heart, and also dry cups; in a word, we must seek to liberate the oppressed organ as much as possible without enfeebling the whole system. We suppose that the physician is present, as it were, at the first appearance of the symptom, before the heart's action is much embarrassed, and while the grave symptoms are due rather to fettered forces than to exhaustion. Nothing can then excuse the physician from remaining at his patient's bedside, or visiting at very short intervals.

The chief of all precepts in such cases, is to repair the immediate bad effects of a bleeding by revulsives and stimulants; to renew it in season; to see and foresee everything, and to grasp the fleeting moment. In this case, exact formulæ may be death warrants.

If grave rheumatism is accompanied by violent pneumonia, manifold engorgements, typhoid symptoms, etc., general blood-letting, without being proscribed, will not be repeated as much as it should be in frank phlegmasias. After a first general bleeding, if it be not contraindicated, wet cups will give equally good results with less chance of harm. Revulsives, calomel, wine, tartar emetic, drastics, may aid the resolution powerfully. These principles of treatment are entirely applicable to rheumatismal meningitis. In three cases observed by us, sulphate of quinia does not seem to have had very happy effects. It is almost certain that it immediately aggravated the symptoms without remote benefit.

But cases of acute articular rheumatism are observed in which endocarditis, pericarditis, and pleurisy, intense and acutely inflammatory, develop without these grave symptoms. In this case also we claim the existence of a complication of inflammatory nature, pre-existing in the patient, or dependent on a "medical constitution." What seems to prove this is that these phlegmasiæ have not the mobility of rheumatism. They are cases in which antiphlogistic treatment may and ought to be used most frankly and fully. Then, as may be supposed, the method of M. Bouillaud is heroic. It reaches its aim. In simple rheumatism, even if very acute, it passes beyond its aim.

To sum up, all treatment of acute articular rheumatism that is not founded on the consideration; 1, of its essentially chronic nature; 2, of its relations to the gouty condition; 3, of the inflammatory and acute element accidentally associated with the two previous conditions; 4, of the

serous plethora which is associated with the rheumatic angiotenic fever, and with the serous phlegmasiæ of the heart in this disease, will turn out to be short-sighted and injurious, in spite of apparent immediate success. These convictions of ours have become stronger within the past few years, and have led us to think it a duty to enter upon pathological questions which we might have omitted, if medicine were nowadays allowed to appear in works on pathology. We hope the reader will not regret it, when he considers that rheumatic and gouty affections form, perhaps, three quarters of chronic non-fatal illnesses, and that we often have to choose between antiphlogistic, tonic, and special treatment, or to co-ordinate them or employ them alternately in the same case.

Antiphlogistic Treatment of Catarrhal Fevers.

Those who deny the special nosological character of acute articular rheumatism are the same who see in catarrhal fever nothing but a common bronchitis with symptomatic fever, and who rush upon the bronchitis with bloodletting, as if it were a conflagration to put out.

Antiphlogistic treatment is not, if we may so speak, the natural treatment of catarrhal fever. It is only accessorily indicated. When the fever is simple and there is no pronounced predominance of an inflammatory or plethoric element, or too violent pulmonary congestion; when the vague and irregular chills are incessant, without general pains and depression of strength, swelling of the face, tearing cough, or sensation of general tension and fulness, bleeding is certainly useless, and may be harmful.

The catarrhal and the inflammatory condition are different, though in a sense neighbors. The former is distinguished from the latter by the fact that the irritations which accompany it do not end in suppuration. They have the character of extreme superficiality, a singular mobility and diffusion. These qualities usually forbid bloodletting; and yet a bleeding may sometimes put an immediate end to a fever—cut its throat at the beginning, though it threatened to become formidable.

It is true that these cases do not belong to the class of acute catarrhal affections properly so called, but to that of the ephemeral fevers which often follow a sudden suppression of perspiration, while the body is heated. The latter circumstance, upon which we choose to insist, and the violence of the febrile movement, might lead us to think that the person was going to be seized in a short time after the invasion of fever by some very violent inflammation; and yet this alarming series of symptoms, this intense fever, this headache, injection of the tissues, general turgescence, and extraordinary painfulness of the whole body, are soon lessened by a general sweat. Now if, alarmed by such a pathological reaction, the physician believes it his duty to anticipate by a bleeding the risk of possible explosions of inflammation, everything yields, and returns to order, with a marvellous instantaneousness which is not less deceitful.

Several very valuable features distinguish these conditions from that of catarrhal fever, and from the commencement of grave acute diseases.

We stated that some such fevers usually followed a sudden suppression of the cutaneous exhalation, while the skin was very heated and covered with sweat. Here predisposition does not play so important a part as in the production of catarrhal and inflammatory fevers, and sometimes plays no part. It follows that the spontaneous or forcible re-establishment of transpiration forms a complete crisis. This is one of the cases which best show what is called the vis medicatrix; perspiration suppressed, perspiration re-established, and, between the two, a pathological co-operation (synergy), or a fever by which the suppressed sweating is re-established—such is the simple and complete notion of these cases.

It is otherwise in catarrhal fevers. They are chiefly prevalent during cold and damp winters, and after this condition of the atmosphere has lasted a certain time, and it is not necessary to suppose, in the great majority of cases, that there was any accidental and appreciable suppression of cutaneous transpiration. The morbid condition forms slowly, is developed, and reaches a crisis slowly, as regards the point under consideration. It presents premonitory symptoms, and establishes itself by steps, whereas ephemeral fever has a rude onset, heralded only by a single violent chill. The symptomatic evolution is at once at the height of its intensity, a circumstance which this fever shares with the acute diseases of children, and which is quite a certain indication of benignity, and of resolution as rapid as the invasion. The physician cannot attach too much importance to this fact in making his prognosis, and in deciding upon the treatment. The vulgar common sense is very often in this case superior to the bad science of the physician. The diseases which attack suddenly and which seem to make the patient pass directly from a state of good health to one of acute sickness, attended by an unmeasured and ungraduated fever, are only in appearance grave, and their coming is not feared.

The nervous system plays a great part in catarrhal fevers, and this is one of the chief reasons why antiphlogistic treatment is only incidentally invoked in their treatment.

The acute catarrhal condition which we are now considering is of much importance in respect to pathogenesis, and we regret that this is not the place to cast a glance upon its nature. It exists in all degrees, and may present a multitude of shades forming so many degrees of transition, from the neurosis or the disease sine materia to the phlogosis with elaboration and secretion of morbid products. In the course of the same epidemic, there may be observed all these degrees in a series; in as many patients as this chain has links; and they may also be seen appearing successively in the same person, and making a part of the same disease.

In some persons—as in thin, impressionable women—the morbific cause produces all the anomalies of a neurosis; continual erratic chills, mingled with flushes of heat; cephalalgia, vague and indefinable muscular

and articular pains; dyspnœa, oppression of the strength, a singular erethism of the cutaneous sensibility and of general tact; various tenesmus of the anus and bladder, troublesome snuffling, without nasal catarrh; partial fleeting congestions; alternate sensations of sharp heat and of penetrating coldness; febrile disquietude, osteocopic pains, insomnia, etc. Where is the catarrh? where is the phlegmasia? where the indication for bleeding? The warmth of the bed, warm and slightly antispasmodic drinks, as infusion of linden and orange leaves; one or two pills of 1 centigramme (gr. $\frac{1}{6}$) of opium with 1 decigramme of camphor (gr. $1\frac{1}{2}$), etc., will do as much good as bleeding would do harm.

In other cases which form the transitional step between the preceding and the following, the pathogenic cause, in virtue of conditions which we need not attend to, gives rise to more fixed symptoms, to which are joined some characteristic signs that give the disease an aspect which recalls at once diseases *cum materia* and those *sine materia*. But evidently, there are not two distinct diseases. The dyspnœa will be accompanied by a more fixed cough and coryza (*raucedo et gravedo*) which give rise to a *distillation* of a thin, acrid, transparent humor, acutely irritating to the surfaces over which it flows. The face looks depressed and a little stupid, the chills are more marked, the heat more general, the fever more regular; and then this first period of crudity is succeeded more or less openly by some signs of coction and critical solution.

Such are the most common cases, which best deserve the name of catarrhal fever.

If we would judge to what degree the nervous element leads the sanguine and plastic element in these fevers, we need but attend to the respiration. Oppression is considerable, the thoracic pains are severe and intolerable, the discomfort of breathing extreme, the cough strong and frequent, and, at a certain period, the expectoration abundant. If we auscult, we find nothing; often not even the normal sound of pulmonary expansion. We might suppose a double exudation existed, but if we percuss, the resonance is natural and equal. But, it will be said, how can so many functional troubles exist without appreciable lesions? Shall we not find a single morbid pulmonary murmur to explain the dyspnœa, cough, fever, etc.? No; but you may find them in a person who breathes easily, who scarcely coughs, who has no fever; and in two days, perhaps, you will have the satisfaction of finding them in the former patient, as soon as, by their cessation or remission, the nervous disorders above noted permit them to exist and appear.

These disorders were due to the fact that the morbid action affected the lungs and the whole respiratory system much more in their nervous elements than in their plastic elements; much more as endowed with the respiratory sense than as living parenchyma of the vegetative life and the seat of secretory and nutritive acts, etc. The pulmonary vesicles and the small bronchi were perhaps closed, tonically or at intervals (for in the symptoms which we have described we notice many remissions followed

by as many exacerbations), as is seen in the nervous orthopnœa known as asthma; and this state itself formed a sort of acute asthma coexisting with a very superficial catarrhal irritation.

The epidemic catarrhal fever or *grippe* (influenza) is an affection which makes a person very sick and causes more discomfort, pain, and suffering than many other affections of much more gravity, precisely on account of the peculiar nervous character which distinguishes it. The general sense of touch, the organ for which is spread over all the membranes of relation, confounded in some sort with the organic parts which have the function of perspiration, exhalation, secretion; this mixed and general sense is what in grippe reports and sends to the sensory centre the great part of the painful impressions, uncomfortable sensations, and painful stimulations. It causes them to be felt in inverse proportion to the intensity of the catarrhal phlogosis; for all these symptoms improve and are dissipated successively when the catarrhal element becomes pronounced and fixed, and develops upon the predisposed surfaces the calculable series of its ordinary phenomena.

The stage of which we were speaking is susceptible of a great variety of shades in intensity and form; but its general character is a mixture of mobile erythematous phlogosis, affecting chiefly the mucous membranes, and of vague pains, disturbing sensations, general superficial malaise, etc. Sometimes there are neuralgias, true catarrhs of the nerves, muscular rheumatism, or catarrh of the muscles, slight anginæ, irritation of the conjunctiva, very movable articular rheumatism, erythematous efflorescence of the skin, etc.; and then, dominating all these local phenomena, a fever of greater or less intensity broken in upon by occasional irregular chills. It is not necessary for us to describe each of these special facts, but the severity of the disease is as we give it. What now are, or can be, the relations of antiphlogistic treatment to this state?

By depriving the plastic force of its material for elaboration, this treatment enfeebles the activity of this order of functions. At the same time it stops the harmony and regularity of the relations between the phenomena of innervation and those of vegetation, and, in a certain way, leaves the nervous system to itself. This completely reciprocal double effect, in truth, constitutes antiphlogistic treatment. Of what service can such a modification be in the present case?

From the occasional incontestable amendment it produces in the symptoms we need not infer that it is the treatment naturally opposed to the condition of simple and ordinary acute catarrh. On the contrary, it is often only a means of simplifying the disease, and does not so much act upon the catarrhal condition itself, as it reduces it to the conditions necessary to its existence. Such an action may obviously be of great importance. Thus, this treatment does not check the progress of the disease, but gives it an easy and natural order of succession, helps resolution, hastens it, lessens the violence of one or another phenomenon, etc.

These conditions singularly limit the claims of bloodletting in catar-

rhal fevers. It is certain that, when in the degree we are now studying, bleeding is only of subordinate use, and is not suitable to all cases; that the reasons for performing it do not exist in all patients, and do not form an essential part of the disease or of the fundamental and characteristic indications which it invariably presents. It hence follows also that, when it is indicated, it is as an accessory remedy, for an accessory state, and therefore should be practised with great moderation. This varies much with the character of the medical constitution; and the annals of epidemics are full of the difference of treatment which is required under different conditions, and especially in regard to bleeding, which, in one epidemic, is found useful only as far as required by the accidental complications just specified, in another year has been generally harmful, and on a third occasion has become of capital importance and a necessary means. The well-marked genius of the constitution may sometimes guide the practitioner in estimating these differences, and the modifications of practice which they entail. Often, also, he can only judge by cautious experiment.

In a third stage, catarrhal fever may assume such intensity, and the material of the catarrh may be so abundant, that it throws itself (as they say) on certain parenchymas, forming in them quasi-inflammatory infarctions, muco-sanguine congestions, called false or bastard phlegmasiæ, and puts the patient in a very unfortunate position. Then, while preserving its special marks, the affection is accompanied—

1. By cerebral congestions characterized by considerable swelling of the face, atrocious headache, and sometimes delirium. This accident is tolerably frequent in the course of epidemics of influenza. The pulse is hard and strong, the fever high. It is necessary to bleed, without neglecting a continual moderate irritation of the legs by sinapisms placed successively on the feet, shins, and thighs. A few teaspoonfuls of syrup of ether, given after the bleeding, form, in connection with the revulsives applied as has just been stated, the treatment most generally applicable to this sort of accident. When there are contraindications to general bleeding, it may be replaced by a few leeches to the malleoli.

2. Quite frequently, also, deep central pneumonias appear, which imperatively demand one or more bleedings, according to the case. The physical signs are then deceitful, until the disease reaches the surface of the lung. The pathognomonic sputa are also wanting in a great many cases. Viscosity and transparency are then the only changes they present, but may suffice to modify the diagnosis, when at the same time the fever is very high, *the respiration short*, the prominence of the cheeks colored, often unequally, the pulse pneumonic, the complexion sub-asphyctic, decubitus on the two sides impossible, respiration puerile on the side opposite to that on which the patient prefers to lie; and when percussion of the latter elicits obscurity of the normal resonance, indicating a pulmonary fluxion and engorgement of the lung, separated from the surface of the viscus by a more or less thin layer of tissue permeable to air, etc.

It is very important, we see, to distinguish this state from that in which the symptoms furnished by the respiratory apparatus are purely spasmodic and nervous. The latter do not require bleeding. The former demand it imperiously in the majority of cases. But while allowing to this indication all its force, we must remember the nature of the disease in the patient, as well as the genius of the reigning epidemic.

This disease, in spite of the state of pulmonary fluxion of which we speak, is not decidedly inflammatory in its nature, and the fluxion itself is rather an acute coryza of the lungs (if we may use the analogy) than a frank pneumonia which may be frankly attacked by bleeding. We must then rather look behind than in front, and must not neglect, along with the antiphlogistic treatment, that which seems specially suited to the catarrhal and nervous condition, and which usually embraces the combined use according to the rule *a juvantibus et lædentibus*, 1, of emeto-cathartics; 2, of antispasmodic anodynes; 3, of diaphoretics; 4, and often subsequently, of a few doses of cinchona to cut short accesses of remittent fever which persist after the disappearance of thoracic phenomena, and to raise the patient from the state of languor, muscular enervation, tremor, and a curious debility of the chief organic apparatus, which characterize the convalescence from these fevers; for the slowness and the peculiar symptoms of these convalescents would of themselves, if necessary, suffice to accuse the organicists' view of the nature of the disease as barren, pernicious, and consequently false at all points.

We have just said that *in the majority of cases* bloodletting was necessary, in varying degrees, in the treatment of the congestive and pneumonic accidents which develop in the course of catarrhal fevers. Has this precept any exceptions? Doubtless it has, and experience shows it.

We need not speak of the common contraindications derived from the age, constitution, idiosyncrasies, concomitant diseases, in a word, from the previous condition of the patient. We would not return to this point if it related solely to circumstances reserved once for all. But, even if none of these considerations furnish contraindications, the nature of the symptoms may impose very strict ones.

Symptoms of such a nature are usually related to the genius of the epidemic constitution. The nature of this constitution reveals itself by such symptoms; and whatever the character of the local symptoms which appear, the indications which they furnish are infinitely subordinate to those dependent on our knowledge of this singular state which dominates and characterizes the entire disease.

It has more than once happened, and will again, that this form of disease repulses all debilitating treatment, particularly the use of bleeding. If it be performed, it speedily exposes, and without counterbalancing advantage, an alarming nervous condition; delirium, ataxia, prostration, coldness, nausea, dyspnœa and the first stage of asphyxia. This was often observed by those treating the epidemics of the last century, before

we ourselves witnessed it during the epidemic of influenza which appeared at Paris and over almost all France, a very short time before the Asiatic cholera of 1832. In these very serious cases, emetics, and blisters, first to the legs and then to the chest, were very much superior to spoliation of blood.

The third catarrhal localization of which we shall speak consists in certain anginæ, at once membranous and tonsillary, which develop like the false pneumonias of which we have just spoken. The swelling of the mucous membrane of the back of the mouth, the velum palati, the groups of follicles which compose the tonsils, is enormous; the uvula falls forward, swallowing is greatly impeded, headache is insupportable, delirium is frequent, the pulse rapid and little developed. Wet cups to the sides of the neck and below the angles of the jaws, with energetic revulsives and purgatives, are then a precious resource. General bleeding may take its place as in the catarrhal fluxions of the lungs which we mentioned above.

It is very interesting from the point of view of treatment to consider a disease as a whole, and its progress; and particularly so in the case we are studying.

This epidemic or malady of the people behaves, in regard to its totality and its complete evolution, exactly like one of the special cases of which it is composed.

What do we observe in one of the latter? Three periods, as in every regular acute fever; one of opportunity, characterized by nervous rather than plastic symptoms, irregular rather than synergic, to which we need not return. Then a period of febrile reaction, more or less energetic, which gives the disease some resemblance to frankly inflammatory fevers; then a period of excretion, in which the products of the catarrh, formed and elaborated during the preceding period, are by degrees eliminated.

It is undeniable that the treatment of these fevers is modified, and ought to be, to answer to the various indications which characterize the three periods which we have just summed up.

In the first, the remedies which regulate and aid reaction (antispasmodics, sudorifics, heat) are used to arrest the spasm by inducing a moderate fever and a critical discharge by the skin.

In the second, if the reaction is excessive, it is mitigated by general or local bloodletting, according to the case.

The third requires a previous use of purgatives, with expectorants, etc., and some bitters to sustain the system in its eliminative processes, and to fortify the nervous system against the impressions which expose it to numberless febrile accesses, etc.

It is certain that these three aspects of the same illness form also three successive aspects and periods of the same epidemic. Thus, at the beginning of the latter, nervous symptoms predominate; toward the middle it takes a more purely febrile, reactional, and inflammatory aspect. Its decline is marked by signs which attest less activity in the nervous

movements, in reaction and plastic fever, and a more particular tendency to secretory and critical symptoms.

Hence it follows in general that toward the middle of an epidemic of catarrhal fever the indication for antiphlogistic treatment is most specially manifest, and its action most useful. Its opportunity, which is less evident at the outset while the nervous state governs the indications, lessens, and ceases when the humoral state is pronounced. Science foresees all this, and experience confirms it.

Sydenham wonderfully grasped this natural progress of epidemics and this successive preponderance of the nerves, the blood, and the humor: *Porro observandum est, quod epidemici omnes, ubi primum e naturæ sinu emergunt exsiliuntque, quantum ex eorum phænomenis licet conjicere, principio magis spirituoso ac subtili videntur inhærescere, quam ubi jam magis adoleverint, quoque magis ad occasum vergunt, eo magis in dies crassi atque humorales fiunt.*

Antiphlogistic Treatment in Typhoid Fever.

We first spoke of the acute diseases which we ought to endeavor to arrest as soon and as vigorously as possible. We passed to others, in which this desirable end cannot always be reached, because of the frequently constitutional nature of the affection, in which one element alone is acute.

The first are the most closely related to traumatic inflammations. Their principle, or if we choose, the force which engenders them, is acute like the phenomena by which they manifest themselves. This force is no more durable than they; it does not persist in a latent form after their disappearance; it becomes exhausted or extinct, in a certain way, in its products.

The second are remarkable for exactly opposite characteristics. The force which rules their phenomena persists after them, in a latent or transformed condition; it is only in part exhausted by its symptoms and products. Such is the reason why, in the former, antiphlogistic treatment ought to be used energetically, and without hesitation, but in the latter, prudently, and with a constant apprehension of the refractory and constitutional nature of the disease.

Nevertheless, the latter consideration is the only one that ought to restrict the use of bloodletting in phlegmasiæ and rheumatic fevers; for the nature of these diseases has nothing essentially fatal or disorganizing, none of those properties which render morbid poisons so deleterious and so hostile to the vital principle, and which at the same time impose on the physician the greatest moderation in the use of debilitant remedies.

We now come to other acute affections, in which the difficulty of applying antiphlogistic treatment does not depend so much on the consideration of the future as on the present state. When the physician

bleeds too much or too little in acute rheumatism, he may lay the foundation for bad consequences, but they will always be remote; this is explained by the constitutional character of the disease, which renders it very susceptible of relapses, sequelæ, and chronicity. It is plain, on the other hand, that this cannot easily happen in true acute diseases, since in these the present alone is to be considered, and as they are frankly acute, they can have no constitutional element, and in consequence, need fear neither relapses nor chronicity. But if they can leave behind sequelæ, that is, functional lesions or disturbances, not morbid, and without connection with the disease that preceded, they at all events cannot leave *reliquiæ morborum*, that is, morbid accidents of the same nature as that of the generating disease. It thence results that the danger of bleeding too much or too little is in this case immediate and more grave, since the direct issue of the disease is in question, and pure acute diseases have only two modes of termination, cure and death.

If bleeding is pushed beyond legitimate bounds in constitutional acute rheumatism, there will be a risk of changing the latter to a chronic rheumatism fixed on an anæmic basis; or the patient will be exposed to relapses without end, and we shall have to solve the hardest and most obstinate of therapeutical problems, how to treat anæmia in a patient who does not bear analeptics and stimulants, or to treat subacute rheumatismal phlegmasiæ in a person in whom antiphlogistics are contraindicated.

If, on the contrary, bleeding is too much avoided, and direct sedative or controstimulant remedies do not take its place, we allow the rheumatismal phlegmasiæ to develop all their effects, to invade the viscera, modify the affected tissues, and thus produce lesions which sometimes are irremediable.

But the evil results of these two excesses are still more alarming in the treatment of grave fevers, for instance, typhoid.

There is this great difference between the preceding acute diseases and this: it is rarely the case that expectant treatment is adequate in the former, while in fevers properly so called the prudent physician has to abstain oftener than to act. This capital difference arises from that relation which we have remarked as existing between these two orders of acute disease. It is certain that, the more constitutional an affection is, and consequently, the more subordinate to individual considerations, the more indeterminate it is also, the less does it confuse the physiological actions, the less is it subjected to specifically definite forms and duration, and the less does it suggest the idea of a foreign force which is implanted in the system and there dies, as it were, after reproducing itself. It thence results that diseases of a well-defined nature, especially if specific, have a course which is much less susceptible of being altered than individual diseases have. The physician is forced, like the patient, to submit to what he cannot prevent. It also follows that when the case is grave, it is much more fatal in its developments and much less susceptible of modification by treatment. This, we repeat, is especially true of specific dis-

eases, that is, diseases which reproduce themselves by generation, always identical. If typhoid fever cannot be exactly ranked in this category, it must be admitted to have several characteristics which bring it near to it.

When we observe these cases of simple typhoid fever without any special symptoms; when, for instance, we see what is so common, typhoid fevers perfectly marked, lasting two or three weeks and more without presenting any special therapeutic indication, we ask how professors and practitioners can be found to say that bleeding is the proper and special treatment of typhoid fever. We have repeatedly seen typhoid fevers which began with moderate febrile action, or even somewhat active, but simple, continuing their well-known course, surrounded by all the desirable characteristic signs, with the exception of the febrile movement, which in a few days was almost wholly gone and left the disease without active symptoms and reduced to its most simple terms. Again, who would dare to say, in face of such facts, that the treatment by bleeding constituted the special treatment for typhoid fever? To speak thus is evidently to mistake one's own meaning; for we ought, instead, to say that antiphlogistic treatment is the special treatment of the inflammatory state by which the typhoid fever often manifests itself. After that, it would only remain to determine to what extent these inflammatory symptoms ought to be combated by bloodletting, regard being had to the typhoid affection which imprints upon them characteristics and a nature which by themselves have nothing to do with bleeding.

In healthy fevers and phlegmasiæ, the symptoms, as we said, represent the whole nature of the disease; they are its adequate manifestation, if we may so speak. It follows that the treatment indicated by the symptoms is also indicated by the affection which produces them, and that if we have quieted the former, we have evidence that the latter is proportionately so. To treat typhoid fever by the method which suits these fevers and these frank phlegmasiæ, is to assimilate the two classes; it is saying, in other terms, that the nature of typhoid fever is exactly measured by the intensity of the fever and the phlegmasiæ which we observe in it, and that the best method of treatment is that which proposes to make the fever and the phlegmasiæ cease in the shortest possible time, as may sometimes be done in a frank phlegmasia, such as common pneumonia.

It is then necessary at first, and for the moment, to distinguish two things in this disease: first, the general affection which forms the principle of its unity; second, the various changes such as inflammations, gangrenes, ulcerations, softenings, hæmorrhages, septic humors, profound alteration of the blood, etc., which form the manifold determinations of this disease.

The affection, in its unity or its general element, is not inflammatory, whatever may be said, however violent the fever, however numerous the inflammations. The affection is typhoidal. Such is its character, just as

in venereal affections their character is syphilitic and not inflammatory. The inflammation is no more necessary to the typhoid affection than to the syphilitic affection.

But the typhoid affection is very generally determined by a fever and typhoid inflammations which, in the specialty of their phenomena, reveal the nature of the affection, manifest it by appropriate symptoms, a peculiar co-ordination and characteristic signs.

Here it is indispensable to understand well the value we attach to the word *typhoid.*

It is not enough to give it the etymological sense, and to suppose that we really know the nature of the typhoid affection of which we speak, because we know that the vital functions are primarily affected with stupor. They are so in many other affections which have but one single connection with our typhoid fever. Why, by what, and how are they thus affected? To reply to these questions would be to state the nature of the affection of which the typhoid condition is the first and the direct effect. So then, when we said—"The affection is typhoidal, such is its character, just as in venereal inflammations the character is syphilitic," we evidently intended merely that the first modification impressed by the direct cause of the disease upon the organic elements was a certain stupor.

The nature of this cause, and the conditions of its formation and manifestation, are an entirely different point. By this term, typhoid fever, we express at once the idea of stupor and that of the nature of the stupefying or typhoid cause. The former notion includes a crowd of typhoid affections; the latter includes but one.

We shall not be required to seek the nature of this state and these conditions of development in the typhoid affection. It suffices us to know, 1, that this state is primarily general; 2, that it primarily affects also the special organic elements of universal distribution, particularly the sanguine and nervous elements; 3, that the mode of this affection is the stupor with which it strikes the same elements.

And yet, to attend only to the affection which is typhoid or stupefying would be to pronounce implicitly that antiphlogistic treatment ought to be banished absolutely from the treatment of typhoid fevers; for what indication can the single element of *stupor* present which antiphlogistic treatment can fulfil? No place would remain for any besides tonic treatment.

Nevertheless, diet, diluent and temperant drinks, bloodletting, and antiphlogistic regimen, fulfil useful indications in this disease.

We must, therefore, consider something very important besides the element of stupor, but without losing it from sight, and conversely.

When we see this muscular prostration, this hebetude of the senses, this profound indifference to outward impressions, etc., we infer merely a typhoid condition, for it alone is revealed by these symptoms and many others, which bear the same stamp.

When afterward we observe the aspect and the physical qualities of the blood, the smell of the excretions, their septic character, the chemical character of the urine, the state of the tongue and teeth, the tendency of the tissues to gangrene, softening and ulceration, either primitive or consecutive to special inflammations, the petechiæ, etc., we understand that there is a profound modification in the plasticity or the state of the vegetative functions as manifested by their products. We further understand that this profound alteration, this general affection, is of a kind to exercise a stupefying influence upon the apparatus of nutrition, or the tissues and the living fluids, which changes them everywhere, when it does not completely mortify them locally.

When we next consider that the disease is usually accompanied by a regular febrile reaction, presenting quite calculable periods, a duration capable of being approximately fixed; that, resembling in this point the specific eruptive fevers, without ceasing to be the same, it displays itself in all degrees, from the most benignant to the most malignant; that these periods and progress of the fever, when it is simple, exhibit in their course a succession and co-ordination which are very physiological, and perfectly in harmony with the periods and the progress of the other phenomena; that, in a word, in cases which are common although grave, it seems as if we might compare this succession of morbid phenomena to a function, that is, to a series of operations tending to a particular end, and ruled by known laws, etc., the mind is irresistibly led to think that here the organism is striving, according to these invariable laws, to return to health, and to fight against a cause of disorganization and death.

Finally, when, exhausting this idea, we inquire whether this efficient cause be a germ like that which produces variolæ and the other specific exanthemata, a living morbid matter from without, furnished by an organism which, having received it from another, transmits it in identical form, so that a more or less direct contagion is the rigorous condition without which the disease would no longer be developed; when, examining typhoid fever with this purpose, we find that the fact is otherwise, that it is observed spontaneously produced, or independently of a multitude of hygienic circumstances and conditions of insalubrity, which would be supposed very powerful agents in producing them; then we are forced to enlarge and to modify our hypothesis, and to ask of the economy itself, of its laws, of observation of its requirements, changes, revolutions, and the perturbations which may follow, etc., some data which may throw light on the obscure etiology of this typhoid fever.

Man is subject to it only up to a certain age, during a certain period of his life, before and after which it is very rarely observed; he ceases to be liable at about the period when he begins to be stationary or to decrease. It is most frequent from the age when sexual differences become marked to that when the individual has no more to acquire in regard to bodily organization and development, that is from fifteen to thirty years; and it occurs later in the male.

One of its chief characteristics is certainly the immunity which it confers on persons who have once had it.

Young people who leave their home in the provinces to live in a large city like Paris, have to undergo the process of acclimation; they find in their new state all hygienic conditions changed, and some very greatly; these persons are remarkably disposed to typhoid fever.

The attack occurs without exemption of temperament, and without external appreciable causes. It is remarked that in epidemics it is principally found in robust young men. It appears more severe, in general, other things being equal, in very sanguine persons, in whom the plastic force is energetic, hæmatosis powerful, the fluids abundant, the parenchyma well nourished, the vegetative life rich and exuberant. According to old experience, its severity is increased in those who, with a similar temperament, have been previously exempt from any disease, and whose health has been exposed to none of those grave affections in which the body, subjected to a long diet, evacuant treatment, natural evacuation, etc., becomes considerably emaciated and renews its substance.

Popular and medical tradition also aver that those who have had a regular typhoid fever, even if severe, which has ended frankly, and has passed without accidents or sequelæ into a good convalescence, come out from the test in better health, more robust, etc.; a fact which we have several times observed.

The disease is characterized by a long and difficult convalescence; the patient eats enormously; is slow in regaining flesh; and it has been remarked with much justice that it was a favorable sign when the patient grew lean almost suddenly about the end of the second week, in cases where the disease was to last three weeks or more beyond that time.

If we were writing a treatise on general pathology, we might be allowed to remark the special seat of the organic sign: the singular anatomical lesion which distinguishes this disease. The distinctive seal of the disease is impressed upon the small intestine, the organ first formed in the most fundamental embryogenic evolution of the viscera or special apparatus of nutrition, that in which the roots of the general system lie, in the patches of Peyer, the origin of the lymphatic system; that cavity, of which one may say, with much more justice than of the auricles of the heart, that it is the *primum vivens et ultimum moriens*. This is the reason why the digestive tube is the apparatus which has the most direct relations with the vegetative acts. None has such close sympathy with nutrition, as is plainly seen in dyspepsia among chronic, and cholera among acute diseases. Reciprocally, when the elementary or vegetative vital functions are primarily altered, as in all grave fevers, *morbi totius substantiæ*, the most constant and the most direct lesions, sometimes the most characteristic, are found in the digestive tube, especially the intestine.

We shall avoid stating a theory of typhoid fever; and we confess readily that we do not feel ourselves capable of doing so. The few con-

siderations upon which we have entered have been necessary, in order to justify our criticisms and our advice regarding the application of antiphlogistic treatment to grave fevers.

The indications for this plan of treatment cannot be well appreciated without attending to all the great points which we have brought out; we are tempted to push bloodletting too far, or to use it wrongly, unless we well understand the value of each of these indications.

We know no specific treatment for typhoid fever; in other terms, we possess no remedy capable of immediately touching the efficient cause or the generative principle of the disease. If we had such a specific, we should not need observations of the laws of nature, for we could demand nothing of the healing force which she exhibits in the course of a fever; we should go straight to the disease, sure of touching its vital point. But, deprived of this resource, reduced to indirect remedies in a well-limited disease, to the laws of which we are forced, more or less, to subordinate our therapeutic action, we have no better guide through these inevitable difficulties than the observation of these laws.

We suppose the simple case of an indication for antiphlogistic treatment. In this case, the essential features of any typhoid fever are closely associated (as is very common) with symptoms of general febrile plethora, or if we please, the febrile exaggeration of acute disease, whether accompanied or not by inflammatory congestions. This typhoid turgescence, manifested by febrile superstimulation of the great circulatory system, and various parts of the capillary system, is very common at the onset of grave fevers. But it is not necessary to suppose that these manifestations, however intense, are complications of the typhoid fever, distinct from it in their principle, of separate birth, and therefore requiring a separate antiphlogistic action proportioned to their intensity. The quantity of these phenomena does not exactly represent their nature. This is so true, that it may happen, in consequence of certain individual or epidemic conditions, that a single bleeding, without in any way lessening the activity of the symptoms, so modifies their physiognomy and permits their bad import to show so clearly that no one would have thought of bleeding if the disease had begun in that form.

This point of practice presents great difficulties. When we attempt to remove the entire disease, like pneumonia, by bleeding, these difficulties disappear, because the physician is then merely a phlebotomist with more or less experience in a superficial semiology. But whoever depends only on the principles of pathology, and the teachings of clinical experience, sees the difficulties and the incertitude reappearing at every step, for the task is nothing less than the application to each individual of that vital dynamometry which it is so hard to teach in theory. We require, in fact, a consummate sagacity and experience to appreciate justly the predominance of a given patient toward one or another particular set of symptoms. There is there a typhoid element, which we might call the *universal* principle of the disease, and an element of fever, inflammation,

etc., which might be termed its *individual* principle. In order to treat typhoid fever well, we must effect a continual *differentiation* and *integration* of these two elements of the disease; that is, while separating them abstractly, considering them as *different* in thought, we should never forget that in the individual they form an indivisible total or *integer*.

If we too much neglect the *universal* element in our treatment, and draw all the indications from the *individual* element, we expose the patient to adynamia, ataxia, etc. But if, on the contrary, we too much neglect the *individual* element, and attend solely to the *universal*, we are in danger of leaving the former in a state of activity which will engender those phlegmasiæ and those special congestions which in turn multiply the typhoid element, infect the system, block the organic functions, alter the tissues and poison all the living molecules.

At the outset of a grave fever, stupor by itself, or rather, typhoid intoxication, does not contraindicate the use of bloodletting, if otherwise called for, and it may be repeated until the disease is simplified, that is, until it presents no more indications. Now, we know that, of itself, it offers no indications, even when it is well-marked.

The latter restriction calls for a word of explanation.

As we said above, it is not so easy as the anatomical school imagine, to circumscribe the morbid species known in our time as typhoid fever. In our nosological tables we have nothing to take the place of the essential inflammatory fever of the ancients, nothing that gives the idea of that which they less vaguely designated as *simple synocha*, *imputrid synocha*, etc. But these fevers, though banished from our doctrine, are not excluded from our clinics. Such continued pyrexiæ are often met there, regarding the nature of which we must remain uncertain for several days, though the onset may be very vigorous, and undistinguishable from that of typhoid fever, simple or with inflammatory symptoms. But, either spontaneously or under the influence of bloodletting, these fevers disappear in a week or two. This is especially observed in blonde, lymphatico-sanguine subjects, when there has been general and continued sweating at the beginning.

These cases, too much neglected by modern theorists, yet common during certain medical constitutions, are variously explained. Some great fever-killers claim all the honor of a cure for themselves; they believe that they have arrested the progress of a typhoid fever which otherwise would have pursued an inevitable path, complicated subsequently by the grave incidents of typhus, etc. Others, convinced that typhoid fever is a specific disease, invariable in duration, impossible without a complete evolution, without the whole train of symptoms and organic lesions proper to grave and complete cases, deny that these continued fevers are of the same nature as the typhoid; they assign them no place, but leave them for the present out of the nosology. Some nosologists cut the difficulty by making out of synocha a species as distinct from typhoid fever as from measles. The latter give no pathology. The smallest number (if there

be any scientific men who thus hold) incline to think that, typhoid fever not being a specific and virulent disease like small-pox, for example, has not, like the latter and the other specific eruptive diseases, a necessary progress, duration, and periods; that there are cases incomplete, ill-formed, even aborted, as there are others complete, perfectly characterized; cases which regularly accomplish all their phases without presenting in their course any of those grave symptoms which have endowed the species with the name of *typhoid;* and that among these varieties are included the non-putrid synochæ which vary in duration from one to three weeks and more. The latter consider that synocha is to grave typhoid fever that which varioloid is to variola, cholerine to cholera, etc. But if it be so when they are left to their own course, they may be shortened by antiphlogistic treatment of some little energy.

In not a few cases, particularly in spring, these fevers begin with great activity and very violent inflammatory symptoms in young, sanguine, vigorous persons, and the physician is led by more than one reason to perform several general and local bleedings in a short time. We have repeatedly seen in the clinical service of Bouillaud at the Charité, and in our own practice, these continued fevers with pronounced inflammatory symptoms cease quite speedily, as if extinguished by this energetic treatment. Had these cases a foreordained course, and were they destined to the evolution of all the features of grave fever? We dare not deny this absolutely, but we think it very improbable; and the opinion which we gave above in respect to the difference in severity and development which typhoid fever may attain, like small-pox, cholera, etc., frees us from the need of affirming it, and allows us to explain the success otherwise. We have seen so many other cases, apparently like these, going on without change, and even becoming aggravated in spite of a similar or even a bolder treatment, that, when we succeed in obtaining such results by antiphlogistic treatment, we never dare to flatter ourselves that we have been treating anything but a synocha, though we could never avoid the idea that the latter differs from typhoid in its degree of determinateness much more than in its nature.

At any rate, a moderate antiphlogistic treatment evidently shortens and weakens the continued fevers which we placed in the first division. The last partisans of physiological medicine claim that this treatment prevents this class of fevers from rising to a more definitely marked stage, to the second period, where the symptoms of typhus are declared which did not primarily appear. This exaggeration ought not to deprive us systematically of the services which bloodletting may render when everything concurs in recommending it.

But in the case where a typhoid fever which presents at the outset the most express indications for antiphlogistic treatment, allows us to see, beneath the inflammatory mask, the grave symptoms which are proper to this class of fevers, what ought we to seek of antiphlogistic treatment? what to hope? and to what result should we limit it? We said above,

to simplify the disease, to relieve it, when that can be done without danger, of all which might subsequently become the basis of typhoid congestions and phlegmasiæ.

We repeat, then: in the cases which we have carefully designated, a few small local bleedings at short intervals at the beginning, if the patient shows neither ataxia nor adynamia, and especially if, before the fever, he was in a good state of health and strength, etc., may greatly simplify the later stages, and very happily modify several of the grave symptoms which are dreaded after the first week.

Since the labors of Broussais, Petit, and Serres, the French school has united under the name of typhoid fever a certain number of fevers which Pinel described as isolated and distinct diseases. But, as always is the case, the opposite excess has been fallen into, and we to-day give the name of typhoid to every continued fever that lasts beyond ten days. Here is evidently an extreme which will not be maintained, and we can already point out two kinds of fever of the continued type lasting from two to three weeks which are not typhoid fever. One of these, described by some as mucous fever, is often merely a sort of acute rheumatism occupying the mucous membranes. For us, it is a catarrhal fever of rheumatic nature.

But there is another fever, very much easier to confound with typhoid, of which we observed many cases at the opening of the war of 1870. Many young soldiers, after forced marches and excessive fatigues, came to us at the Val de Grâce and the Hôtel-Dieu with a continued fever, with a temperature of 40° (104° F.) at evening, and with slight remissions of about half a degree ($\frac{9}{10}$° F.). This fever was accompanied by a very marked prostration of strength and adynamia; the tongue was dry, and the mind sometimes wandered at night.

The bowels, however, were unaffected; there were neither putrid stools, nor even diarrhœa. This fever, treated by rest, light diet, and especially divided diet, declined during the third week in that regular way which is called *lysis*, without exhibiting those great remissions which characterize the decline of typhoid fever. We have given it the name of *adynamic fever of the over-driven.*

If we were not mistaken, the same facts were observed by others, and we had the pleasure of imparting our idea to several of our colleagues. We have heard from certain accoucheurs, that when women have had to take long walks in order to reach a maternité, or considerable efforts in parturition, they have developed continued adynamic fevers which have resembled puerperal fevers. Perhaps in these conditions there is even a cause which predisposes to pyogenic puerperal fever, for we know how much over-driving predisposes to the formation of pus. We will not dilate upon this subject, as it would lead us much too far from antiphlogistic treatment; our only object was to call the attention of our colleagues to this typhoid pseudo-fever.

If, then, it is important to know when to yield to evident indications

presented by febrile and inflammatory phenomena, which are dangerous when in excess, it is not less important to observe, in the use of the remedies indicated, the restraint and the prudence which the laws of the disease prescribe.

Now, we do not find in these laws any absolute contraindication of bleeding, but only of its abuse. They present, on the contrary, very distinct reasons in its favor.

When a vehement febrile reaction, with plethora, turgescence, various fluxions, phlegmasiæ, either existing already, or threatening to break out, occurs with the typhoid affection in a robust person in whom the plastic force and the hæmatosic and vegetative functions predominate, the indication for bleeding is not only hinted at, but is commanded by the nature of these symptoms.

Compare this fact with a correct idea of its cause and the conditions of its existence. What a violent action it reveals ! and will the system suffer ? The organization is profoundly altered in its plastic functions; its most animalized parts seem struck with stupor and a septic tendency. It must succumb, or else this morbid poison, furnished by its own substance, must be (as they say in the Hippocratic school) digested, separated, eliminated, and the body re-established in its normal crasis. There is then an urgent requirement to evacuate, to withdraw a part of this infected blood, in order to lessen by so much the labor of nature. It is necessary to aid the physiological rebuilding of the body, by aiding morbid eliminations, and the evacuants of the primæ and secundæ viæ are a great resource in this.

Let us now recall, 1, that bleeding in an acute disease is the less required in proportion as the cause of the disease has a septic and dissolvent action upon the blood and solids; 2, that bleedings, when indicated, ought to be small and at brief intervals, in proportion as the patient is weak, and his disease confirmed and its course necessary; 3, that in special inflammatory diseases, in which evacuation forms the chief treatment, humoral or indirect spoliation is indicated, relatively to direct or sanguine spoliation, in proportion as the special element predominates over the inflammatory, and reciprocally.

It is certain that, in the cases we have indicated, bloodletting, by lessening the mass of the blood, by disanimalizing it, removes material for the phlegmasiæ and putridity. This has induced certain enthusiasts to say that sordes of the tongue and other signs of putridity were erased from the symptomatology of typhoid fever by bleeding *coup sur coup* according to Bouillaud's method. We have observed patients affected by this disease in the service of Bouillaud and others in the same hospital, and we owe it to truth to say that the diminution of severe symptoms connected with the septic condition has seemed to us one of the advantages of employing antiphlogistic treatment more liberally than is done elsewhere, and that this difference is much more evident when Bouillaud's patients are compared with those treated by pure expectation, and left to

whatever may happen. The question is, whether this precious advantage may not be gained at a less expense, and whether, applying Bouillaud's procedure (rarely necessary in its rigor) under the direction of other principles and ideas, we might not obtain the benefits more certainly, without incurring the risks.

The general indications, as we said above, which are drawn from the knowledge of the nature of typhoid fever, authorize bloodletting when the signs and symptoms demand it, but, we added, they forbid the abuse which might result from basing our action only upon the indications furnished by the abstract phenomena. This is the chief benefit of this distinction.

While this treatment leads the physician to aid nature's operations, to remove the vitiated matters from the system, and thus assist the metasyncritic movement as far as its necessity is indicated by the urgency of the symptoms; at the same time it warns him that it is impossible to be a complete substitute for nature, and that while she is relieved of the accidents, the overweight, the protracted waiting, the dangers, a certain amount of action must be left to her. This is demanded by necessity, and it is very dangerous to neglect it. Such is the disease, such its nature, such its laws. Do you pretend to oppose them? This is very well, if you will give us the means of doing so; that is what we find difficult! We limit the disease as much as possible, but we do not think we can change human nature.

Thus, then, while fever, phlegmasiæ, and morbid phenomena persist, and seem to demand of the physician that he continue the remedies by which they were first moderated, the nature of the malady forces itself on our thought, restricting the indication and justifying art in its intelligent though forced inaction.

We will not pay attention to the contraindications of bleeding in typhoid fever. The length of the task would exceed our intention and object. In what has preceded, there are more principles than are needed in order to understand the nature of these contraindications. They, and the indications as well, are contained in this passage from Sydenham:

"Indicationes veras ac genuinas quæ in hoc morbo consurgunt in eo versari, ut sanguinis commotio intra modum naturæ proposito congruentem sistatur; ea nimirum ratione ut nec hinc plus æquo gliscat, unde periculosa symptomata insequi solent, nec illinc nimium torpeant, etc. . . . Adeo ut sive materiæ heterogeneæ irritanti, sive cruori res novas molienti febris ortus debeatur, indicatio utrobique eadem existat."

Few acute diseases have a more *personal* character than typhoid fever; and its treatment is susceptible of more modifications than that of any other. The countries, the medical constitutions, the epidemics, impart the greatest variety to the treatment. This is matter of history. The inflammatory, putrid, adynamic and ataxic forms are, so to speak, its natural varieties, and the passage from one to the other is easy and natural also. There is, we repeat, a simple form, of which the treatment con-

sists in simple expectation. To bleed in this form, and even in that which is accompanied by a pretty severe reaction, with an intense but frank inflammatory and putrid diathesis, without any pre-existing personal morbid element; and to suppose that we have been of great service because the patient gets well, is a prejudice which is singularly prevalent at La Charité. They bleed in all cases, and in circumstances where nothing calls for it, and the recoveries seem to belong to the method. Fortunately, these cases are of a sort which it is not easy to hurt; they recover against and in spite of all.

"Venæ sectionem in talibus casibus plane omisi," says Stahl: "ad ipsius autem febris veram curationem omnia dirigens nihilo infelicius, imo nihilo difficilius, sub divina benedictione, febres ad salutarem exitum perduxi."

Only severe, medium, and light cases are known; and they bleed, accordingly, much, moderately, or little. But a little is sometimes far too much. The half of typhoid fevers requires no active treatment, and we do not fear to say that the better typhoid fever is known, the less blood is shed.

Bleeding being indicated, the same question is continually reproduced: how often, in a given period, should it be performed? Sydenham shall reply to Bouillaud, who invokes him so often:

"Mensuram quod attinet, mihi solenne est eam duntaxat sanguinis quantitatem detrahere quantum conjicere liceat, quæ ægrum ab incommodis quibus immodicam ejus commotionem obnoxiam esse diximus, incolumem præstat. Æstuationem illam deinceps rego ac moderor, phlebotomiam vel repetendo, vel omittendo, cardiacis calidis vel insistendo, ac denique alvum vel laxando vel compescendo, prout motum illum vel efferari vel languere animadverto."

Here we will close our advice respecting antiphlogistic treatment in typhoid fever. Instead of confining ourselves to such generalities, we might much more easily have taken the contrary path. This method would have been interminable; and as we could not say everything, we could not have known what to choose. One of the greatest faults of our medical period is that of confounding the practical with details, and details with what is practical. We think, without entering into details, that we have better shown our practical medical skill to those who faithfully study their art, than if we had touched on some special points without showing the principles with which they are connected.

Antiphlogistic Treatment of Facial Erysipelas.

The treatment of this disease has been the subject of many disputes between expectant and active treatment. Here, perhaps more than elsewhere, the exaggerated pretensions of killers of disease have been destructive; and the false prognosis of certain physicians of the natural school has cost more than one patient his life.

Facial erysipelas is a special eruptive fever, of which the periods are pretty regular, and the termination very generally favorable. In the greater number of cases, a physician is not called in by those of the poorer classes, if they are acquainted with the disease. They know very well that *they are in for nine days;* they have had opportunity to know, for erysipelas of the face relapses with an uncommon facility, and with a sort of annual or biennial periodicity. Their expectation is rarely disappointed, unless the erysipelas leaves the face.

We have observed the natural progress of a great many cases of facial erysipelas, left entirely to themselves, and we have never seen this method result in any accident, any unfavorable issue.

It is, however, certain that in some cases in which the intensity of the headache, the inflammation and the febrile reaction furnished positive indications for bleeding, the treatment would doubtless have been followed by no bad results; nay, that obedience to the indication would only have relieved the patient; but we think that the duration of the disease would not have been sensibly abridged, nor its progress notably modified.

In opposition to these cases, we have observed some treated by abundant bleedings; and, at the outset, we may say that if we had to choose for our own person between the systematic expectation above described and the systematic method of bleeding *à outrance* (we mean, pushed beyond the indications), we should prefer the former of these routines.

To whiten an erysipelas of the face is not to cure it, nor even to moderate it, but to make it worse.

Under this inconsiderate treatment we have seen erysipelas *walk in white*, so to speak. Their coloring matter had been removed, but nothing more. They were scarcely to be distinguished except by a sickly or grayish rose-tint, circumscribed by a rose-colored border of a somewhat lighter tint, spreading imperturbably, and day by day enclosing a larger space of this virtual phlegmasia, which loss of blood had converted into a quasi-inflammatory œdema, a white phlegmasia, which still betrayed all the speciality of its erysipelatous origin, though no longer representing the intensity of its effects.

The fever, the special symptoms, and the general condition, were, like the phlegmasia itself, impoverished and languishing, without having retired a step; the whole disease was unrecognizable, and, having been converted into something nameless, all prediction became impossible. In place of a known and calculable inflammatory disease, there was a persistent, nervous, irresoluble febrile movement; in place of convalescence, a cachexia, etc.

In speaking of bleeding *à outrance*, we immediately justified and defined the unfavorable and critical sense we attached to the word, by saying that we understood by it bleeding pushed beyond the indications. We must now explain the latter word.

For the systematic expectant practitioner there never are indications;

for the systematic active practitioner, always. The latter, as often as he finds symptoms, must needs oppose them.

The indications for bleeding in facial erysipelas are exceeded when we attempt to obtain by it anything more than the disappearance or remission of certain symptoms that are foreign to the natural and simple progress of the eruptive fever, and indicate a grave complication; or more than a limitation of the symptoms which are inseparable from the affection itself, when their excess might confuse and alter the periods and the termination.

The summit of art is to avoid the excess of unqualified expectation, without falling into that of unqualified activity.

The fear of meningitis is that which most troubles the physician in erysipelas of the face, of a certain intensity. We ourselves, not to go beyond our own observations, should be greatly embarrassed to say how well this fear is founded; for we do not in strictness recollect ever having observed this unfortunate combination. We are aware that in certain epidemics of facial erysipelas arachnitis has carried off a good many patients, but we pass over these extraordinary events, and confine ourselves to our sporadic cases. Without denying the fact of termination by meningitis, which is incontestable, and without discussing the value of the theories which have lately been proposed to explain the extension of the phlegmasia of the skin to the periencephalic membranes, we think that the frequency of this terrible accident has been exaggerated.

In the first place, delirium, somnolence, even coma, subsultus tendinum; and next, the vomiting, are sufficiently common in erysipelas of the face. These symptoms, taken together, may lead us to suspect meningitis, but do not suffice to characterize it. They are nevertheless sufficient in the eyes of some practitioners; this is enough to popularize meningitis, and to persuade many that there has been a cerebral fever which has yielded to this or that treatment.

But as regards those who die with cerebral symptoms?

Once more, we do not deny that which at present we are only seeking to define. We have performed and have seen performed autopsies upon persons "dead of facial erysipelas with cerebral symptoms;" and we have not found in their arachnoid, pia mater, or brain, any certain signs of inflammation.

Along with this, we have observed a great number who, having presented the same accidents and given the greatest anxiety, were more lucky than the former, and recovered without retaining any trouble of the cerebral functions, absolutely as if from a typhoid fever with delirium. The latter surely did not have arachnitis; and yet, if they had succumbed and the autopsy had not been performed, how many physicians would have attributed their death to a cerebral phlegmasia! Again, let us reflect on what occurs in typhoid fevers, scarlatinas, etc., where the patient dies *with* numerous, persistent, intense cerebral symptoms, not *of* them, nor of a meningitis, which the autopsy scarcely ever reveals.

It was very necessary to state these things, in order to bring into some agreement the exaggerated assertions of those who in no case *treat* erysipelas, and those who *ill*-treat it with equal blindness.

A physician who is less preoccupied with the often illusory view of a meningitis, will naturally retain more moderation and independence of mind than he can have under the influence of this fear; and his prudent security of mind will stamp upon his methods of treatment something of that deliberation and firmness, of which Sydenham, Boerhaave, Hoffmann, have left us models.

In almost all sporadic erysipelas of the face, when it passes a certain limit of intensity which gives rise to a dread of accidents, or of an unusual duration or extent, there are two fundamental indications: one, which bloodletting alone can fill, the other, requiring the use of emeto-cathartics. It very often happens that while we are satisfying the one, everything else takes a favorable course as promptly as possible. These indications are, on the one hand, considerable fever, headache with enormous congestion and all the indices of a violent inflammatory state. On the other hand, dyspepsia some days before the invasion, and after that the saburral element, the gastric state in a most pronounced form, etc.

If the latter state is only indicated by the mucous-bilious coating of the tongue, without a recollection of gastric distress previous to the attack of fever; if the mouth is not decidedly bad, and the loss of taste and the bitterness are not mentioned among the most annoying of the symptoms, with a sensation of overfulness and indigestion accompanied by painful eructations, nauseas, and efforts to vomit; if, at the same time, the signs of the inflammatory state are very marked, we may defer at once to the indication presented by the latter. It is probable that emetics would then be useless, and that cathartics will not find their proper place till later.

For stronger reasons, it will be the same if, as sometimes happens, the patient has no symptom of the gastric state except a more or less acute pain at the epigastrium, increased by pressure, a tongue bright red at the tip and edges, with a nacreous coating in the middle through which the bright red mucous membrane shines—a peculiar appearance which gives the tongue the look of a muscle covered with shreddy, ravelled aponeurosis, and is special to the phlegmasiæ and all the eruptive fevers, including typhoid, febrile erythema nodosum, etc. Even in this case the application of leeches to the pit of the stomach may be made, either alone or conjointly with bleeding from the arm, according to the general state, the season, the temperament, habits and strength of the patient.

As regards the limits or "doses" of antiphlogistic treatment in this disease, we do not pique ourselves on exact medicine, but make a point of not fixing them even approximately. When once the indications are pointed out, the genius of the disease known, the rest belongs to the physician. Empiricism will find its needs gratified elsewhere; treatment ready made for severe, moderate, and light cases.

By trusting wholly to nature we sometimes aid the extension of the disease in an unfortunate way; it seems to multiply indefinitely and to impregnate itself, as in cases of erysipelas which are not frank and which extend to the trunk, owing to pre-existing bad conditions in the patient.

By evacuation of the gastric passages and the circulatory system, we should have simplified the morbid state, assisted the natural movements, and facilitated that sort of metasyncrisis which is always more or less produced in exanthematous febrile affections, especially in those which return periodically, like the febri-phlegmasia which we are now treating of.

Nothing of all we have said applies to cachectic erysipelas, that which occurs subsequent to certain typhoid fevers, nor that of the limbs; nor to any of those which form more or less grave episodes in the course of certain morbid conditions, more especially of the chronic sort.

Antiphlogistic Treatment in Acute Specific Diseases.—Small-pox.

Strictly speaking, *specific* means that which *makes a species.* A specific disease, then, is one which makes a species, which acts like a natural species, and may be compared with it. What, then, is a species? In zoölogy it is defined as *a type of organization, of rigorously determined form and activity, which multiplies in space and perpetuates itself in time by direct generation in an indefinite manner.* (Hollard, *Nouveaux élêments de Zoologie*, Paris, 1839.)

Thus the essential character of a species is the constant preservation of a type, and its indefinite perpetuation by way of direct generation; a feature which establishes one of the most important of the facts on which species is founded, to wit, its *incommunicability.* The species do not communicate one with another; this is an axiom of natural history.

If we now apply to small-pox this notion of species, we shall find it fit exactly.

Small-pox is transmitted and perpetuated by a true generation. It does not communicate with another species, does not mingle and become confounded with another specific diathesis to form by a sort of amalgamation a composite disease. On the contrary, when it coexists with another specific disease in the same individual, they are seen travelling in parallel courses, as it were, in complete independence, one beside the other without fusion or even reciprocal modification in any respect. The same may be said of all specific diseases considered in themselves or with respect to one another.

These species have their varieties, and even their races. Their varieties, as in the natural kingdoms, are produced by the surrounding circumstances, whether special to the organization in which the specific virus germinates and develops, or dependent on the medium which the individual inhabits, etc. These entirely sporadic modifications really seem to

correspond with the zoölogical varieties, which are (as has been said) nothing but accidents of species, perpetuated by generation, and constituting races. In epidemics or endemics of specific disease, these accidents of the species, or *varieties*, are seen reproduced by contagion, infection, or community of origin, forming, as it were, pathological *races* or accidents of the species; in a word, varieties which are retained and perpetuated for a certain time.

The varioloids, the confluent, malignant, petechial variolæ, etc., are examples which justify this comparison.

It follows from these preliminary considerations, that the specific fevers, proceeding from a germ which it is their office to perpetuate, and conferring immunity upon those whom they have once struck, are, in general, like natural functions, and that they also call for natural remedies.

A natural method, in medicine, attempts to imitate the salutary reactions of nature: 1, by letting them have their way, and surrounding the organism by circumstances favorable to their spontaneous development, when the symptoms are regular; 2, by checking their excessive violence by various tempering treatment intended to reduce the reaction to a degree compatible with the preservation of life and the accomplishment of the morbid function; 3, by stimulating the inertia of the nervous system, and enabling it, by various excitant remedies, to satisfy the needs and the requirements of the disease, sustaining the fever, animating the eliminative organs to a proper degree, and, in a word, bestowing upon the living organism the force which it needs to resist the disease, repair its losses, and rise from its weakness.

In the immense majority of simple and discrete variolas, bloodletting is useless; and we ought never to draw blood uselessly.

We know very well that this disease is one of those in which we can do least harm, precisely because of its admirable regularity and the fixed nature of its course and termination. In a well-disposed patient, presenting a certain degree of reaction, one or even several bleedings in the course of the fever of incubation cannot prevent the eruption or alter the order of the symptoms. Some patients of a feeble complexion, *laxioris sanguinis*, are exempt from primary fever, according to Sydenham, and we have more than once witnessed it. The eruption occurs after a few days of slight malaise. It would be otherwise in certain grave forms of the same affection, and in the erythematous exanthemata belonging to the groups of which we shall presently have to speak. But once more, as bleeding is useless except when there are special indications, which we shall note, we ought to abstain from it, and preserve strength which may be needed.

The abundant sweats which accompany the fever of incubation are a reason for proscribing bleeding, for this circumstance usually announces that confluent small-pox is not to be feared.

There is no antiphlogistic treatment to be used for the pains in the

loins or stomach and the vomiting, which cease spontaneously when the eruption is complete, and even when commencing.

We must also take care to avoid precipitation in treating a certain degree of somnolence and stupor, which is a pretty faithful indication that the eruption is at hand. We have seen physicians alarmed by these symptoms, and undertaking to combat energetically a supposed inflammatory congestion of the brain, although the first signs of the cutaneous phlegmasia had warned them that they were about to do ill.

It does not follow that antiphlogistic treatment is not in some sort the only form indicated in benign variola. But this treatment has other agencies than that of bloodletting. Rest, diet, diluent drinks, are very powerful antiphlogistic remedies. By themselves they suffice to cure regular variolæ, especially if they be associated with Sydenham's cooling method, which consists in rising every day, walking in the house, and prudent ventilation, until the second day of the eruption, or the sixth day of the disease.

By the latter precaution Sydenham claimed to do more in tempering the effervescence of the blood, the violence of the fever, and the complications which may result, than by the intervention (often untimely) of rigorous antiphlogistic treatment. This great practitioner had the art of supplying the place of bleeding by all sorts of simple, natural, and effective means; though he knew when to bleed with due energy. He knew the urgencies, and seized the fugitive occasion so as to economize his patient's blood. Thus he not only cured, but cured *well; non tam cito quam tuto.* We will return to this general principle at another time.

Let us return to the variolæ and discuss the indication for bleeding.

We ought at the first to ask whether confluent variolæ is only a discrete variola of greater intensity, the abundance of the eruption of which causes the pustules to become confused; and whether, in consequence, supposing that the confluence could be foretold by certain signs, a very active antiphlogistic treatment might change confluence to discreteness, and replace the danger which is connected with the former state, by the almost absolute security of the second.

The comparative study of these two varieties of the same disease formally contradicts this hypothesis.

Although all the pathological marks which impart the character of confluence are very probably much more dependent on the state of the patient than on the nature of the direct cause or of the virus, it is yet true that the two varieties of small-pox differ in some other point than that of intensity, and that the confluent diathesis proceeds, if not from a specific morbid state, at least from a peculiar state very distinct from that which forms the basis of discrete and simple variolæ. This state is doubtless related only to individual predisposition, for a discrete variola may communicate the confluent form, and *vice versa.* But we ought to add that from the combination of the variolous state with this special crasis of certain subjects there results a compound disease, of quite another de-

gree of gravity, we repeat, as regards its nature, from that which it owes to its violence. Nevertheless it is impossible to deny that the intensity of the reaction, the abundance of the materies and the morbid products, the depth and extent of the local organic lesions, etc., concur to a certain extent with the deleterious character of the virus to render this affection one of the most deadly of those called acute.

It is well to oppose the ferocity of a confluent small-pox as far as possible by a well-guided regimen and treatment; but it none the less retains all its characteristics and all its insidious fatality. We know that the confluence is sufficiently indicated when the pustules, discrete and even rare over the entire cutaneous surface, are nevertheless small and run together on the face alone; so that the extent of skin inflamed is sometimes greater in the discrete than in the confluent form. This is so true that Sydenham observed an epidemic of variola, confluent without confluence, that is, presenting all the characteristics of confluence except the running together of the pustules. The latter were discrete, but very small, turned black rapidly, were sometimes replaced by large phlyctenæ; and further, the precocity of the eruption (occurring on the third day), the salivation, the unusual gravity of the affection for discrete cases, unite in testifying that these variolæ were of the nature of confluent in spite of the discrete character of the pustules.

We must therefore be warned in advance that we ought not to undertake to do an impossible thing by bleeding, namely, the reduction of a confluent to a benign attack. We do not deny the advantages of bleeding at the beginning of a good many very intense variolæ with a great preponderance of the *inflammatory element*, that is, the individual element, to use a term already employed; but it is not necessary that the small-pox should be confluent in order that the bloodletting should be indicated by this condition.

Let us explain ourselves.

In confluent small-pox there is the inflammatory state and the inflammation, whence the disease derives the individual traits which give it points of contact with all the phlegmasiæ, all the inflammatory states. There is further, the accidental and special disposition to confluence, in virtue of which this variola is different from every other variolous fever. In the third place, there is the specificity, which, governing the two preceding states, may exist independently of them, and which imparts to the disease the inalienable characteristics of every variola.

Now, bleeding has nothing to do with specificity, little with the accidental disposition on which confluence depends, and more with the individual element, which would, however, furnish many more indications for it, if it could be used (except within certain limits, which we will trace) without violating the most stringent contraindications furnished by the state of confluence and the specific state.

There are discrete variolæ in which the inflammatory state is exaggerated owing to certain conditions of season, medical constitution,

regimen, temperament, etc. Bleeding, even repeated bleeding, during the primary fever, admirably simplifies the disease, which then goes on of itself. The eruption is facilitated, the suppuration lessened, the secondary fever moderated, all the phases of the affection are shortened and reduced to their most benign proportions. The blood is strongly buffed, the clot voluminous and constant; we have thus deprived the fever, the phlegmasia, and the pustulation-process, of certain materials which could only have aggravated or prolonged the malady, and perhaps have given rise to dangerous inflammatory complications. But the variola was discrete and simple. There was no special state to consider between the inflammatory or individual state and the specific diathesis.

This special element which gives birth to confluence not only does not always indicate the antiphlogistic treatment, but almost always formally contra-indicates it. And in cases where it most sincerely calls for it, the call is made in circumspect fear, and with all kinds of restrictions.

On the contrary, in simple and discrete variola with dominant inflammatory state, we have nothing to fear. We might push bleeding to superfluity and abuse, but could not easily do injury, because of that species of predestination which the specific element, when it reigns alone, impresses upon the course and duration of the disease.

When Sydenham was able to allow his patients to arise during the first six days, in confluent small-pox, he did not bleed them, for he regarded his refrigerant method as much more proper than bleeding to oppose to the violence and precipitation of the eruption. He attributed the most simple confluent variolæ (that is, the most frankly inflammatory, the least septic) to over-heating of the blood, anterior to the variolous infection, or provoked by an incendiary régime unskilfully employed to bring out the eruption, or to a too speedy absorption of the virus : "a præcipiti nimis materiæ variolosæ assimilatione ortum ducit, etc. Quibus omnibus modis disponitur sanguis ad excipiendas et intimius admittendas morbi impressiones, ipsaque natura, seu furiis agitata præ exuberanti materiæ variolosæ copia et plenitudine, omnem fere succorum et carnium molem in exanthemata evomere satagit."

He had remarked (and indeed the fact is remarkable) that in confluent variola the eruption takes place on the third day; that it is very often preceded by diarrhœa; that at a certain fixed time in the disease a sort of supplementary emunctory is formed by salivation, which at a later period is replaced by a more complete development of the exanthema at certain parts of the body; that, further, when by good treatment the excess of the confluence has been brought in check, the eruption is retarded by one day, and the pustules are larger and farther apart.

This good treatment as employed by Sydenham consists of *deambulation* and *ventilation*. Bleeding does not seem to him to be indicated except in cases where the patient, too enfeebled by the excess of fever or by some local suffering, absolutely cannot leave his bed. What does the great physician then do? Does he bleed largely *coup sur coup?* he does

not like to do it. One bleeding from the arm; an emetic a few hours later; then acid drinks, a mineral lemonade, to enable the patient to rise, to walk the room, and take a continual bath of temperate air continuously renewed. We see from his precaution of giving the emetic directly after the bleeding, and of prescribing sulphuric acid lemonade, that he was concerned with something else than the inflammatory state, since, after obeying a spoliative indication, he very soon returned to two antiphlogistics which are among the most powerful when we suspect a grave state of nervous and phrenetic febrile agitation, or a putrid or purulent transformation of the blood.

In another passage, he allows bleeding at the beginning of confluent variolæ only when the patient is young, very sanguine, or when, being addicted to the use of spirituous drinks, he is suffering especially and severely in some organ, or when he is vomiting enormously, and cannot be relieved.

We just now spoke of the confluent variolæ in which the special diathesis which causes confluence consists in a very intense phlogistic tendency, whether natural or factitious, etc.; and we see that in these cases, the most favorable ones for the success of antiphlogistic treatment, it was nevertheless necessary to be quite guarded in its use. There are two reasons for this reserve, which it is important to point out, in order to impress the mind of the reader with all their gravity. We refer chiefly to purulent fever, and sudden death in the course of confluent small-pox.

When we consider the profound change of the entire substance in this horrible disease, and of the sum of vital resistance required in order to pass through all the stages of this new condition and to re-establish the system in its physiological constitution, we are astonished that sudden deaths and purulent fevers are not still more frequent in the course of confluent small-pox.

No doubt, in a general way, antiphlogistic treatment is the basis of the curative treatment proper in confluent variola of the species we are now speaking of; that is, of that form (to use Sydenham's expression) in which we observe a violent precipitation and a considerable multiplication of the variolous matter owing to the inflammatory condition of the blood.

But antiphlogistic treatment has other resources than bloodletting. This treatment consists in the modification produced by the application and influence of antiphlogistic remedies, whether produced by subtracting elements of nutrition and stimulation, or by tempering the qualities of the blood and subsequently moderating the nervous system by the ingestion and absorption of cooling substances, or by the removal of all causes of physical or moral excitement.

We readily grant that bleeding holds the first rank among remedies suitable to produce antiphlogistic effects: but it is not the only one. Certain diuretic remedies, some purgatives, tepid and moist applications, fomentations, baths, cataplasms, pure air frequently renewed, diluent,

mucilaginous, acidulated drinks, diet, rest, several remedies called sedatives and temperants, such as camphor in small doses, belladonna, nitre, digitalis, cherry-laurel, etc.; others called alteratives, as calomel, alkalies, etc., are more or less potent aids to bleeding; they sometimes are able to take its place, may often limit its use, and especially may assist its action.

According to the case, the physician can and ought to choose among all the means and agents of this class. To persist in using only one or another is to imply that there is only one species of phlegmasia and inflammatory diathesis. Thus, among other antiphlogistic evacuants, it is not indifferent whether we choose cathartics, diuretics, sudorifics, or sialagogues.

If there be a disease where it is necessary to economize the harmony and the assistance of the nervous system, that disease is confluent small-pox. We have already pointed out the reason; and this is one of the important reasons why we should not bleed in this case unless with extreme consideration. If we further recollect what we said before of the chances of sudden death in this disease, and the necessity for an energetic and firm condition of the nervous system as related to the vegetative functions, we shall feel still more seriously the necessity of not compromising the vital resistance by arbitrary bleedings, unless the indications are of extreme urgency.

The authority of Sydenham, who will certainly not be accused of a prejudice against bleeding, adds considerable weight to our precepts, which we do not wish to lose:

"Et sancte assero, insignissimum fere omnium quos mihi unquam videre contigit e confluentium genere morbum, et qui ægram undecimo die jugulaverit, juvenculæ supervenisse ubi primum a rheumatismo usitata illa methodo copiosæ et iteratæ venæsectionis fuerat liberata. Atque hinc primum mihi innotuit, phlebotomiam non perinde atque ego prius arbitrabor, variolis intra justos limites coercendis conducere: tametsi sæpe numero observaverim iteratam catharsim, sanguine nondum inquinato, subsequentes variolas laudabiles et distinctas ut plurimum reddidisse."

Sydenham did not waste his resources, and he found them ready when needed. He skilfully reserved in confluent variolæ the accommodation of a bleeding at the very beginning of this third febrile manifestation which constitutes suppurative fever, and which he advises to distinguish very carefully from the fever accompanying peripustular inflammation. It arises about the eleventh day in robust men, and about the sixteenth or seventeenth in weakly persons.

It is toward the eleventh day that those unexpected deaths occur, of which we have spoken. This frequently fatal fever, says Sydenham, is neither that of origin, nor that of eliminative inflammation; it is an inflammatory and putrid resorption-fever.

As soon as this fever appears, he says that he knows of nothing better than a bleeding of 300 or 400 grammes (℥ ix.—xii.), followed by a purge

and the continued use of sedatives; at the same time he feeds very lightly and advises vinous drinks.

Measles.

Measles never exists without a tracheobronchial catarrh of varying intensity; it is on account of this internal phlegmasia, and of the pneumonias and pleurisies that too often supervene, that antiphlogistic treatment becomes of importance in the treatment of this exanthema.

But what obstacles are introduced by the specific element! The bronchial irritation is most acute; the cough is obstinate and tearing; the dyspnœa considerable; pneumonia is added; it is extensive, and is associated with pleurisy; the patient is young and vigorous; the inflammatory state excessive; the phlegmasiæ multiply in every part; the fever is vigorous enough. It is impossible to find so many indications for bleeding united in a more marked degree.

We bleed, then; and in the form which we are describing we bleed with propriety, and with incontestable benefit. But the limits of this use are soon attained. The physician is forced to abandon it long before it ceases to be needed. It gave relief at first; it gave all the relief it was capable of giving in such a case. The physician is now disarmed upon this side, face to face with a pneumonia which is making progress, an unquenchable fever, and a dyspnœa which increases and gives alarm.

The organism still presents all the symptoms of a phlogistic diathesis, but already the most powerful antiphlogistics are forbidden by the adynamia which is indicated by the prostration of the nervous system and the ataxia, of which several marks begin to appear.

The nervous system is already bending and giving ground; tonics and stimulants are indicated in that direction, and the blood is still too inflammatory, the tissues too inflammable, the morbillous phlogistic diathesis too extended to permit the use of remedies which would irritate instead of giving tone, would feed the fever and the phlegmasiæ, and would hasten disorganization instead of hastening solution and maintaining vital unity.

Do we not see the perplexity of art in the presence of these intense cases complicated by pleuro-pneumonia? And will any enthusiastic advocate of bleeding, *coup sur coup*, deny its impotence and his embarrassment?

We see, from what precedes, that specific causes have in general a more or less profoundly stupefying or disturbing influence upon the nervous system.

In laying down the treatment, therefore, we have indications which are to some extent opposed.

On the part of the common element of the disease, we must consider that it is inflammatory, and often extremely so, especially in measles. But we must remember that beneath this element and the indications

which it furnishes, there exists a specific element which impresses its own nature and gravity upon the disease. As a specific, that is, as obliged to pass through all the phases necessary to the production of a material capable of gendering a disposition like that whence it originates, it must cause the system to pass through, and must itself pass through, a series of special modifications which art can hardly suspend. Hence the indication not to do violence to this morbid state, and to accept the necessities it imposes, while seeking to foresee or prevent the accidents, that is, bad symptoms which have no useful object.

On the part of the nervous system and the circulation, we ought certainly to attach much importance to their excitation by the common pathological element. But let not this prevent our paying attention to the deleterious action which may be exercised by the second virulent or specific element, which controls the progress of the disease, regulates its duration, commands the connection of its periods, paralyzes or disunites the nervous system. When the imprudence has been committed of obeying exclusively the indication presented by the phlogistic element, it has been easy to triumph over this element; but the whole of the poison has not been evacuated with the blood. There no longer remains enough diseased blood to nourish the fever, the eruption, the various crises, etc., but there remains more than enough to introduce a fatal disorganization into the functions of the nervous system, which has been deprived of its counterpoise and moderator, the blood. It is true that we suppress the fever, eruption, phlegmasiæ, products of morbid secretion; but we unveil a *specific* neurosis, a nervous state a hundred-fold graver than a fever which is known, which allows of calculations and foresight, while the malignant element deceives foresight and attacks the vital movement at its source.

There are benign cases of measles, which require only to be watched, though the patients have a severe bronchitis. We need not speak of these cases, which, very fortunately, are the most common.

Some cases are more severe, either because the bronchitis is very deep-seated and borders on diffuse pneumonia, or because the latter exists and is extensive In such, the inflammatory state is most intense, and there are few acute diseases where it is so well developed. Not only is the febrile reaction intense, the phlegmasiæ very active, but the nature of the virus of measles adds something of an irritant and caustic sort to the ordinary phenomena of phlegmasiæ. The products of these phlegmasiæ are very coagulable. Like the contact of ammonia, the action of this virus easily develops diphtheria on the mucous membranes and abundant plastic and pseudomembranous exudations on the serous coats. The bronchial catarrh is as it were purulent, which speedily gives to the sputa a form and color which makes them resemble those of very advanced phthisis. We see, then, that the inflammatory element is not absent; in truth, the indication to let blood seems very evident.

In these cases, small bleedings are usually advised. In this way, we

admit, we are spared the regret of pushing so useful a remedy beyond limits. We are free to begin again when necessary, and as soon as is judged suitable, without risking the disturbance of the natural order of the disease, or the suppression (especially in children) of a very mobile and transient eruption. But we affirm that kermes has almost always enabled us to dispense with bloodletting, while awaiting the indication for flying blisters *coup sur coup*.

The difficulties, then, are here very great. The fever of the inflammation seems to demand bleeding, by itself. The nature, that is, the specific proximate cause of this fever and these phlegmasiæ, restrains the indication. What we need is then a specific agent to neutralize the pathogenic agent; but we do not possess it.

But let us remember that antiphlogistic treatment is not confined to bloodletting as her sole agents, and that there are others which modify the crasis of the blood in the same way, without exposing the nervous system and the phenomenal order to those terrible risks of which we just now spoke.

This is not the place to repeat the remedies which draw the irritation of measles to the skin, such as rubefacient frictions, and revulsives applied to the extremities, which fill so important a place in the treatment of grave and complicated cases. But we ought to mention the antimonials and calomel.

In the exanthematic fevers with erythema, it is much easier to drive in the eruption, and such much more frequently occurs, than in pustular eruptive fevers, where the cutaneous phlegmasia is fixed, profound, suppurative, etc. Thus, in the former, we should be exposed to grave danger if we authorized the method of Sydenham, aëration, rising from bed, etc., which in the first stage of variolous fever is so desirable.

This point in the history of measles is one of the most interesting in theory, and one of the most important in practice, one to which every sensible physician ought to pay most attention.

Sometimes the eruption is localized *en masse* at one point of the skin, while the rest of the surface is hardly marked. At other times the spots, though very diffuse and general, are pale or slightly violet in hue, which gives the skin that dappled look which it has in certain children, especially when exposed to cold. In other cases the eruption comes and goes, appears and disappears with a singular suddenness and irregularity. In one it is precocious, in another tardy. And in certain children the skin is scarcely covered with a few livid marblings; while, as by way of compensation, the buccal and bronchial eruption is intense, horrible, confluent in some sort. The internal integument has drawn from the skin; these cases are among the gravest, together with those of mobile, fleeting, ephemeral eruption which we have just described.

What can be the good of bleeding, and what harm can it do, in these various occurrences?

The eruption of measles appears pretty constantly from the fourth to

the fifth day, and, very fortunately, during these days of incubative fever, the patient presents certain signs which are pretty surely characteristic of the nature of the fever and the impending eruption. These signs are known to all. We have repeatedly had occasion to observe that, contrary to what we said above regarding variolæ, a retarded eruption is in measles less favorable than a premature. This is explained by the fact that in the great majority of cases it is by the intensity of the pulmonary phlegmasia or by a special nervous state connected with laborious dentition that the natural tendency of the eruptive fever seems to be concentrated or confused.

Premature eruption is generally favorable. As to retarded eruption, it may be caused, 1, by the violence of the inflammation of the thoracic organs; when, if the child is vigorous, a bleeding, followed by revulsives and a continued application of mustard to the four extremities, may generalize the eruption. We prefer in this case to bleed from the arm, rather than by leeches, especially in children.

2. Or by congestion of the brain with somnolence, headache, stupor, broken by convulsive attacks. This case is less grave than the preceding, and the frequency or doubled intensity of the eclamptic attacks usually presages an eruption very close at hand. Yet, if these anomalous prodroma persist, one or two leeches on the malleoli, rubefacients passed over the surface of the body, a laxative, etc., break quite readily the fluxionary concentration to the brain and allow the eruption to come out freely.

3. Or by excessive purging. Then narcotics and warm baths are the most suitable remedies. One or two drops of laudanum in infusion of borage, with a few drops of spirit of Mindererus; starchy or albuminous enemata; and, in case of need, a moderately warm bath, or better still, friction with cool water containing vinegar, moderate the diarrhœa and stimulate the skin, a double effect which proceeds from one and the same modification of the system.

But there are diarrhœas which come on at the same time with the eruption, and which, coinciding with a very active fever, an abundant and excessively red eruption, seem to indicate an intense inflammability of the blood, or, as some would say now, a considerable degree of hæmitis. Sydenham, with his usual sagacity, had observed that these purgings were the sign of active enteritis produced by the same cause as the cutaneous erythema, a true measles of the large intestine, a phlegmasia of that mucous membrane, entirely analogous to that specific form which is seen in the mouth, and which, no doubt, when it fixes itself on the pulmonary mucous membrane, forms the concomitant tracheobronchial catarrh. He compared these inflammatory diarrhœas to those which often accompany the onset of frank pneumonia; and treated this superfœtation by bleeding from the arm.

"Quin et diarrhœa quam morbillos excipere diximus, venæ sectione pariter sanatur. Quum enim habitus inflammati sanguinis in intestina ruentibus, ortum suum debeat (quod etiam in pleuritide, peripneumonia,

aliisque qui ab inflammatione creantur morbis usu venit) a quibus illa exscreationem stimulatur, sola venæ sectio levamen adfert a qua tum revelluntur acres isti humores, tum etiam sanguis ad debitam redigitur temperiem."

We have several times been able to verify the justice of this observation and the practice based on it.

4. The special nervous state to which we must ascribe the mobility, and the dangerous alternations of the eruption, as above described, is hardly to be reached by antiphlogistic treatment. It usually repels it. A coexistent difficult dentition often gives rise to this deplorable condition. Irritant applications to the skin, temperate baths, sometimes even cold affusion, diffusible stimuli taken internally, washing with vinegar or vinegar-water, ought to replace the debilitant treatment. It is not rare, then, to see eclampsia supervene; but, far from announcing the approach of an active, general, and frank eruption, as in the case just spoken of, it is a symptom of ill omen, indicating formidable ataxia.

We ought to be the more cautious about bleeding in measles, as this disease chiefly affects children, and in them emeto-cathartics, baths, and revulsives, are the true and the most potent antiphlogistics.

But not only does the age of the patients impose a great reserve in the use of the treatment, but the specific nature of the disease, as we cannot too often repeat, adds an equally weighty reason; for in adults (though bleeding is less contraindicated than in children) its usefulness has, unfortunately, very narrow limits, no matter what the violence of the fever, the inflammatory engorgement of the lungs, etc.

In order to be convinced of this, we need only consider what wonders the bold use of bleeding effects in frank pneumonia, and then observe the same lancet, in the same skilled and exact hand, attacking the morbillous pneumonia of adults under the same physiological and hygienic conditions as the former.

Here the physician commands, governs freely, and in a way anticipates the disease. There, on the contrary, he is commanded, ruled, and anticipated by the disease. Here he can treat and lead the disease like a master; provided he obeys the supreme laws of nature. There, he is not only forced to accept the demands of nature, but also those of the disease. What an excess of embarrassment and of duty, especially when the two classes of laws are in contradiction, as most often happens in specific fevers! Nature seems formally to point out such a plan of relief; the disease accepts it only within restricted limits, and sometimes altogether rejects it, etc.

Let no one, then, be surprised at seeing us so cautious and perplexed in estimating the limits of the use of bleeding in measles. We are not hostile to the treatment; and one who, after reading this, should see us in action in a case of the disease, might think us very bold in the use of bloodletting, to which, nevertheless, we prefer the indefatigable repetition of antimonials and blisters.

Scarlatina.

We may state at once that bloodletting is less indicated in this disease than in the two preceding.

Sydenham, upon whom we so often lean—because to our mind he sums up the school which hitherto has best understood and treated acute diseases, because his practice is the faithful expression of an idea with which he is so identified that with him nothing is abandoned to chance and empiricism—Sydenham also rejected, absolutely, the use of bleeding in scarlatina.

It is right to state that he did this for another reason, one entirely opposed to that which has weight with us: Sydenham found the disease so light, and so simple that he did not think it worthy to be treated by so energetic a remedy as bleeding. In his eyes, it was not worth the trouble.

We, quite on the contrary, are afraid of bleeding, because the disease is too grave and too susceptible, in certain cases, of aggravation from antiphlogistic and debilitant treatment.

We certainly would not speak of it if it were always as mild as in the cases which Sydenham had in his mind when he drew his description.

Some cases require only rest and the most natural and simple expectant treatment. Yet, when we compare these cases, even the lightest of them, with these which formed the basis of Sydenham's description, we ask whether the great practitioner did not deceive himself, and give the name to erythemas of a more or less febrile but non-specific character. Is it credible that an observer of Sydenham's power should not have noticed the scarlatinal angina and the consecutive anasarca—not to speak of other less obvious facts—the former of which is so general and so constant that it is more constant than the eruption? Whatever the benignity of a scarlatinous fever, we have never met with it unattended by its angina.

These cases, however simple, deserve more attention than the description and teachings of Sydenham would excite in a person who had not seen our scarlatinas. One need not have followed and treated many cases, to be alarmed at the tone of indifference, and even of pleasantry, in which Sydenham allowed himself to speak of this affection, which alone clearly show how unfavorable his opportunities had been, in the course of his long practice; since, however, we may doubt his having seen true scarlatina, it is certain that all those which he observed were so light as not to possess any of their specific characteristics. "Simplici hac et naturali plane methodo, hoc morbi nomen (vix enim altius assurgit) sine molestia aut periculo quovis facillime abigitur."

We have repeatedly recognized a scarlatina, when we had been called in to treat quinsy; and when, in the absence of any cutaneous eruption, we found the pulse (our only symptomatic guide) of unusual smallness

and frequency. This one peculiarity, connected with the existence of angina, without any other specific sign that could enlighten us, enabled us to affirm the existence of a scarlet fever; a prognosis which a later examination, or the consecutive development of certain phenomena, soon confirmed.

This fact, which formally contraindicates bleeding, gives warning of the probable existence of other facts equally unfavorable to the use of this remedy; it is sufficient to exclude the thought, or at least, to inspire us with the most legitimate distrust of its effects. This extreme frequency, with smallness and sometimes irregularity of pulse, characterizes the action of the most deleterious morbid poisons, the infections, and the most pernicious miasmatic fevers. Of what consequence are the heat of the skin, the headache, the intensity of the anginous fluxion, the delirium, etc. ? There are also sometimes diarrhœa, abdominal pain, meteorism, even gurgling on pressure in the right iliac fossa; there is often a slight inflammation of the mucous follicles of the intestine, and swelling of the spleen—all that leads exact practitioners to bleed—and we, vitalists, we will repeat it: Do not bleed, for the pulse is frequent and small, not indirectly from oppression of the forces, but directly and under the influence of a near cause which is destructive by itself to the blood. And, in order to be less physically but more medically exact, we will repeat this in a general way, as addressing physiologists who are led by vital indications, and not organicists who seek their reasons for acting in the physical facts, to which they unwittingly subject the vital phenomena, exactly as physicians should do who study the system as related to their science.

Scarlatina is an eruptive fever, much more irregular in the development of its phenomena and its periods, much more insidious in its tendencies, and not less grave in its complications and sequelæ, immediate and remote, than small-pox and measles; all which are so many new reasons for abstinence from bleeding or moderation in its use; for these complications or sequelæ are not of the sort which we should regret as effects of the omission of bloodletting; on the contrary, all are consonant, so to speak, with the frequency and smallness of the pulse, and their presence can only fortify the contraindications drawn from the latter circumstance.

Delirium, under these conditions, does not indicate bleeding. Nor do the petechiæ, the bloody urine, the intestinal hæmorrhage. All these fluxes of blood call for antiseptics rather than debilitants. We have repeatedly believed that we had lessened the enormous swelling of the tissues of the fauces and of the lymphatic glands of the neck by the vigorous application of leeches to that region, but the success has always been so doubtful that we are ready to ask if we did not do more harm by the weakness which we certainly caused, than good by the relief we tried to procure.

So much for the most ordinary concomitants. The sequelæ, anasarca, extreme debilitation, a special cachexia which often lasts several years, purulent catarrhs of the eyes and ears, buboes, albuminous nephri-

tis, etc., are not, to our knowledge, related to those symptoms which usually call for the aid of antiphlogistic treatment.

It is, nevertheless, possible that bleeding may be called upon to fill some indication in the treatment of scarlatina, independently of that which medical constitutions and the genius of certain epidemics may require. We observe, in certain scarlatinal patients, a state of general turgescence, cerebral congestion, painful swelling and stiffness of joints, a high pulse, vomiting, indisposition of the eruption to become generalized, etc.; accidents which seem to be governed and produced by an evident plethora, a plethora which, no doubt, cannot be separated from the specific state, a scarlatinous plethora, which, therefore, does not bear bleeding except with the most careful management. It is, nevertheless, true, that when no other formal contraindication is presented, we ought, in this case, to draw blood, and to act, subsequently, in accordance with the precept *de juvantibus et lædentibus.*

An English physician, Dewar, published in 1835 a statistical table, which shows that, having bled in 183 cases of scarlatina until the eruption disappeared, he never saw consecutive anasarca. But he specifies no circumstances; he throws to us a coarse empirical fact which we have no desire to dispute, and concludes, without more ado, that bleeding is heroic in scarlet fever, and has only been proscribed in the treatment because it has been used inopportunely.

We should like very much to know what would have happened if this physician had ordered nothing but diet, barley-water, and injections; or what would have happened if Sydenham had used any energetic treatment in the scarlatinas of which he speaks so lightly, and had drawn general conclusions from his observations in favor of emetics, purges, or bleeding. As an empiric and numerist, he would have ascribed to himself all the honor of the cures; as a physician, he acted in accordance with his medical inspiration, and obeyed indications which suggested a rational and conscientious expectation; and thus he did not transmit his error to us.

Do we not also know that one of the most eminent practitioners of the day, Bretonneau, during twenty-four years of medical practice, did not see a single case of death from scarlet fever, and that he afterward had such terrible occasions for studying the same disease in a graver form, that he does not hesitate to compare its gravity with that of confluent small-pox and yellow fever? This is why Darwin says that in different epidemics scarlatina may have all degrees of severity, from the harmlessness of a flea-bite to the danger of the plague. After this we are less surprised at Sydenham's prognosis, and we admire his honesty in treatment.

Hence it follows that the physician above quoted, acting as a good numerist, counted without observing, or rather, concluded without premises, and that the numerous facts he reports form but one fact, for the very simple reason that, after witnessing a hundred and eighty-three

cases of scarlatina treated by bleeding, and afterward proceeding exactly and numerically, we have no right to say any more than, "I have 183 cases in which scarlatina was treated by bleeding, etc., with this or that result," etc., which, as we see, is merely one fact. This fact might, it is true, form the basis for a medical conclusion, but the numerists do not wish that. We may therefore treat their pretended observations as we have just treated that of Dewar, and show how sterile is this abundance of facts, and how trifling the rigor of *exact* physicians.

We repeat it, then: of all eruptive fevers, scarlatina is that which is least adapted to antiphlogistic treatment. It is the most likely of all to put on the malignant form; the most irregular; it gives the least opportunity for prediction; it is the most concealed, the most fertile in organic alterations and consecutive cacochymies. The remittency of its fever of invasion, the irregularity of the period of eruption and the variability of its other phenomena, the dangerous attack it makes upon the life and the plasticity of the blood, the extraordinary fulminant manner of its stroke, which in certain cases renders it fatal within ten hours of its invasion, and finally, several other marks pointed out in the preceding lines, are so many indications of the class of affections which generally reject antiphlogistic treatment.

Section III.

Antiphlogistic Treatment in Chronic Diseases.

We pointed out at the beginning of this chapter the circumstances which may call for the use of antiphlogistic treatment in chronic diseases; we say the circumstances, in order to show that bloodletting is entirely circumstantial or accessory in such cases. The existence of fever and phlegmasia in a chronic disease is not enough to call for bleeding. The fever or the inflammation must be accidental, superadded to the disease in a certain sense, and must possess the character of acuteness, not of hectic. In what, then, does an acute fever differ from a hectic fever? What essentially constitutes the latter morbid state? To reply to this question is to lay the foundation of the indications and contraindications for bloodletting in chronic diseases.

In words which might be thought to be those of an animist, Hunter says that hectic fever is any fever connected with a disease, of the incurability of which the system is conscious. Suppress the portion of Stahlian error which this last word seems to contain, and the notion of hectic fever is perfectly just. But while rejecting the moral sense of this passage, we must carefully retain for it the physiological sense which Hunter certainly connected with it; for all the force of the idea which the illustrious pathologist had of hectic fever resides in this sense.

To be conscious of the incurability of a disease, or to feel unable to

recover from it, is for the organism to use up its own powers against itself, and to exhaust itself in actions whose whole tendency is to dissolution, and in no way to re-establishment.

It might be supposed that this notion was applicable to any incurable affection, and that nothing prevented its extension to one of those pernicious acute diseases in which all the morbid actions attest the disorder, and each symptom is one step nearer to death. An ataxic typhoid fever, acute glanders, an algid or comatose subintrant fever, etc., proceeds inevitably to a fatal ending; all the symptoms of these terrible affections have a sinister character; we can no longer perceive those great features of the physiological condition modified but not overthrown by the disease, that *vita superstes in morbis* which some of the elders carefully studied, which forms the basis of the physician's hopes, and can alone give a *point d'appui* for his therapeutic lever. But nothing is more unlike a hectic fever than grave fevers of any sort. It is, then, in the essential difference between these two sorts of fevers that we shall find the justification which we wish the reader to share.

In a grave fever, small-pox, typhus, glanders, malignant pustule, plague, scarlatina, etc., the system is affected by a more or less specific, morbid, non-constitutional principle, almost always well-defined, which is consequently very distinct from those common diatheses of which the product is pus, tubercle, glucose, uric acid, or which manifest themselves by dartres, rheumatic affections, etc. We call these various morbid products common or general because some of them, as pus, are what all morbid states may possess in common, while others, like uric acid, diabetic sugar, are materials which the system manufactures originally and spontaneously at the cost of its own substance. The morbid poisons, pathogenic seeds or virus, are very different; they are rather morbid principles than products. In the minutest quantity they contain the disease eminently or dynamically, as the egg or the seed contains, or is itself, the plant or the animal.

Without raising the question, whether, as we suppose, these principles are formed spontaneously in the system, or how they are formed, let us observe that the latter is the place of their incubation, that they enter it like parasites, though subsequently they manifest themselves there by an identification which quite clearly reveals their original source. The disease which results from this union is only the series of periods or ages, more or less regular, which constitute the life of these peculiar principles. But that which we need to understand at the present moment is, that they have a life of their own, and that, once formed, they enjoy an existence apart which renders them independent of the system, from which they can then be separated without losing one of their properties. This separate existence has its determinate phases and duration, like that of a living being; and this duration is generally too short to give the system time to succumb to marasmus, exhaustion, or hectic. Incompatible with life, they arrest it by poisoning its sources, by throwing the great func-

tions into disorder at a time when the system is still rich in force and organic materials. In this case the animal body evidently succumbs to the attack of a hostile principle or poison; not a poison which violently, brutally, chemically destroys and disorganizes, but one which kills and disorganizes according to laws which are entirely vital, because it is itself a living thing. Once again, we consider a virulent and specific disease only as the life or evolution of one of these principles; and this existence, this life are in our view the real acute disease. These kinds of diseases, then, are not simple alterations of the system. Grafted spontaneously upon it, they reproduce and develop themselves there when they meet with elements of a nature akin to their own. Their existence within it is but transitory. When their principle is well formed and completely matured, it cannot remain in the organism, and tends necessarily to separate from it. But this is not done till an infinite multiplication has occurred, at the expense of all the congenial material which exists there. The specific disease, we repeat, is nothing else than this operation of multiplication and separation. When this is once completed, the system, deprived of all such material as is fitted to reproduce the morbid principle, can in future undergo exposure with impunity.

We see, then, that these diseases are essentially characterized by the individualization of their efficient cause. If now we choose for a moment to endow the system with consciousness, as Hunter rightly supposed it to be endowed, we must see that it cannot be aware of the incurability of this sort of diseases; for though they are too often incurable, it is owing to accident, and not to a quality of their nature. It is true, on the contrary, that curability is one of their chief characteristics; and according to Hunter's view, the system which is affected by one of these affections ought to be aware of their curability. Indeed, from the very fact of this tendency to individualization, and the fact that the system is, in a sense, only the matrix in which the morbid principle develops, the subject may doubtless succumb during the pathological process, but it will be accidentally, and owing to the violence of the shock. From the moment that the morbid principle is individualized and is able to separate from the system, it is plain that, in Hunter's language, the force or consciousness of incurability resides in it, and the force or consciousness of curability in the system.

It is not the same when the system is affected by one of those common diatheses, the principle of which cannot require specific properties or become individualized; for they have the evil power of assimilating to themselves the whole substance of the system, and of tending, irresistibly, to reproduce themselves to the point of consumption, at the expense of all the living molecules. We do not then observe the separation proper to specific diseases, the crisis which attests the existence of the *vita sana superstes*, the depository of the force or consciousness of curability. That which we dare to call the force or principle of incurability consists precisely in that unlimited assimilation of the organic substance by a dia-

thesis which, by its nature, has no power to become individualized. Thus we see the purulent, tuberculous, cancerous, scorbutic, glycosuric diatheses, etc., tending to transform the entire organic substance into pus, tubercle, glycose, etc., to the point of consumption. The fever which is connected with these morbid states is called a *hectic fever*. It was formerly termed *consumptive*, or *colliquative;* expressions which perfectly render the idea which we have tried to explain.

We can produce artificially a morbid state which gives the simplest and most just idea of hectisis, and of the fever which, usually associated with it, receives from it the name of hectic fever. This state is one which is determined at will by inanition, or a complete deprival of food. Does not the system then truly use its forces against itself, and exhaust itself in actions which wholly tend to dissolution, and not at all to re-establishment? Does not this physiological type of hectic fever present the case in which the system, if it were endowed with the inner sense, would have the fullest consciousness of incurability or incapacity of restoration?

Slowness and chronicity are the ordinary attributes of hectic fever. Nevertheless, it is not impossible, it is even not rare, to see hectisis and hectic fever presenting all the symptomatic characteristics and the rapid progress of the acute diseases. Galloping consumption is an instance. There is one which is still more striking by reason of the extraordinary rapidity of the colliquation which occurs: we mean purulent fever. This grave disease may run its whole course and end in death in a few days; and yet it has all the marks of hectic fever.

In order to penetrate to this essential character, we have attempted to interpret a definition of Hunter's, of which we believe we understand the idea. Veiled and fragmentary as Hunter can be, he very often conceals in these rude and undigested passages the most profound sense, and in them is almost always found the key to the original observations which are profusely scattered through his works.

Having distinguished hectic from acute fever by its nature, it is, no doubt, needless to trace the symptoms by which the former may be recognized. Nevertheless, the principles, according to Hunter, are the following: debility, small, frequent, and hard pulse; retreat of the blood from the skin; loss of appetite; frequently an entire rejection of all food by the stomach; emaciation; a great tendency to perspiration; spontaneous sweats in bed; frequently a constitutional diarrhœa; clear urine.

When the physician encounters this group, he must be on his guard against specious indications for bloodletting. These indications are almost always furnished by the existence of certain acute phlegmasiæ. If these phlegmasiæ are accidental, if they control the pathological state and threaten life rather by their violence and their situation, than by the rapidity which they impart to the hectisis, we may permit a few slight, general, or local bleedings to quiet them, according to the case. We shall hereafter give an instance of this conjunction. Unless in these exceptional circumstances, we must in every hectic fever abandon antiphlogistic treatment. It

is often indispensable to give food, if the state of the digestive tract allows it, in spite of the intensity of the fever, which may be very great. These functions are performed with energy in a considerable number of cases, though Hunter made the opposite condition a characteristic of hectic fever. Far from drawing blood in this fever, we ought to support the patient whenever we can. This is the best way to retard the dissolution. In an acute fever accompanied by a "consciousness of curability" the disease is ended, the elimination accomplished before the organism is exhausted. In a hectic fever, we cannot count upon this spontaneous termination or reparation, as the system, in Hunter's words, is stimulated to produce an effect which is beyond its powers. In order, then, to prolong the struggle, we ought to remove nothing of its substance, and, on the contrary, to furnish to it nutritive material. In an acute fever, the disease ends before the system. In a hectic fever, the system ends before the disease. Upon the observation of this fact, Hippocrates based the plan of diet in the two orders of cases; he doubtless had them in view when he laid down the following aphorism: "Considerare oportet etiam ægrotantem num ad morbi vigorem victu sufficiet, et an prius ille deficiet, et victu non sufficiet, an morbus prius deficiet et obtundetur."

There are certain diseases which naturally tend to hectisis, but which at the outset are exactly like a common or non-specific acute disease. We will cite, in particular, that form of tuberculous phthisis of the lung which is called galloping, and acute albuminous nephritis. It is very hard to give an immediate prognosis of these affections, and to ascertain their constitutional or chronic character beneath the febrile symptoms which give them the course and the external features of acute diseases. But one might suspect or even know their nature at once without being obliged to regard bloodletting and all the accessories of antiphlogistic treatment as contraindicated. But we ought, in this case, to act with the circumspection which we advised in applying the treatment to grave fevers, and also to recall continually to mind the Hippocratic aphorism which we have just quoted. The most important modification to which antiphlogistic treatment should be subjected in these cases of acute-chronic fevers which soon degenerate into real hectics, is, that the diet must not be so restricted as in frank acute diseases. The preservation of a natural condition in the functions of relation and digestion is, perhaps, one of the most remarkable general differential signs between these and acute diseases. We have already observed this in speaking of acute rheumatism, because the latter resembles those of which we now speak in its constitutionality, and is sometimes followed by a genuine hectic fever.

There are certain cases of acute specific disease which bring on hectisis. This is seen in confluent variolæ, for instance, when the suppurative diathesis is not confined to specific pustulation, but invades the whole system, tends to transform the blood into pus, and to distribute its products everywhere. This case in no way invalidates our fundamental distinction;

much rather, it confirms it, for this pus is a common material which does not at all contain the specific principle of the disease. The affection, though inoculable by the pus from a pustule, is not so by the pus of an abscess resulting from the common purulent discharge which exists in certain grave variolæ. If the hectic fever supervenes, it only serves the better to mark the difference which we have established between it and acute fever, for the one is seen to follow the other in a way to prove that the hectic depends on circumstances which are wholly individual and foreign to the nature of the variolous principle. The latter is then not the efficient cause of the hectisis, but only its determining cause. We said above, in speaking of this dangerous phase of confluent variolæ, what rôle antiphlogistic treatment might play.

We will conclude by an example of the manner in which antiphlogistic treatment may be applied to those cases of hectic disease which possess at the outset the intensity of acute phlegmasiæ. We will take for our example pulmonary phthisis.

If the tuberculous diathesis exists, its products may be formed under different dominant circumstances and conditions.

In one case the tendency to tubercle is so pronounced, that the material is formed spontaneously in the pulmonary parenchyma without the existence of an irritant body, and without, in its turn, producing the formation of any foreign substance. These phthises are slow; the patient wastes and falls into cachexia without much reaction. No one here thinks of drawing blood ; a tonic treatment and an analeptic regimen are prescribed with one accord.

In a second case the patient is irritable, and his tissues are very liable to phlegmasiæ. He contracts fever readily, and has frequent hæmoptyses. The formation of tuberculous matter in the lungs, before any appreciable deposits occur, is accompanied by frequent bronchial irritation without frank and complete resolution. Such are the persons, who, without special occasion, contract bronchitis, cough habitually, have hæmoptyses, catch cold at the fireside, as we say, suffer from stitch in the side, which is often symptomatic of dry and partial pleurisy, or circumscribed pneumonia, which is characterized by more or less equivocal signs, which never directly endanger the patient's life like ordinary pneumonias, etc., etc.

These special irritations and phlegmasiæ notably hasten the development of tubercles. The latter are their special product. Such irritations are by no means simple, and in treating them we must give great heed to their internal cause. There are two opposite indications. In filling the one without considering the other, we miss both. If we persist in trying to destroy the acute catarrh or the pneumonia—which we cannot do without grossly deceiving ourselves—we give strength to the disease, and greatly increase the cachectic state. If we do not give attention to judiciously arresting these fluxions and irritations, we bring upon the lung a premature, abundant tuberculous irruption, and afterward an acute disorganization.

In order to satisfy the double demand of these cases, we ought to remember that phlegmasia is only an element of the disease, the proximate cause of which escapes the action of bloodletting; the latter having no other object than that of tempering the phlogistic tendency of the blood, and rendering the living tissues less irritable; in a word, weakening one of the morbid elements without strengthening the other, and removing the accident or complication without doing harm either as regards the principal disease or the patient's strength. The energy with which the antiphlogistic treatment should be used depends entirely on the intensity and character of the accidents.

These tuberculous irritations of the bronchi are refractory—which is a first reason for husbanding the strength. Next, it is necessary to be warned of some important peculiarities, which often deceive in regard to the suitability of bloodletting.

In the first place, these chronic-acute phlegmasiæ are accompanied by a sensation of heat and tearing in the region of the great bronchi and above the sternum ; by a cough, which is more obstinate than that of simple bronchitis; by a very fatiguing oppression and difficulty of breathing; by a pectoral malaise, or a sort of sense of exhaustion of all the thoracic walls. To this is sometimes added pain in the epigastrium, which, with a more or less vivid redness of the tip of the tongue and a stomatitis which resembles that of the majority of fevers and phlegmasiæ, announces a slight degree of gastro-enteritis. Add to this fever, a pulse usually accelerated in proportion to the other elements of pyrexia, and you will have a morbid series which seems to demand a very active antiphlogistic treatment.

It must be confessed that when the tuberculous cachexia is not yet manifest, and the general strength is not sensibly affected, a small bleeding is often an excellent means of calming all these symptoms, or, still better, the application of a few wet cups between the shoulders or under the clavicles. We say, wet cups, rather than leeches, because a great many persons find leeches hard to bear; they occasion a nervous fever and an erethism which must be carefully avoided, on account of the extreme irritability which characterizes this class of patients, under the influence of which the tuberculous secretion is formed very rapidly. This is an established result of observation.

But in the greater number of cases, these inflammatory complications and special irritations yield to a milk diet, rest in a place which is kept at a gentle and uniform temperature, a few ounces of a pectoral laxative like manna, tepid chicken-broth with honey, pectoral and mucilaginous drinks, to which is added, at evening, a very little of the sirop diacode and distilled cherry-laurel water, Burgundy pitch plasters applied to the chest, frictions over the sternum with belladonna ointment, etc., etc. We cannot too often repeat the cautions we have already given in regard to bleeding in this class of bronchitis. Wet cups give much relief, and in most cases we ought not to do more. Antiphlogistic treatment is not

inseparable from the brutality, too often ill-timed, of the method of La Charité. In women, leeches placed at the upper part of the thighs aid very happily the action of a few wet cups on the chest. The antiphlogistic remedies aid in the treatment, and we gain the advantage of saving for the unhappy predestined victims their strength, their stomach, menstruation, and the liberty of repeating the same treatment in case of need, a privilege which is often lost by the attempt to cure at once the disease and the complication under the pretext that the complication produces the disease.

There is a third case or mode of the development of pulmonary tubercles, and its accessory circumstances.

In the two preceding categories, the formation of tuberculous matter occurred spontaneously and without the aid of any accident or external cause. But in the second, owing to the extreme irritability of the organic elements of the patient, the strumous secretion provoked hyperæmic and inflammatory accidents, in regard to the treatment of which we gave a few practical rules.

We have now a class of common cases, which has furnished the physiological school with its most precious arguments in favor of the inflammatory origin of tuberculous phthisis. These are the cases where a person contracts acute pulmonary catarrhs, pneumonia or pleurisy under the influence of the usual cause of such phlegmasiæ, for example, the action of cold upon the perspiring body in spring time, or of moist cold in winter, without a sudden checking of perspiration. These persons had never presented signs of the tuberculous diathesis; and yet, the phlegmasiæ in question are not cured easily, are prolonged, constituting what are called "neglected colds;" and this provocative circumstance is required to realize the disease and expose an incurable phthisis. The signs of the tuberculous diathesis in these cases have not usually preexisted, and the chest has not been previously affected.

Here are evidently two diseases which, when once united, mutually aggravate and support one another. The occasion of the phlegmasia makes these catarrhs or pneumonias more inflammatory than the preceding; which gives a right to use antiphlogistic treatment more vigorously. The blood is buffy, the fever intense, the sputa rusty and viscous (if there is pneumonia), and we must act at the beginning as in a frank phlegmasia; must consequently use the method of small bleedings at short intervals, even at the outset, if we are so fortunate as to recognize the tuberculous predisposition. But we ought not to continue its application as long as in frank pneumonia, for this might waste the patient away before we destroy the element which lies deep—an element which is destined to control the pathology, and to keep up a residuum of irritation and phlegmasia which is hardly more to be controlled than its efficient cause. The latter is immovable—increases only—and gives to everything the *consciousness* or the force of *incurability*.

Section IV.

Bloodletting and its Indications in Morbid Disturbances of the Circulatory Apparatus: Plethora, Congestions, Hæmorrhages.

Of all the morbid states, plethora is that which seems most naturally and beneficially treated by bloodletting. It is probably the one which, in the beginning, suggested the use of the remedy.

But the man who first bled a fellow man had no statistics to go by; he doubtless obeyed one of those ideas which are to-day castigated by the name of "preconceived." Nevertheless, let us remember that, if it were possible for the human mind to resist the impulse which forces it to take this path, the facts would be for it as non-existent. If the truth resides in the facts, as some have boldly declared, it ought to be sufficient to receive the impression of a phenomenon in order to grasp the idea or notion of it immediately; it should be sufficient to see the lightning and hear the thunder, in order to have a theory of lightning. We think, on the contrary, that the truth resides in the mind which judges the facts; that it resides there precisely because it judges them—this judgment, when it is true, being nothing but the truth itself. It is, then, necessary that, in order to grasp *it*, the mind should grasp *itself* entirely applied to the facts; that in consequence it should *put as much of itself as possible into the judgment which it forms.* If the contrary is true, the mind by no means knows and judges the fact, but the fact knows and judges itself.

And yet they were fortunate who, coming after the first trials of bleeding, had, at their service, the light of experience! Not that they, any more than their predecessors, were released from the necessity of thinking and marching forward, urged by fruitful hypotheses; but, on the contrary, because they had the advantage of possessing experimental data, as sources of new ideas and hypotheses, both more numerous and more legitimate. These reflections will not seem inappropriate, if we consider that, in spite of the immense acquisitions which experience has made in the subject which we are about to study, every physician, who, to-day, undertakes to bleed a patient recommences, though in less doubtful conditions, that which the first bleeder once undertook.

Doubtless there are cases so well known, especially in certain classes of disease, that we only need to ascertain their existence, in order to declare the indication for bleeding from the great vessels. But even in such distinct cases, there are individual elements or exceptional circumstances which may lay restrictions, if not to bleeding absolutely, at least to the manner of its employment. Next come the diseases in which the remedy is only accidentally indicated, for which the physician has had in his experience only very contradictory precedents. Finally, the independent physician encounters every day cases in which he is forced to take counsel of science in general, and not of data derived from the recollection of

similar cases, for his experience has never furnished him with such, and that of others is equally dumb.

These facts so far escape classification, that they hardly appear in nosologies. And yet they are the most common in practice. As they do not constitute diseases properly so called, they present in each person a special physiognomy, and they are so far from extinguishing a person's individuality that they are often only a consequence or an exaggeration of that individuality. There is, evidently, something more in an acute disease; and in fact, when it is powerful and well marked, it overrules individual differences, effaces them, and places almost all organisms on a level. The indications for bleeding are then easy to grasp, and there is little dispute about them. But in the cases of which we first spoke, their use requires medical science, and sagacity which are rare to-day. An individual acquaintance with each patient is essential in such a case; without it, the physician goes from error to error, and from danger to danger.

The morbid conditions which we refer to are not acute diseases, though their symptoms often present the vivacity, and their progress the rapidity, which form part of the character of these diseases. They are really not chronic diseases, for, if they are refractory, like the latter, if they appear to spring gradually from original vices of constitution or external causes which have acted gradually, their limits are not so clearly cut, their progress so uniform, their periods so calculable, their signs and lesions so comparable, as to be regularly classed and described in a nosology. Nevertheless, if they cannot be classed with acute or chronic diseases, they very often serve as prodroma of the latter, and sometimes throw into the midst of the former certain accidents and complications which may make bleeding necessary in diseases which do not usually require it.

The causes of these morbid states, as we said, are personal characteristics, usually hereditary, sometimes acquired; the morbid predominance of the physiological properties which form the temperaments; the modifications produced by age or the various periods of life in each person's normal state of health, and a thousand other circumstances which are as variable as the individual nature, and which, in short, are the elements of which most chronic diseases are composed.

But these general conditions are not sufficient to occupy a place in this chapter. We require those which also affect the circulatory apparatus, and manifest themselves by general or partial disorders of this important system.

At the head of these morbid symptoms, as furnishing indications for antiphlogistic treatment, stands general sanguine plethora, and next the local plethoræ; lastly, the hæmorrhages or congestions. In these cases, as manifold and as unexpected in their variations as are the patients themselves, bleeding requires more tact and skill than in acute diseases.

Nothing, in fact, is more difficult than to recognize the nature of these accidents in persons who are not of a sanguine temperament, and in

whom, consequently, these diseases do not betray themselves by the common symptoms of plethora and congestion, but by functional disturbances, the cessation of which, under the influence of bleeding, is often the only hint we have of their nature.

What is plethora? In systems in which the circulation of the blood is considered as a hydrostatic fact, plethora is and perhaps can be only a physical disproportion between the contained liquid and the cavities in which it circulates. In this hypothesis, the blood ought to be considered not only as distinct, but as independent of the vessels; and the latter as capable of existing without the blood. Such, in fact, is the essential condition of an hydraulic system; and if it cannot be admitted as the condition of the vessels and the blood, if we cannot consider them as independent, every mechanical theory of the circulation is deprived of its natural basis, misses its aim, and soon becomes a tissue of pitiable contradictions.

The solidist school, or school of Haller, which has always been led by a semi-vitalism to a mechanical theory of therapeutics, sees in plethora only a greater or less irritability of the cardiac fibre, a more tense or a more lax condition, with a circulation consequently more energetic or more rapid. This school begins with a physiological fact and ends with a physical fact. This is its invariable character. Mutilate a function—consider one of its acts as isolated—and the latter, no longer finding its reason in the total, will lose all sense except such as it finds in a physical system. Such is the Hallerian irritability. Of what use is it to grant to the living tissue a principle of movement which has no natural relation to that of the external causes which may excite it, if all the acts which result from this movement are considered as its mechanical or necessary effects? We might as well give the fibre a borrowed movement, for the succession of events would be the same.

The present anatomical school, a product of the preceding, resting on its histological researches, assigns as the characteristic of plethora a determinate increase in the proportion of one of the elements of the blood, as the globules. It carries exactitude so far as to define from this quantitative datum the point where plethora begins, stating that within that limit it is almost impossible, and that the accidents which characterize it increase or diminish in the direct mathematical ratio of the increase or diminution of the globules.

But if we reflect that, although composed of several distinct anatomical elements, the blood has a unity; that it has life, not only in each of its elements, but as a whole, that is, as blood; and that, thus, it certainly has a direct sympathy with its blood-vessels, and the nervous system, we shall soon see that it is more than a liquid or a mass resulting from other assembled quantities; we shall see that it is a force; that as such it produces its phenomena much more through dynamism than by mechanism; that its quantity, its movement, all its general physical properties, are merely the manifestation of the development of its true force and prop-

erties, the force and properties of life, and equally the conditions of the manifestation of this force and its properties.

The word plethora, then, means not only physical fulness; for such fulness may exist in a high degree in certain morbid states which are contrary in nature to those under the influence of which true plethora is formed. We shall understand the word in its vital sense. Physical plethora, that is, an excessive quantity of the mass of the blood or of some of its ingredients, may be, and often is, associated with vital plethora, but it does not essentially constitute it, and at the most is only one of its characteristics; although it may become in turn the cause of some of the phenomena of plethora.

If the French physiologists have separated the blood too mechanically from the vessels, and have failed to see their vital relations, the German physiologists have fallen into the opposite excess in identifying the blood with the vessels in which it circulates. They consider the two as closely united as, in a monocotyledonous shoot, the soft tissues of the centre are with the harder tissues of the periphery. They say that the vessel is the outer layer of the blood, as the latter is the centre or medulla of the vessel. This would put an end to the existence of blood, vessels, and circulation, for the latter results from certain differences and relations between the blood and its vessels. In order that this function may find a place in such a theory, the vessel itself would have to circulate and move with the blood.

Plethora is no better explained than the circulation, in the German system. Does not the notion of plethora at once disappear, when we regard the vessel and the blood (as they say across the Rhine) as only one thing under different aspects?

If sanguification is abundant, and the anatomical and physiological capacity of the vessels for blood develops simultaneously and in the same proportion, where will be the plethora? If, reciprocally, the vascular energy first increases, and the force and quantity of the blood accurately corresponds to it, how, again, can plethora arise? There would never be an indigestion, if the digestive force always increased in proportion to the quantity or the indigestible quality of the food.

Thus the iatro-mechanicians deny plethora, in denying the physiological relations which connect the blood with the vessels.

The German hyper-vitalists deny it by abolishing, as far as in them lies, the physiological differences which exist between two things which their connection does not prevent from being distinct.

One might suppose that these two points of view, vascular irritability and the anatomy of the blood, would give birth by their union to a true view of the circulation and its morbid disturbances. This would be a mistake; there is lacking the relation between these two things, or more simply, the idea of their function. If this be left out, it is impossible to see in the circulation any other phenomena than those of hydraulics, that is, movements of a liquid through a system of tubes; or in the morbid

disturbances of circulation anything but perturbations of movement. What change can irritability effect in this? Resolving itself only into movements, how can it, in whatsoever modification, produce anything but differences in that single phenomenon?

Though distinct from the vessels, the blood is not a foreign body to them; it does not stimulate their irritability like an external or artificial excitant. How does it do so, then? Observe, first, that when outside of the vessels, the blood loses its proper life, although it is surrounded by living tissue; it is not assimilated by them, nor does it undergo any of the changes which are imparted to it by the vessels in which it circulates naturally. It therefore has something more than mechanical relations with the latter, more than relations of physical friction and excitation; the vessels have a function in regard to it other than that of passively conveying it to the different parts of the body; they bear their part in the hæmatosis. It may even be said that hæmatosis is accomplished in them alone; for, from the chyle-ducts and lymphatics to the pulmonary vessels, and from the latter to the general capillary vessels, the blood does not cease to flow in a continuous system of closed vessels, in the interior of which occur all the processes and transformations which constitute the great function in question. These changes, which form arterial blood from venous, and vice versa, occur in the vascular cavities, in virtue of special properties, which belong to each department of the circulatory system. The pulmonary hæmatosis is not an exception. It is a manifest error to suppose that the atmospheric air is capable by itself of producing the arterial transformation of blood. This chimiatric aberration would be unpardonable in a physician who had observed what takes place in Asiatic cholera, and in a certain form of dyspnœa in which the air penetrates the lungs abundantly without causing the change to a bright red color. The contrary is observed in venous hæmatosis. In some persons, and in given conditions, the blood which escapes from the veins is almost as red, and we have seen it quite as red, as that from the arteries. In the former case, oxygenation, or rather arterial hæmatosis, does not occur, in spite of contact with oxygen; in the latter, carbonization, or rather, venous hæmatosis, does not occur, in spite of an energetic nutrition which ought to make the hydrocarbons predominate in the blood. These anomalies can only be explained by the inherent difference in the hæmatosic properties of the two sets of vessels. The arterial sanguification would no more occur in inert vessels with oxygen than in living vessels without oxygen.

Studied from this point of view, the circulation of the blood immediately presents fresh aspects at every point, it has a new interest, more physiological than any which it has had up to the present day. What greater discovery has been made than that of the circulation of the blood? and yet, what discovery has been less fruitful in medicine! Who would be so senseless as to think that this disagreement is as real in nature as in science? Does not the simple fact of the existence of this improbable

disagreement throw deserved discredit on the way the theory of the circulation has been taught since Harvey?

What! say you; does not the blood circulate? Does it not move in a circle? and can a liquid thus move in channels without following the laws of hydraulics? When a liquid does nothing but this, it doubtless can do it only in obedience to such laws; but if it does something beside moving, if it does not move for mechanical purposes, and by the agency of a mechanical motor, its movement ought not to be subjected to laws with the natural causes and effects of which it stands in no relation. Placed, if we may so say, between the central nervous system and nutrition, the circulatory apparatus represents them in its special function. It finds the efficient cause of its acts in the one; its final cause in the other; its laws, therefore, proceed from both indivisibly. If it is isolated, it is annihilated; yet that is the only case in which we can conceive of it as obeying the laws of hydraulics.

This organic apparatus will then express the condition of the innervation and that of the nutrition in its own way. It will express it sympathetically, when an affection originates outside of it. But it will express it idiopathically, when the affection has its seat within it; for in this case, it is only a special organ of nutrition experiencing an affection. And yet if we reflect an instant, we shall soon perceive with surprise that, in the physiology of the school, all affections of the circulatory apparatus can be nothing but sympathetic. As these systems suppose in it nothing but irritability, how can it have proper or spontaneous affections? Such affections cannot originate in an organ except from its own special life. Otherwise it is absolutely necessary that the organ should receive the impulse from a force situated outside of itself, and consequently that it should enjoy neither spontaneity, nor proper life, nor special functions. And in fact, all these properties are denied to the circulatory apparatus. Such is the passive and incomprehensible part which the doctrine of the school assigns to this apparatus, in pathology and physiology.

If it had only irritability, the circulatory system would never experience anything idiopathically, or on its own account; and we could not conceive of any morbid disturbances in the circulation, except those of a sympathetic nature. But if, as we are convinced, this function has idiopathic affections, it is plainly necessary to admit two things; first, that the vascular apparatus has the cause of the affections within itself; second, that this cause has to do with sanguification, and is nothing but the principle itself or the reason of the existence of all circulatory phenomena. In a word, we do not doubt that the blood-vessels have hæmatosic powers, as the stomach and intestines have digestive powers; we further believe that in the normal state these properties are the principle of circulation, and that in the morbid state they are equally the source or principle of the idiopathic affections of this great and universal function.

Harvey, who had the eminent glory of discovering the simple fact or

bare phenomenon of the circular movement of the blood in the vascular system, left to a successor, who is yet to appear, the duty of completing his immortal work and of adding the greater glory of discovering the physiological theory or the laws of this movement.

We see how all pathology has been falsified by the habit of considering in the blood nothing but an hydraulic movement, which in its various modifications reflects the state of the system only as do the inert tubes which experimenters, as Hales of old, and Poiseuille of to-day, adapt to the vascular apparatus of living animals in order to estimate the mechanical force of the heart. Of what do you suppose that the group of idiopathic affections of the circulatory system is composed, in our nosologies? Our posterity will hardly believe it; it is composed of diseases of the tissues which form the heart and blood-vessels. These diseases of the vascular tissues, however, are no more special affections of the apparatus of circulation than encephalitis, neuritis, myelitis, etc., are nervous diseases although seated in the organs of innervation. A medical doctrine, in which so considerable an apparatus as that which we are studying is the only one which has no idiopathic affections, is a doctrine already judged.

Is it well understood, whither this system (whether admitted or not) would lead us, in which the circulatory apparatus, considered as a mere organ of movement, possesses only the solidistic irritability? It would lead to nothing less than the removal from therapeutics of the indispensable aid of bloodletting, or else to the rejection of this remedy for all purposes except, at most, that of fulfilling some of the secondary indications which constitute what is called symptomatic treatment. And in fact, as the disturbances of the circulation could be only sympathetic, bleeding would never act directly on the cause of the disease. It could attack only a symptom, whereas the remedy ought to be addressed to the affection or to the affected organ, and bleeding could never be this remedy. The sedative spoliative bleedings would then cease to have significance; the depletives alone could be indicated. Thus, when, after the discovery of Harvey, the iatromechanical infatuation arose which caused so much blood-shedding, bleeding was done only in accordance with the indications of Boerhaave; nothing was proposed to be effected by bloodletting except the removal of physical obstacles, and the deobstruction of the vessels. This is the point to which a false system would lead today, if good sense, experience, and tradition did not render physicians inconsequent. Nevertheless, the direct and special utility of bleeding in a multitude of affections of the circulatory system proves that the system has its own idiopathic sufferings outside of its organic lesions and the nervous affections of which it may be the seat. Here again the therapeutic result is the surest means of diagnosis, and justifies the aphorism of Hippocrates, which forms the motto of this treatise. *Naturam morborum curationes ostendunt.*

In order to prove scientifically the value of bloodletting in idiopathic disturbances of the circulation, it was necessary to establish the true

part played by the apparatus of which antiphlogistic treatment is the special modifier. This has been our purpose thus far. We have now to close the chapter with a few pages upon the principles which should govern its application in plethora, congestions, and hæmorrhages.

Plethora has changed its name; it is now called *hyperæmia*. This word sufficiently indicates the point of view which is taken by modern pathologists. If the expression is an accurate rendering of their thought, an increase of volume in the mass of the blood ought to suffice to constitute general plethora, or (according to them, more exactly) hyperæmia. Nevertheless, what they mean by this term, or by *polyæmia*, is simply an increase in the quantity of one of the elements of the blood—the globules—as we have said. But this character is purely anatomical, and has no pathological value unless every person whose blood contains an excess of globules presents the symptoms of plethora, and vice versa. Plethora is a morbid state characterized by various well-known derangements of health. Polyæmia, on the contrary, is an anatomical state which does not necessarily involve these functional troubles. Correspondingly, the symptoms of plethora are often seen in persons whose blood is by no means too rich in globules. The physicians who were called anatomists, ten years ago, now call themselves hæmatologists. They have changed nothing but the name. Yet they suppose that they have changed their system, and congratulate themselves upon having escaped from the "rut of anatomism," because, instead of founding medicine chiefly on the pathological anatomy of the solids, they base it principally on that of the liquids. This, evidently, leads to nothing but a displacement, or rather an extension of the error, which, nevertheless, remains as gross as before, only including more phenomena, so that it falsifies a greater number of notions and facts. What medical worth can there be in an isolated, organic modification, which is capable of existing without injuring the health, and without offering the least footing for diagnosis?

When this modification exists, it characterizes a kind of plethora, that which we will call physiological, but upon the condition, either that it determines, or that it is associated with the morbid symptoms of every plethora. It is as impossible to base a pathological notion upon an anatomical fact, as to base an anatomical notion on a pathological fact.

Physiological Plethora and its Various Forms.

We shall first distinguish an absolute or physiological, and a relative or morbid plethora. The former shall be symptomatic of an abundant hæmatosis; it is in this case that we observe an excessive proportion of globules. We term it physiological, because it may exist without any definite disease, owing simply to a too powerful sanguification. The health is constantly troubled by accidents which cannot be called diseases. The most laudable temperaments have their inconveniences, of which the

sanguine is an instance. The physiological disposition of the system, by virtue of which too rich and too abundant a blood is formed, is not a disease; but it may lead to one, either immediately or under the influences of different causes which would have had no effect but for it. In the soundest system, the different apparatus have very unequal susceptibilities. Each feels, in its own way, the impression of too stimulant or too abundant blood. Hence, we see, in general plethora, a predominance of certain affections; hence, also, the very frequent, sudden development of symptoms of plethora in persons who experience some shock, previous to which they had not the least functional derangement. The anatomical state of the blood, which constitutes physiological plethora, very probably existed on the day before the sudden outbreak of symptoms; and yet this disproportion in one of the elements of the blood, which is regarded as the efficient cause of the polyæmic symptoms, did not produce any. Evidently, then, this anatomical condition cannot be the efficient cause of such accidents, nor produce them of itself, except in a theory of circulation which is based on the principles of hydraulics. Yet it is certain that by the excess of its mass, the exaggeration of its quantity, and its other physical conditions, the blood can produce some accidents which form a part of the symptomatic group of general plethora. The application of bloodletting to the treatment of this indisposition is not always judiciously made, because we cannot sufficiently distinguish in practice the three species of plethora which we are about to describe.

First form.—There is a class of plethoric persons, containing, in particular, certain fat and sanguine women, in whom the exuberance of hæmatosis is revealed only by the order of symptoms which the ingenious Professor Lordat calls anenergetic, in order to express the fact that their immediate cause fetters and stupifies the vital acts rather than excites them. But this general character would not suffice to specify the persons we have in view. They have small vital resistance, with very powerful nutrition. The plastic functions absorb all their vitality. Their nervous system gives way under the slightest fatigue; the bony and muscular systems are imperfectly developed; but their chief characteristic is debility, softness of the vascular fibre, the lack of tonicity in the capillaries, slowness of circulation in the capillaries, shown by the dark red tint of the skin, the spots, the marblings and the sugillations which are visible on the skin, and which so plainly distinguish them from the bright, clear color of sanguine persons who have more tone in the living solids. Ecchymoses are produced with the greatest ease in these persons; their gums bleed at the slightest touch, and all the hæmorrhages which are called passive occur on the least provocation. In a word, the symptoms of scurvy have a great tendency to appear. The veins and arteries are small, while the capillaries seem excessively developed. The pulse is small, hidden, sluggish; and these characteristics nearly represent those of the nervous system of those plethoric persons who sleep heavily, and all of whose faculties of relation are slow and torpid. The blood when

drawn is rich in red clot, in which the globules seem notably to predominate over the fibrin; for it is soft, friable, does not support its own weight, and readily dissolves in the serum.

If we judged of plethora anatomically (or in the language of the day, hæmatologically), these persons would be the plethoric, *par excellence.* Yet this is by no means so. Bleeding is doubtless the best way to relieve them, but we must not use it frequently. Its immediate effects are almost always bad; first, syncope is very common under the lancet; then, the beneficial effect is not seen till several days after bleeding. In persons of the second class the contrary is true. For some days you would suppose that bleeding was contraindicated, so much do the debility, atony, and enervation seem increased. But the nervous system, at last escaping from the indirect weakness into which the plethora had thrown it, soon regains more activity, and then the effects of bloodletting appear. It is important to be aware of these peculiarities, in order to wait, and not repeat the bleeding in obedience to false indications of oppression of the forces of the system. These indications are the more specious, as in the cases we speak of the complexion loses little of its deep color under the influence of bloodletting. The tissues of the face seem as if soaked and tinged by the coloring matter of the blood, for the redness scarcely disappears under the pressure of the finger.' The abuse of bleeding, in these cases, would cause the gravest troubles; it would very speedily determine a state of cachexia, infiltration, scorbutic symptoms, and a profound, nervous debility.

The characteristic of this species of plethora, which we may name *plethora quoad crasim*, as did those of old time, is a great disproportion between the richness of the blood and the vascular tone. The circulatory apparatus possesses little vital energy, at least in its relations with the sensory and motor functions; all its activity is absorbed by the functions of hæmatosis and vegetation. It is therefore necessary, except in extraordinary circumstances, never to draw more blood than is absolutely required to relieve the embarrassment of the circulation, to alleviate some predominant local pains, and prevent the grave hæmorrhages into parenchymatous organs to which these patients are liable. These precepts are generally applicable to the antiphlogistic treatment of phlegmasiæ, congestions, and hæmorrhages in these persons, with such modifications as may be required by circumstances.

Second form.—In this species, the symptoms are opposed in almost all points to those of the preceding kind; an opposition in externals, which proceeds from a correspondent opposition in the internal constitution of the blood-apparatus.

While in the previous form, the energy of the apparatus lay in the blood, much more than in the vessels; in the present form it is much more developed in the vessels than in the blood. The hæmatosic properties in the vessels were the dominant ones; the sensitive and motor properties are now the chief. The arteries and veins are quite voluminous in

calibre, but the capillary networks seem much less considerable. The circulation is active; the artery dilates freely; its pulsations are ample and high; the congestions, the raptus sanguinei, are easy, brusque, not very obstinate. The least excess of sanguification immediately causes symptoms of plethora, for the vessels are very impressionable, and feel, with great acuteness, the slightest modifications of the properties of the blood, their living stimulus. They have much tonicity, and a very marked idiopathic sensibility. We mean by this, that their physiological susceptibility is not so much sympathetic—or, we may say, is not so much produced by the affections of the nervous system—as by the modifications which take place in the circulatory system itself, of which the blood forms a constituent part, as has been sufficiently shown above. This is a second variety of the sanguine temperament, to which a second variety of plethora corresponds, which it is very important to know in bleeding for various troubles of the circulation.

The patients in question bear bleeding much better than the preceding class, in spite of a comparative poverty of red corpuscles. The tendency to produce fibrin seems in them to outrun the tendency to produce the globulous element, to judge by the firmness of the clot. It also seems to us that the greatest number of rheumatic patients are found in this class of temperament, which might be called the vascular. We often see men of this temperament who, though not yet old, have a hard, large artery, apparently cartilaginous; ossification of these vessels is very common in such cases. Without claiming to base the distinction between gout and simple rheumatism upon organic differences, this is perhaps the place to observe that in gouty persons, and in simple gout, when it produces disturbances of the circulatory system, the centripetal organs—veins and venous capillaries—seem to be the more active; and that in acute rheumatism it is the arterial ramifications that seem to be the more special seat of morbid activity.

The nervous-sanguine temperament has always been noted as fertile in hæmorrhages. Certain phthisical persons who are very much disposed to hæmoptysis are included in this class. All these patients belong to the category with which we are now engaged. The plethora proper to this variety of the sanguine temperament was termed in former times *plethora ad vasa*. We ought not to obey too unquestioningly the indications furnished in this class of cases, by the various accidents of plethora and the symptoms by which these accidents are usually interpreted. We ought to remember that the vascular impressionability is so great that it is easily aroused to energetic action by the weakest direct excitation, and thus gives rise to a false plethora which will disappear spontaneously or by the aid of very simple remedies. The pulse, in particular, is often deceitful. But when these indications persist, we should obey them without fear and open the large vessels. Bleeding is well borne and gives immediate relief. The circulatory apparatus is so sensitive, that local bloodletting is sometimes sufficient to give relief.

To complete the picture, we add that in persons subject to *plethora quoad vasa*, the arterial bruits are developed with great facility, as is observed in rheumatic persons. Another characteristic connects these two physiological constitutions—their slight disposition to suppurate. These persons "have no humors"—to use a vulgar expression which well expresses our thought.

Third form.—In the two preceding divisions we saw two opposite phases of the sanguine temperament and physiological plethora. The latter appeared to have two parts—to be doubled, as it were, but complete in each aspect. We shall now see this plethora result, absolutely and completely, from the association or coincidence of the two conditions of the circulatory system which bore the old names of *plethora ad crasim, plethora ad vasa.* In this case the hæmatosis is exuberant, the blood rich in all its elements, especially in its organizable portions, and the vascular apparatus is in harmony as regards sensitive and motor properties with this excessive activity of sanguification; the circulatory system enjoys all its powers in an exaggerated degree.

In plethoric persons of this class, all parts of the functions of circulation and hæmatosis are well proportioned; excess is not to be found within the apparatus itself. The exuberance of life and force is only relative to the other systems—to the rest of the organism. It is hard to form an idea of the hæmatosic power of these plethoric persons *par excellence.* We often hear it said that there are persons in whom "everything turns into blood." Do such persons eat more than many others? No, and often less. Do they absorb more atmospheric air in respiration? There is no reason for supposing so. Do they lose less by the various organs of excretion and exhalation? No, again; for in general they perspire very freely. Is their digestion more perfect? Upon this point they differ greatly among themselves, but are not unlike the generality of people. We know some of these persons who eat extremely little, either from natural disposition or as a hygienic precaution. Finally, ought such a power of sanguification to be confounded with the energy of interstitial assimilation, or nutrition proper? We cannot think so, when we see this physiological disposition or temperament existing in persons whose vegetative functions are not excessive and who in some cases are lean and pale in spite of a very good development of bone and muscle. But it is certain that in them the plastic force appears less in the production of fat, the development of flesh, than in abundance and richness of blood. The popular expression is exact: everything turns to blood; they make blood of everything. Placed in such hygienic and physiological conditions as are the least favorable to sanguification, the tendency is still greater than it should be. In view of such facts, how can we deny the hæmatosic properties of the circulatory system, or the power possessed by the vessels to form blood by themselves, without a necessary connection or proportion with the functions which prepare for hæmatosis, such as chymification and chylification?

To physiologists of the school, the organic system of nutritive life seems like a mill, in which, before reaching the condition of perfect flour, the grain has to pass through several pieces of apparatus which discharge the one into the other, and each portion delivers to the one which succeeds, in the order of its mechanical function, just the amount of grist which it received in a less finely-ground condition from the portion or movement which preceded it. Whatever difference these physiologists may recognize between the special actions of the nutritive system and the movements of a mill, it is, nevertheless, true that, implicitly or not, the general conception of these two apparatus is essentially the same to their minds. But if they would sometimes base their ideas on observation of the laws of nature rather than the procedures of art; if it were the custom in physiology to draw theories from the study of comparative anatomy and embryogeny, rather than from that of descriptive anatomy and that physiology, termed elementary, which may surpass the Galenic treatise "De usu partium" in precision but not in doctrine, and will always give medical physics the precedence of the science of organized beings; if, in a word, they would once take the position of seeing what nature does instead of imagining it, they might soon be assured:

1. That the organic apparatus and their special functions arise simultaneously and not successively; that, therefore, we cannot say that the function is the effect of the organ, as the scholastic idea would entitle us to do in all strictness.

2. That the organic apparatus grow and develop, each in its own province, and in its own natural relations, without seeming to originate from one another in the mechanical order in which the physiological acts of the perfect animal seem to take place.

3. That, in consequence, each organ performs its own acts and forms its own special products by drawing from itself the characteristic properties which it stamps upon both.

4. That if the words intussusception and juxtaposition, used to distinguish the mode of formation of organized bodies from that of inorganic, have any sense, the former means that the system and every living part in infinite subdivision draw from themselves (*suscipiunt ab intus*) all their acts and all their products; that the materials they receive for that purpose give them growth by fecundation, by furnishing a seed to their power of generation or intussusception; while growth by juxtaposition, on the contrary, supposes that, receiving everything as it were from without, the system does not, and cannot have any other laws than those of external agents which modify it.

5. Finally, that as regards the formation of the vascular system in particular, the vessels, the blood, and the circulation appear simultaneously in the embryo; we do not see first, the vessels, next the blood, and then movements of the fluid in the tubes, beginning, progressing, and forming a circulation proper, as we should observe if the function were a pure fact of hydrostatics.

This word "circulation" protects and perpetuates an error; it is false in the mechanical sense, and yet it is understood in this sense only. But it might be thought that in an adult whose circulatory system is formed, the function goes on otherwise than in an embryo, where it is in process of forming. This is incorrect. Though several circumstances in regard to the function are changed, the function remains essentially the same, and is not subject to other laws. The circulatory system remains charged with sanguification, properly so called, both during and after embryonic life; to prove which, we must return to the facts which we first cited, when we had to justify our opinion regarding the hæmatosic faculty proper of the blood-vessels.

There are persons, we stated, in whom the force of sanguification proper is so energetic, that with them everything turns into blood, and they are affected with a sort of bloody colliquation, to borrow a term from pathology. Just as in certain scrofulous persons who have reached the last stage of general tuberculous colliquation, but who continue to eat a good deal, and to digest properly, all the digested substance, and all that absorption removes from the system, transforms itself into tuberculous pus; just as in cases of marked dropsical diathesis all the materials from without and within are converted into serum, and in polysarcia into fat, etc.; so also, there are subjects with so marked a sanguine temperament that the plastic force hardly acts, except for the benefit of hæmatosis, in spite of the temperance of the individual, which may be very great. Do not these facts permit us to suppose that in such a case the blood-vessels are endowed with such powerful hæmatosic properties that they extraordinarily multiply and impregnate the materials which are furnished them by the organs of chylous and lymphatic absorption? A pregnant woman often eats very little and vomits a part of what she takes. She nevertheless, in a great many cases, grows fat, contributes to the development of the fœtus, becomes excessively plethoric, and her blood, when analyzed, shows a poverty of globules which is by no means proportionate to the anorexia and dyspepsia, while in other women, who in pregnancy eat a good deal and digest perfectly, the proportion of red globules remains below that of the normal type, and probably below their own standard when not pregnant and eating much less. It has been remarked that in all these persons, bleeding only increases the plethora, as if the circulatory system, relieved of an excess which encumbered its powers, became more apt to accomplish a very active sanguification.

In these facts there is nothing more surprising than in that which presents to us the formation of an abundance of blood and vessels under the influence of inflammation; or in a false membrane which receives only white fluids. The case is similar in the formation of the first red vascular ramifications in the umbilical vesicle, and in the punctum saliens of the embryo, which is composed solely of anæmic tissue surrounded by sero-mucous or sero-lymphatic fluids at a period when the umbilical cord is not yet formed. These facts are alike, except in regard to the circum-

stances in which they occur; they are, also, of the same order, and we can reason without fear from one to the other. We wish to cite one in conclusion, which seems to us of capital force in physiology and pathology, and which is directly related to the question of general treatment of which we are now speaking.

Active and passive hæmorrhages have always been distinguished; but the idea which has been formed of the two facts may never have been much more complete than that which was entertained in the system of the old methodism, or at best, the modern methodism of Hoffmann and Cullen, which hardly differs from the old view, except in the fact that the pores, endowed with special sensibility and movement, sympathize and act at a distance upon one another. In these systems, hæmorrhage is active, when the blood flows under the influence of excitation and contraction of the vessels; passive, when it flows in consequence of their abexcitation and dilatation. We do not think true active hæmorrhage should be thus understood. We would gladly distinguish these affections, as we have distinguished plethoras, into three species. But, to speak here only of those which seem to us to deserve specially the title of active, we are greatly inclined to regard them as accompanied by a very energetic, general, and perhaps local hæmatosis, of which the products are continually exhaled, and form hæmorrhage itself. This assumes a close analogy between secretion and hæmorrhage.

This view was suggested by the observation of several cases of epistaxis and metrorrhagia, which were inexplicable upon any other hypothesis. The patients were losing a good deal of blood, without losing strength; their blood did not grow thin, the pulse retained a force and vigor which became more and more hæmorrhagic; abundant general bleedings hardly depressed; in a word, neither asthenia of the nervous system, nor of the circulatory system, nor weakening of the physical and organic qualities of the blood, existed in correspondence with the inconceivable profusion of blood which was shed. The entire system of blood-vessels was in a state of excessive activity, not only of a motor kind, but involving an unusual exaltation of its hæmatosic properties. This is the interpretation we prefer to give to true active hæmorrhage, yet without denying that there are others which seem to be active, but whose activity consists only in a special superexcitation of the sensitive and motor properties of the vascular system.

The preceding will show how the application of bleeding to the third species of plethora, of which we have just had a general view, is under much fewer limitations than in the two preceding classes. The latter class of plethoric persons need large and abundant bleedings, and as rarely as possible, local bleedings; for, even when the latter are indispensable, it is almost always necessary to precede them by general bleeding, unless we wish to produce congestion in the part to which wet cups or leeches are to be applied. The great plasticity of the blood makes hæmorrhage through leech-bites or the scratches of the phlebotome very difficult.

Special Remarks on the Diagnosis of Plethora.

Every one knows the table of symptoms of plethora in general, as it is given in all works on pathology. But what is much less known are the marks of latent and masked plethora; and here the vices of nosologism are exposed, as they are in the clinical history of all ill-determined morbid states.

It sometimes happens that the most pronounced general plethora exhibits none of the ordinary classic symptoms. The patient complains vaguely; has no exact suffering to indicate. If he does not present the usual marks of the sanguine temperament; if his complexion is not high, his pulse sunken and weak, and he has no malaise, or at most, a certain difficulty in dilating the chest which compels him to heave a deep sigh occasionally, or an oppressive pain at the epigastrium—symptoms sometimes connected with vertigos which, in connection with a weak pulse and a dull complexion, may be taken for nervous spasms as readily as for signs of plethora—the physician is thrown into an insurmountable perplexity. One thing only can relieve him; it is the patient's own statement that he has formerly been benefited by bloodletting, and wishes it done again. If this information is not given, the physician goes to work tentatively. He gives tonics which, being badly borne, irritate the digestive passages, produce congestion of some organ, and cause the symptoms indicative of the true nature of the case to break out. If he makes a tentative bleeding, the success of the trial puts him in the right road.

General plethora may be revealed by a special yet isolated sign, detached from the rest of the picture; for instance, a simple redness of the eyes, or a stinging of those parts without any redness. The latter symptom is precious.

In other cases the physician will have nothing to decide him but a prickling of the skin, intolerable itchings without redness or eruption of the surface. In another, sleepiness, torpor after eating, heavy and prolonged sleep at night, will be the only indication. The swollen and glistening appearance of the veins of the forehead and back of the hand may also form a sign. Many plethoric persons have no symptom but a dry incessant cough, usually of a coarse tone. In this case it seems to come from the bottom of the lungs, and requires considerable shocks and efforts of the upper muscles. In certain other cases it is less voluminous, and shakes the respiratory apparatus less ; it then seems to come from the larynx. In one way or another it is continual and dry, prevents sleep, increases in the horizontal posture, especially when lying on the back, and one of its chief characteristics is that of being increased by deep inspirations. If a free bleeding is made from a vein of the arm, the savage cough is quieted as by enchantment, in proportion to the discharge of blood.

We know certain plethoric persons who are warned of the need of

bleeding by dryness of a given portion of the mucous membranes, sometimes in the nasal fossæ, sometimes in the pharynx. In those who have issues, the suppression of pus, with or without the exhalation of a few drops of blood in its place, is an infallible sign. We know one in whom the chief indication is a rigidity of the hair of the head, a certain sensitiveness of the scalp, and a yellowish tint of the face. The "taste of blood in the mouth" is a sensation mentioned by many persons as expressing a positive need for bleeding. It is the same with certain spontaneous aphonias and with numbness of one extremity.

We desire to have it perceived that this is not a symptomatic group —for that rarely allows the physician to hesitate—but a natural analysis of the picture composed by the symptoms. To a consummate observer, a single one of these symptoms represents the morbid state as characteristically as the whole.

A well-observed practice will have shown similar facts to every independent physician; but these remarks are not just, nor intelligible, except from the point of view from which we considered the morbid disturbances of the circulatory system. Like the digestive apparatus, that of circulation has the greatest variety of idiopathic morbid susceptibilities; it has its sthenic state, its asthenic state, its ataxiæ, its indigestions, fluxes, irritations, spasms, etc. We have already said that in the scholastic system it was susceptible of no idiopathic, but only of sympathetic affections. If a term of the sympathetic actions, it cannot be their point of origin; and hence the reason why the masked and anomalous forms of plethora are neither known nor studied. Yet it is certain that the circulatory apparatus does not always manifest its own sufferings, and that it sometimes reflects them upon other organs. This is incomprehensible if we hold to the medical ideas which are officially taught, and nevertheless nothing is more certain. In this respect there exists an inconceivable lacuna in our general pathology, and even in our nosologies.

The pulse is rightly regarded as capable of furnishing the surest points for basing the diagnosis of plethora; but it must be admitted that this capital symptom leads to many mistakes; it points to plethoras which do not exist, and fails to point out those which do exist. There are also some in which the pulse remains full, strong, large, hard, even when the indication for bleeding has been sufficiently obeyed. This is especially observed in persons threatened with cerebral congestion, or who have already had sanguineous apoplexy. We ought to dread throwing such patients into anæmia by abusing bleedings which may be speciously indicated by a pulse that continues indefinitely in a hæmorrhagic and cerebral condition.

In old men, and even in adults who are predisposed to ossification of the arteries, the pulse has also a fulness, a hardness and volume which are very deceptive. Conversely, certain persons have naturally very small arteries, which constitutes another source of error.

There is another characteristic of the pulse, to which Récamier gave

the name of *recurrent;* in this case, when the radial is strongly compressed with several fingers, so as to cut off the circulation in this artery, we can feel the pulse in the portion beyond the compressed part, to which the blood passes through the palmar arch—a true recurrence. This special pulse, often encountered during the mobicum hæmorrhagicum, and more particularly in subjects of hæmoptysis, does not always indicate plethora. It is often found in young and non-plethoric persons, and we have even found it in certain fevers, particularly in purulent infection; this sign, considered alone, may deceive, and may lead to the bleeding of weak or even anæmic persons.

Thus the symptomatic portrait of general plethora is not so simple nor so easy to read as is supposed; and yet we have as yet spoken only of the physiological plethora and its different classes. We gave it this name in order to show that it is not connected with any morbid state, and consists solely in an excess of sanguification, or in a simple and non-morbid excitation of the apparatus of circulation. You have seen what lacunæ exist in our treatises in regard to this point. We have been obliged to make them good by some considerations, which, though insufficient in a work on pathology proper, will be found, we trust, neither too long nor out of place in a treatise on Therapeutics.

Morbid Plethora.

It remains to finish our task by an analogous study of another class of plethoric accidents, the most common and severe of all, the most difficult to recognize, and the ones which demand in prognosis the greatest sagacity, and in their treatment the most prudence; we mean morbid or diathetic plethora and its different species. If modern works are very barren of all that relates to simple and physiological plethora, they at least admit it, and describe its ordinary forms. As to the diathetic or morbid plethora which we find mentioned in certain old authors under the name of *plethora a cacochymia*, it is unknown to-day; it is not even named. The old humorism, well or ill based on the observation of man, proceeded according to a method which harmonized with its principles, by the method of physiology, and clinically. Sydenham, Stoll, Pringle, Quesnay, Dehaën, judged, or claimed to judge, the state or the crasis of the blood by the individual constitution, the temperament, habits, and physiological peculiarities, by his maladies and their symptoms, without neglecting the physical and external inspection of the humors and blood. This is the path which Bordeu followed in order to produce his Analyse médicale du sang, an admirable sketch, full of the truest and most fruitful observations, along with the most false and chimerical ideas.

Modern humorism tends to convert the procedures and methods of investigation which are furnished by physics and chemistry into principles of physiology and medicine. Having recognized their necessity in study-

ing the composition of the blood and the animal humors, it concludes that these sciences dominate the physiological facts and explain them. Bordeu, studying the blood by its vital phenomena, and using them as reagents to estimate the composition of that fluid, really makes the medical analysis of the blood; only he is destitute of means of investigation which are often indispensable in demonstrating the hæmatological bearing of one or another symptom, one or another condition of the system. He is fundamentally right. But though he has the principal thing, and is on a correct foundation, he lacks the accessory, the exact procedures, the methods of verification; whence several great views of his are scorned as futile hypotheses, although they are open to no objection except that of being destitute of exact proof, or rather of the anatomical complement which puts the seal to medical proof.

Medicine needs a medical analysis of the blood. Modern hæmatological studies answer with the anatomical or chemical analysis. These are plainly but means of reaching the end, and not the end itself. Descriptive anatomy is not physiology, but it is indispensable to it. It is so with pathological anatomy as related to medicine. Thus the investigations of some older physicians concerning the blood in disease, which are originally summed up in Bordeu's little treatise, were conceived in accordance with the true spirit which ought to preside over the labors of medicine. They did not displace that science in order to deliver it to the accessory sciences, though they neglected too much the auxiliary procedures in investigation. Though our predecessors, more physicians than anatomists (for in the just and profound appreciation of the nature of this end lies their sole superiority), understood the aim, they often wandered from it, or missed it, for want of instruments of precision. The modern hæmatologists, more anatomists than physicians, have the instruments, but miss the aim because they do not understand it. Their precision has no immediate value in pathology. The materials they amass are in the region of the accessory sciences; they must be transported to that of medicine.

These two sorts of analysis of the blood—the analysis medical and the analysis anatomical—were in existence in Bordeu's time. They were thus contrasted by this illustrious physiologist.

"The physicists will find in the blood, the serum, or fibrinous particles; the others will note in it, as in milk, the fatty, butyric, caseous, and watery parts. This comparison between the blood and milk is the more remarkable, as it is found in the works of Hippocrates. The others admit no fatty or buttery substance in the blood. Some will have it composed of globules, which they count, without being brought to book for their very arbitrary calculations; they even see or imagine some globules broken in pieces like glass balls; but sensible people will make little account of such trifling. Others find the blood too thick, too liquid, sweet, sour. Some claim that it becomes warmed by attrition between the globules and the solids, but others deny this wholly. They calculate the amount of blood that each individual can contain, and they fix it no bet-

ter than they fixed the force of the heart and stomach, about which so many absurd things have been written. They try to find the specific weight of each part of the blood, of each humor which proceeds from it, and amuse themselves with all these objects without determining anything. They speak of hydraulics; and they shall be told to leave their dead vessels, insensible to the stimulus of life which physicists and anatomists have neglected, equally with ordinary chemists.

"We shall proceed somewhat differently with physicians, in penetrating the composition of the liquid flesh which rolls through the vessels of animals; out route shall be very simple and natural. We shall examine the bodies which enter into the mass of the blood to renew it and keep it good, as the bodies which leave the animal mass in order to purify it. We shall try to seize these nutritious and excremental bodies at the closest possible point to their union with the mass, and while they still retain animality. We shall continue attentive to the history and modifications of the healthy and the diseased condition, always keeping under our eyes the living individual, the entire animal, such, for example, as the egg which the hen is actually incubating. Finally, we have to study man, and his parts as actually living and engaged in their functions."

Bordeu is right: the blood, that "liquid flesh," as a living being has no other proper reagent but the organism; all other reagents kill it as blood, and destroy its unity or its life before manifesting one of its dead properties. But if Bordeu is right in being first and foremost a physician, in referring everything to medical knowledge, in subordinating all the data of physics to the physiological observation of the living individual, and co-ordinating them with the phenomena of the entire animal, he is wrong in making fun of these data and the means which may be taken in order to obtain them. He justly incurs the opposite criticism; driven by too eager a desire to extirpate the error, he only aids to implant it more deeply. What will remain of all those cachexias, those cacochymic plethoras, which he saw with such sagacity? They cease to exist, unless modern science proves them to us with its laudable rigor. One may, however, predict, that science will never reach this point while it subordinates vital facts to those of anatomy and chemistry.

In any case, the morbid or diathetic plethoræ exhibit, in a much more pronounced degree than physiological plethora, the accidents proper to disturbed hæmatosis and circulation which indicate a surcharge of this apparatus, and require the use of bloodletting. They not only present them with graver symptoms and sufferings of a nature more expressly pathological, but they are much more fruitful in affections of all sorts; congestions, phlegmasias, hæmorrhages, various organic changes.

That which, from the point of therapeutics, rules the study of these accidents, is that they may exist, and very often do exist, in persons not of a sanguine temperament, whose affections are by no means such as naturally call for bleeding. There is here no question as in physiological plethora, of a natural increase in the normal proportion of the globules,

etc.; but of morbid states in which the vital properties of the blood, pathologically overexcited as by a poison, produce upon the vessels an impression whence results an artificial plethora, which nothing but bleeding can calm. Reciprocally, an increased, morbid susceptibility of the vessels to the blood produces in another way a morbid plethora, which also calls for bloodletting. We have seen hysterical persons in the latter case: only bleeding put an end to this artificial and relative plethora. The school of Italian controstimulism professes to possess means of appeasing these morbid supraexcitations of the vascular apparatus. Digitalis, aconite, cherry-laurel, colchicum, squill, sulphate of quinia, camphor, etc., are boasted by it as specific for that effect. We do not deny the reality of the sedative action which these remedies may exercise directly upon the blood-vessels; but we must add that their influence is very uncertain, is quickly expended, and that it is very often impossible to use these remedies in the doses necessary for efficient sedation.

It is in morbid plethora that we most frequently see the symptoms manifested, not by the circulation which is the seat of the affection, but reflected to other apparatus. And every sort of morbid plethora has also something special in its symptoms, and reveals itself in particular forms.

In order to understand this well, we must recall two principles of general pathology, which we have often stated, and which we shall not cease to repeat whenever we find a new application. They are these:

1. Any diathesis, though usually manifested by known symptoms and affecting a preferred seat, may nevertheless appear in any part of the system, and in the strangest forms. The symptomatology of these affections may also be analyzed and reduced to a number of symptoms much less considerable than the nosographies contain ; it may be, to only one, even the most insignificant of them.

2. Each symptom of a special diathesis or affection, however isolated, is nevertheless marked by the stamp of the affection or diathesis. It represents it by special properties, as the entire group of symptoms represents it by the special character of each element, and by the fact of their special co-ordination. The unity of the diathesis ought to be found in each part—to infinity—as well as in the whole, or the completed disease.

We see at once that the former proposition would be valueless and indemonstrable without the second.

It thence follows that all diatheses can be betrayed by plethoras, congestions, etc. Observation also proves it.

Let us hasten to add that morbid plethora must be distinguished from the cachectic. The latter kind is appreciable anatomically, and consists in an increase of the mass of blood in respect to serum only, while the globules are usually below their normal standard; this is polyhæmia or serous plethora. We prefer these terms to hydræmia. The morbid or diathetic plethora may degenerate into cachectic plethora, but is distinct from it; we define it as an affection made up of the ordinary symptoms

of plethora, and the special characters of a diathesis. Therapeutical experience or medical diagnosis allows us to divide morbid plethora into two very distinct classes :

1. Those in which the special marks of a diathetic affection are manifested by the symptoms of plethora in persons of a sanguine temperament, who at the same time present the conditions of the various forms of physiological plethora. The blood is then rich in globules, or the vascular apparatus enjoys a great vitality, etc., and the patient exhibits, in connection with the marks of physical plethora, those of some diathesis.

2. Those in which the peculiar characters of a diathetic affection are manifested by the symptoms of plethora in non-sanguine persons, who by no means naturally present the conditions of the various forms of physiological plethora. Then the blood is not rich in globules, nor is the vascular apparatus of high vitality, but the patient presents the pathological signs of plethora; and yet, we repeat it, he has neither the anatomical nor the physiological conditions for it.

From the therapeutical point of view, which ought here to be at once our aim and our standard of certainty, this distinction is of high importance. We have already said that the chief point in the clinical study of morbid plethora is, that it may exist in non-sanguine persons, and even in those whose blood is normally very poor. Does fibrin, the excess of which forms one of the anatomical marks of frank natural inflammation, that which, with Hunter, we call healthy or physiological, does fibrin increase in amount in phlegmasiæ connected with a general affection, a grave fever, a special and ill-conditioned fever? It does not. We think the same is true in morbid plethoras relatively to physiological plethora, and that they may exist without this augmentation of the globules, which is the anatomical character of plethora *quoad crasim.*

Treatment becomes very difficult when we have to deal with these plethoric symptoms; the appreciation of the opportunity for bloodletting is so, because prognosis is singularly difficult. The general remarks which we made regarding the diagnosis of plethora, the analysis of its symptoms, etc., are specially applicable to these subjects. It is often manifested by a single phenomenon ; but this symptom is not of the nature of a simple physiological perturbation; it has an unusual morbid character, a morbid stamp, and is almost always a sign of congestion of blood in the part. These congestions usually occur with a brusque suddenness which is rare in congestion symptomatic of physiological plethora; and their indications are much more pressing. The uterus is very often the seat of these symptomatic fluxions. The head, the lungs, etc., are very subject to them; there is almost always joined to the functional troubles of these parts something morbid, as a very acute pain, a spasm, and a thousand other sensations contrary to nature, strangers to healthy or physiological plethora.

The symptoms proper to morbid plethora also excite many sympathetic symptoms. These congestive symptoms have a mobility and anomalies

of progress and form which are unknown in the description of physiological plethora. The latter does not rise to the febrile condition, to irritations and phlegmasiæ; morbid plethora, on the contrary, rarely lasts any time without passing to that order of symptoms which is more decidedly pathological. Thus, when it is manifested by the common symptoms of general plethora, it almost always has morbid sensations, and special marks which reveal the action of a cause different from that produced by a simple physiological overcharge or overexcitement of the blood-vessels. A tolerable idea of it may be formed by observing that which occurs in a person in whom plethoric or congestive accidents are produced by poison. It is thus that morbid plethora sometimes presents symptoms analogous to those which characterize the toxic plethora of opium, given in a certain dose. We have often observed these symptoms; they constitute what Récamier called a spontaneous narcotism. A bleeding dissipates them, or at least modifies them favorably. In other cases the symptoms of morbid plethora partly resemble those produced by belladonna, or those of ergot, that is, they consist of painful constrictions, etc. In some persons, they are rather accompanied by the accidents which we observe after the use of preparations of iodine or resins ; burning irritation of the conjunctiva or nasal fossæ, burning itching of some parts of the skin, painful hoarseness, fluxions to the breasts with pricking, pruritus vulvæ, etc. These comparisons aid in explaining the nature of the plethoric and congestive accidents which are formed under the influence of a morbid principle, and of a diathesis which is well enough represented by the examples we have given of toxic agents.

Such are the general marks of morbid or diathetic plethora. But each species has also its special marks, like the general affection or diathesis of which it is a special manifestation. Fortunately, the physician can draw the elements from other sources than those which are afforded by the only actual symptoms of the morbid state. The pathological constitution of the subject, his former diseases, and those of his parents, etc., will put us on the track; the actual symptoms thus find their form and their singularities explained.

When the morbid principle which begets congestive and plethoric accidents is well formed and well determined, there exist, in each symptom of the group, and in the single symptom which is sometimes the sole representative, the characteristics which evidently represent its special nature. The wise physician can grasp them to climb to a general diagnosis, as in natural history an entire animal is reconstructed if one of its parts is given, or even a fragment of one part, because, being made for the whole, it represents it from its own point of view, to whoever can observe.

The characteristics of gouty affections are mobility, constrictive boring pain, periodicity, sensation of distention, obstinacy, *venosity*, if we may coin the expression. In the muscles, the gouty principle produces the sensation of cramp; in the brain that of vertigo and confusion, with irritability of character; in the digestive passages, anxiety and flatulence; in

the urinary organs, strangury, etc. These various characteristics will be found more or less distinct and complete in the symptoms of gouty plethora and congestions.

The burning intensity of the pain, the sensation of pruritus, ardor, sharpness characterize the dartrous sort, under whatever form; and these entirely subjective signs will indicate much more clearly the nature of the diathesis if the subject is lean and high-colored; if the skin of the face is as if tattooed with crude red without shading, the tissue of the lips fragile, the border of the lids reddened with a chronic dry or non-secreting irritation, and in general, the outer integument without suppleness and a little rough to the touch, although translucent and delicate.

These general points are of more value, as the coexistence of the two diatheses in one person is very rare. In fact, these conditions seem to be mutually exclusive, unless they fuse into one, with a predominance of one or the other factor. These fusions are frequent between gout and dartre, between dartre and scrofula, etc. When any pronounced diathesis exists in a person, we may almost without fear refer all the constitutional accidents to this morbid disposition, in spite of the nosographic differences, often considerable, which separate these symptoms from those under which classic authors are accustomed to recognize and paint the diathesis in question.

Morbid plethora, as we said, has no appreciable anatomical character. It is not necessary to seek in it for an excess of any element of the blood; for the plethora is morbid, that is, it is an affection of the blood and its special apparatus. The blood may be affected as having life, without differing in regard to the form or quantity of its anatomical elements. This is universally admitted in regard to the living tissues, and is equally true of that liquid flesh called blood. All the artificial diseases, or the intoxications which the blood may be subjected to, are capable of producing in it and in its apparatus these perturbations without appreciable anatomical changes. Let us recall, also, that we are making a medical, much rather than an anatomical analysis; or, in other terms, that we are studying the morbid condition of the blood and the hæmatosic apparatus, much more by mutual comparison of the vital phenomena than by physical investigation.

When morbid plethora coincides with physiological plethora, bloodletting is very palpably indicated, even more so than in the least questionable physiological form. The secondary agents of antiphlogistic treatment are also much more useful as assuring the efficacy of bleeding. It is generally well to use simultaneously cathartics, acid, or depurative drinks, tempered baths, a milk diet, attenuant and vegetable; exutories are then very often useful. But in the morbid plethoras of weak persons, whose sanguine system is rather poor than rich, the difficulty and perplexity are often extreme. It is in such circumstances that those direct remedies would be inestimable, which the Italian school professes to possess for the purpose of producing immediate sedation of the circulatory

system. It is very rare that the digestive tract can endure these various remedies for any length of time, for they are, in general, very irritable in this class of persons.

We are too often reduced to drawing blood in order to put a stop to these symptoms, because it is the only remedy which relieves, and prevents worse ones. We daily bleed, with regret, women tormented with the symptoms of morbid or diathetic plethora, whose age, constitution, and the nature of their disease, require remedies rather of the opposite sort, if they could be used safely. But these would do more harm than bleeding. The latter, we repeat, is the only way to give relief, the only preventive of more dangerous morbid states; it is a lesser evil, a mere makeshift, but the patient demands it and the physician thinks himself very fortunate to be able to offer it. Those patients are more lucky whose nature tends to a resolution by fluxes, by humoral evacuations or habitual and slight suppurative phlegmasias; for in those who suppurate with difficulty, who "have little humor," in whom exutories dry up in spite of all that is done, spontaneous hæmorrhages or sanguine evacuations are the only effective modifiers.

There is another fact which strongly tends to prove that the local or general plethoras of which we treat are morbid, *i.e.*, symptomatic of a morbid principle or diathesis; that is, the wonderful success of a spontaneous bleeding, even if extremely minute, compared with the failure of artificial bloodletting formerly practised. The return or appearance of suppressed menses, a few drops of blood from the nose, the anus, or an issue, often cause the cessation of a formidable array of symptoms, which abundant bleeding was unable to modify. Nothing like this is observed in true physiological plethora.

Of course the physician, in these different cases, will always keep in mind the diathesis to which the symptoms of the circulatory apparatus point, and will act with the circumspection which we have already recommended in the application of antiphlogistics to acute diseases, in which, while destroying the symptoms and the organic states, we do not attack the principle of the disease radically and by the same blow.

Cachectic Plethora.

After the physiological and the morbid plethoras come, in the natural order, those of a cachectic sort, which, in the absence of specific or direct remedies, sometimes present indications for bloodletting.

Cachectic plethora is that in which the mass of the blood is or seems increased in its total quantity, in spite of a greater or less diminution of the amount of red globules.

The excess in the mass of the blood is then due to serum, and in the latter water is the element which has chiefly increased. It is not necessary to suppose that this plethora is purely quantitative, or *quoad mo-*

lem, as was formerly said. It displays not only an anatomical state, but symptoms. Without the latter it would not exist, either for the physician or the patient; or it would be only a general puffiness, a purely passive serous plethora; something like anasarca. The symptoms, on the contrary, indicate an overstimulation of the blood-vessels. This overstimulation has for its principle, or efficient cause, a spontaneous reaction of the circulatory apparatus against the inanity and weakness into which every anæmia throws it, whether natural or accidental, morbid or hæmorrhagic. It causes a superabundant formation of serum, which is an anatomical sign of cachectic plethora, then a doubling of motor energy in the circulatory organs, which is a symptom of the same plethora. The overstimulation in question differs much, then, from that which marks true plethora; it is even opposed to it, for it seems to consist in an excessive irritability of the circulatory cavities, determined by poverty of the blood, as we see the digestive tract become extraordinarily irritable when too long deprived of food. Such, in fact, is the erethism, or in the ontological language of Aristotelian vitalism, the superexcitability of the forces of an organ, determined by the weakening of its virtual forces.

The physiological type of serous plethora is furnished by persons who have suffered considerable losses of blood. In some, not all, it develops as an immediate consequence of anæmia proper. A fever, often very acute, accompanies the formation of it, and may lead the practitioner into grave errors of treatment. Although these cases do not at all interest us practically, and though, to whatever degree such a plethora may attain, it can never furnish an indication for bleeding, it is nevertheless well to pause there a moment, as at a point whence we see more easily the mode in which this morbid state originates, and whence we can observe some facts suited to confirm our given opinions respecting the part of the circulatory system in plethora in general.

Dr. Beau, who has devoted infinite art and remarkable talent to the theory of the arterial bruits and the conditions in which they are produced, thinks that the materials of serous plethora, which he calls post-hæmorrhagic, are furnished by the water drank by the patient after their losses of blood. It is true that these patients are tormented by very intense thirst, and sometimes drink freely. But we have seen persons who, after enormous hæmorrhages, were almost entirely deprived of drink for special reasons, such as the fear of provoking vomiting in hæmatemesis, and who, nevertheless, on the next day or the day but one, presented all the signs of cachectic plethora. Shall we say that in such a case the evacuation of the vessels overexcites the absorbing powers of the veins and lymphatics, and that through them a shower of serum inundates and fills the circulatory system? This precarious explanation would have to be abandoned in cases of spontaneous serous plethora, as chlorosis. Why need we make the vessels, that vast system which of itself forms almost the entire system, a mere assemblage of inert tubes? Are not their walls lined with a serous membrane? For what purpose? Perhaps it is

only to facilitate the rolling of the globules, to prevent bits of fibrin from catching upon the rings of the middle tunic, or to keep the blood from filtering through the fibres of this membrane? Surely no one would dare to draw these coarse inferences from iatromechanics; yet they are involved in it, and should be noted by criticism.

The serous membranes are the organs which form serum. Now since the circulatory system is everywhere furnished with a membrane of this sort, it contains in itself all that is necessary in order to produce this element of the blood, and therefore does not need to have it poured in from without as if into an inert pump, incapable of forming the water which it contains. Besides, this exterior and purely auxiliary cause, derived from the ingestion of drinks, explains only the half of serous plethora, and accounts for only the anatomical fact, which characterizes this morbid state, to wit, the excess of serum. Whence comes, in this hypothesis, that other much more important element, the physiological element of plethora, that irritability of the circulatory system, that excess of sensitive and motor energy under conditions which would seem adapted to throw this apparatus into a state of impotence and languor? Does it also arise from the watery and diluent drinks taken by the patient?

It is certain—we have very often observed it, and M. Beau has stated it better than any one else—that after large and sudden bleedings, the vascular system reacts, and that then the cardiac impulse is more energetic, the pulse more developed; there is a general vibratile tremor, a greater and more abrupt superexcitation of all the circulatory system, than existed before the loss of blood. The fever of acute articular rheumatism presents some analogy. But we think that this reaction is spontaneous, that its organ is the entire circulatory system, that is, that it puts in simultaneous action the hæmatosic and the motor properties of this immense living apparatus. We think that only one explanation is required for the anatomical and the physiological fact, because this reaction, this increased irritability, needs but one cause, which should be a physiological cause, extrinsic, functional or final. The circulatory apparatus, drained by a great loss of blood, experiences, as Hunter would have said, the "stimulus of necessity," that is, that the movements which agitate it arise from the pressing need of a new sanguification. To this reason there seems to correspond an efficient cause in the vascular apparatus—the hæmatosic force which this apparatus possesses, which, in virtue of the laws of preservation common to all living organs, draws from itself new actions and new products with increased vivacity, but with lessened moderation, regularity, and harmony, in proportion as the extrinsic sources of its activity are enfeebled. This is the theory of all those spasms which used to be called *spasmes par atonie.*

There is no doubt that the drink may furnish material for this new formation, as solid food does for the repair of the more animalized portions of the blood. In saying that the apparatus for the inseparable functions of hæmatosis and circulation forms blood, and draws its prod-

ucts from itself, we evidently do not intend to suppress the digestive apparatus, nor especially the lymphatic system, which forms the white globules, or to maintain that the animal can live without eating or drinking.

We only claim that the organs of circulation have by themselves a power of sanguification; that they live and act only in order to impress, and in impressing continually, the properties of blood upon the organic materials and corpuscles which the vortex of nutrition continually furnishes. It is impossible to fix *a priori* the limits of this power, for no one can easily measure the point where the force called plastic or generative ceases to act, which we shall just now term the multiplicative force. It varies infinitely according to circumstances and individuals. It is certain that if it gave up only what it received from without, death from inanition would be as common as it is now rare in sickness.

As we have said, every act of nutrition or assimilation is essentially only an act of generation. Hence the alimentary molecule, whether it comes from without or is recrementitial, ought to be considered, not as an inert molecule which becomes agglutinated to another and increases it by juxtaposition, but as a seed, which, touching the part which it is designed to increase or renew, only fecundates it, thus sowing life and its products at all the points which it impregnates. This power of intussusception varies extraordinarily in different persons and in accordance with a great number of internal circumstances. In one, it is energetic with a light supply of food; in another weak, in spite of abundant repair. One part of chyle or lymph will multiply the blood of a given person like ten; in another it will multiply like five. And one definite amount of blood will multiply the flesh, the fat, as much as twenty parts will in another person, or ten parts in a third, etc.

We pointed out this general theory under true plethora, and have ventured to return to it because, as is easily seen, it is the basis of all the ideas which we have uttered upon this important subject. Besides, are we not now speaking of the functional deviations of these apparatus? And how, without these explanations, can we make ourselves clear to a reader who, with the school, sees in circulatory disturbances only deviations in movement and variations in quantity?

The theory which we are at present combating, since conceived in a mechanical spirit and applied to the living system, cannot embrace in one idea all the facts of serous plethora; it therefore lacks unity. Forced to seek the elements for an explanation in two different orders of phenomena, it will necessarily become powerless in the presence of spontaneous serous plethora, where we can point neither to the visible and mechanical loss of a liquid, nor the visible and mechanical ingestion of another liquid.

We know how speciously these lacunæ have been sought to be dissimulated, and these contradictions palliated; for we know that in elaborating a system, circumstances may always be found which are connected with the fact to be explained, and seem to be its essential producing

cause. Dyspepsia, a common affection in the course of morbid states where serous plethora exists, naturally occurs as a sufficient explanation. It may be guessed how it will replace hæmorrhage ; and the ingestion of drinks will do the rest.

We cannot here enter upon details sufficient to refute the arguments drawn from these facts; but without denying in general the influence of imperfect digestion upon impoverishment of the blood, we cannot admit that chlorotic cachexia, hypochondria, saturnine cachexia, and all the other serous plethoræ which accompany the different cachexiæ are only the effect of bad digestion. We daily see consumptives who eat little, digest poorly, drink much, are reduced to a state of profound cachexia, and yet have marasmus without serous plethora. And by their side we see others who retain appetite, good digestion, are almost equally cachectic, but are not plethoric.

There are young girls of tuberculous diathesis, whose lungs contain, or may not contain, a few crude tubercles. They present all the characteristics of chlorosis, and then display in full force the conditions for the formation of serous plethora required by the theory which we are discussing. Nevertheless, these young girls remain for a long time in this state without exhibiting the phenomena of this sort of plethora.

If the chemists, who at present delight in shaping ingenious theories of digestion and hæmatosis, would observe nature instead of counterfeiting her in their laboratories, we would beg them to examine two very interesting types; on the one hand bulimia, and on the other certain physiological anorexias in fat and sanguine persons, particularly women.

We have at present under our notice bulimic patients, in whom the chief features are as follows: excessive appetite, rapid and perfect digestion, as far as one can judge by the absence of dyspepsia, constipation, normal urine, absence of thirst, of sweat—in a word, of every excretion which might by its excess explain the need of so considerable a repair. But it is much more significant that these persons present, and did present, shortly before the development of the bulimia, incontestable signs of anæmia without any appreciable cause. It would then appear that anæmia developed spontaneously in them; that is, that being affected by a peculiar nervous state, the circulatory system was struck by an anhæmatosis, as it is in hypochondria and chlorosis (in fact, these persons are hypochondriacs), and that, the organism being thrown into inanition by the deprivation of a supply of blood, the digestive system showed this want by an excessive appetite and rapid digestion, as if it had received innutrious food, or food in too small quantity. Whatever we may say of the explanation, the fact remains. It proves that hypochondria may affect at a blow the circulatory apparatus, and that this idiopathic affection may produce anæmia in spite of the perfection of the digestive acts.

Is a counter-proof desired of this fact and the correctness of this view? It exists in the second type, which we stated. Who has not seen a hundred times very fat and very sanguine persons affected with a

sort of natural anorexia? who require for their daily support only a few ounces of bread, fruits, and vegetables, a little milk; who eat no meat, etc.? Yet these persons are plethoric; their blood inconveniences them; they have to be bled, etc. Their circulatory system has so much energy of sanguification, that it draws from itself sufficient force to nearly dispense with alimentary material. The digestive organs then have only a very feeble appetite and assimilant force. Thus in these persons indigestion is very easy, and anorexia is a natural state.

So, on the one hand, an extraordinarily powerful capacity for digestion, and a very weak one for blood-making; on the other, an excessive hæmatosic power, and a minimum of digestive capacity; a double proof of the relative functional independence of the two apparatus, though they are connected otherwise by very close bonds. Hence a necessity of not considering these bonds as mechanical, but as resulting from a vital association, a consensus which may exist in infinitely variable latitude.

People whose sanguification is excellent and their nutrition perfect often complain of dyspepsia. These facts should be attended to by the chimiatrists· they are allied with the theory we have sketched.

We might multiply such examples without end, all to prove that in the formation of serous plethora, the apparatus of circulation and hæmatosis has a place of its own, and that the asthenic and spasm into which it falls in this case are either the direct effect of a morbid affection like chlorosis, hypochondria, etc., or a sympathetic effect of asthenia of some other important organ. The apparatus of digestion and that of generation have the most marked influence upon it.

But, like the other organic apparatus of the system, that of circulation and hæmatosis has a very wide circle of morbid susceptibility and vital resistance. It also enters into sympathy more or less easily. Even when, in one of the numerous affections in which cachexias and serous plethora are developed, the latter does not exist, or hardly exists, in spite of the most powerful intrinsic conditions for producing it according to Beau's theory (and such cases are not rare), it is because the apparatus of sanguification aud circulation has resisted these influences, or has been feebly affected by them, and also, owing to a singular degree of vital resistance, has failed to enter into morbid sympathy with the other apparatus, and has thus been able to maintain the integrity of its hæmatosic properties.

Outside of these ideas, and in an iatromechanical system, what can be the meaning of the "consentientia omnia" of the Father of Medicine? This consensus requires an active, special, and spontaneous co-operation of all the organs, of all parts of each organ, and so on *ad infinitum*. A living apparatus never acts by necessity, or it would not be living. It is only excited to it, and according to its native or accidental disposition it co-operates, or resists, etc. The apparatus of hæmatosis and circulation forms no exception to this law. Every machine which acts otherwise is

a machine from man's hand; and such an one is the mill of which we spoke above.

No one would dare say that the morbid plethoras which we have been attending to in the previous section of this chapter are the result of bad digestion. This would be no more exact in the case of these plethoras than in all sanguine dyspepsias, or all the affections in which the blood undergoes more or less profound alterations. The apparatus of hæmatosis and circulation has by no means a passive part in these morbid modifications of the blood; it certainly plays there an idiopathic rôle, and is not limited to the function of an inert gutter for the products of dyspepsia. That which is true of dyspepsias and morbid plethoras is also true of cachexias and serous plethora. The vascular system is there affected on its own account. This is the truth which we have wished to introduce to our readers; in spite of want of fit space to treat it, we hope they will grasp the unity of principle which unites all the features of the coarse sketch which we have just given of plethora and the various other physiological and morbid troubles of the circulation. We hope, especially, that they will see that this is the only possible point of view for understanding the value and the mode of action of bloodletting, and for medically directing its application in these cases.*

In our times pathology and therapeutics do not go together. The science of diagnosis has no great connection with that of medicine proper. This vicious and fatal separation can only be remedied by resuming pathology from the therapeutical point of view, as we are here trying to do. Since medicine or therapeutics are not made for the purpose of diagnosis and pathology, it is necessary to make diagnostics and pathology for the ends of medicine and therapeutics. This method is more natural and just than it seems.

In beginning our remarks on serous plethora we said that this condition might sometimes furnish an indication for local and general bleeding. If in the immense majority of cases it rejects this treatment, an avoidance of error is not always so easy as might be thought. M. Beau, whose very original observations on serous plethora will not perish, finds it plainly proved that this plethora has several of the marks of true plethora. If, among these signs, force and vibration of the pulse, impulse

* The idiopathic affections of the circulatory apparatus seem to play a great part in the Italian school. We say, they *seem* to do so, for the Brownian dichotomism has entirely spoiled this idea among the Rasorians. They consider the vascular system (or rather, the tissues composing it) only as susceptible of hypersthenia and hyposthenia. It is not, then, the apparatus of hæmatosis and circulation that is, for them, susceptible of idiopathic affections, since they regard it as a mere compound of irritable tissues, and not the organ of a special function, which as such may be ill. It is hardly better to admit a subarteritis in chlorosis or hypochondria than it is to convert them into gastritis. In fact, in both cases, in the Italian as well as the French physiologism, two fundamental truths are neglected: 1, the principle of the proper life of the organs and their spontaneity; 2, the specific distinction between diseases; and without these truths there is no pathology or nosology possible.

of the heart, sometimes due to a certain degree of hypertrophy in the walls and of dilatation of the cavities of the organ, dyspnœa, giddiness, etc., are observed, a bleeding might seem advisable. But the existence of arterial bruits, pallor, etc., will dissuade. Yet we have seen chloroses without pallor, and even with a persistent and very brilliant facial color, which might easily have misled to the performance of bleeding.

What are the rare cases which call for bleeding?

First, in the serous plethora observed in organic affections of the heart in their last stage. It is often the only means of solacing the patient, of assisting the circulation and respiration, and putting an end to a multitude of accidents dependent on embarrassment of these functions. The mode of origin of serous plethora in these diseases would present many arguments in favor of the general theory which we have proposed, while the opposite theory would only meet with objections.

In the second place, bloodletting may be indicated in certain conditions in chlorosis.

Iron does not cure chlorosis and chlorotic serous plethora as surely as a good diet does post-hæmorrhagic serous plethora. This is because the latter is not a disease. The chlorotic state will be improved, apparently cured by the ferruginous drugs. The use of the latter is suspended, and the symptoms reappear; the symptoms are expelled again by the same means, but less easily; a third time it is still harder, and a fourth time it fails. Then, if there is vascular plethora in a strong constitution, free from all organic lesion, either completed or impending, and especially if there is no disappointment or moral affection—the hidden influence of which so often explains the rebellious character of chlorosis—then a small bleeding does good, and may make the apparatus of hæmatosis and circulation freshly sensitive to the action of iron.

The efficacy of this remedy has been explained by its stomachic virtues. This is a systematic necessity. We do not deny these properties, but we think them secondary. It has been explained chemically, by substitution or juxtaposition, as if the ingested iron replaced that lost, molecule for molecule. But first, how is the iron in the blood lost in chlorosis, and by what way?

It seems to us that iron acts directly upon the hæmatosic properties of the vascular apparatus, as nitre does on the uropoëtic properties of the kidneys, iodine on the alterant properties of the lymphatics. It is a substance which is specially related to this apparatus. It directly excites sanguification and particularly assists the formation of cruor and the development of the stimulant properties of that element of the blood. In certain cases the circulatory apparatus is rebellious to the action of iron, and then a modifier of that apparatus, like bleeding, may restore its susceptibility to this metal.

Here are facts inexplicable upon any other theory than ours. If the circulatory system has a special modifier which acts directly on sanguification, it is because it has some other properties than those of a carrier

of blood. If this apparatus is sometimes sensitive, and sometimes not, to the action of the modifier, it is because it is not passive in the treatment; and yet it ought to be so according to the theory which considers it as a simple stomachic. From the moment when the hæmatosic properties of iron preparations are relative and subordinate to the vital state of the circulatory apparatus, it is proved that this apparatus governs hæmatosis, and that iron acts not as a direct repairer of lost material, but as a special excitant to such repair.

Finally, serous plethora and the congestions which go with it may be usefully palliated by small general bleedings, particularly local. We refer to hypochondria, especially in women.

This cachexia has no special remedy like chlorosis. Iron is generally harmful in hypochondria. Why? It is not plain, if we only consider cachexia as a result of dyspepsia. We can never produce an hypochondriacal cachexy, for instance, by lessening the quantity or changing the quality of the food. In many dyspeptic persons there is neither cachexy nor serous plethora. There is no more reason to give for the efficacy of iron in chlorosis and its worthlessness in hypochondria than there is of the curative effect of mercury and the uselessness of cinchona in syphilis; or, conversely, of the value of cinchona and the worthlessness of mercury in marsh fevers.

We see hypochondriacs who have all the symptoms mechanically attributed to serous plethora, in whom this plethora by no means exists. Conversely, it exists in others who do not present the symptoms. The most sudden and sometimes the most alarming congestions often occur in hypochondriacal women, especially if the periods are irregular. These congestions are habitually seated in the heart, the uterus, head, intestines; and when they persist with symptoms of irritation, which is common, it is impossible at last to avoid local bleeding. Fever suddenly appears with relative plethora, which bleeding from the great vessels is alone capable of relieving. Yet their blood is by no means rich, though it never shows the same total amount, or the same relative quantity of serum, or the same diminution in the number of red globules, as in chlorosis, as far as we can judge from the physical and physiological characteristics.

We stated above that in pregnant women the globules were less in number. The inference has been drawn that bleeding was inadmissible in pregnancy. But anatomical facts must yield to clinical; the converse would ruin medicine, and establish anatomy as the basis of pathology and treatment.

Do pregnant women often present symptoms of plethora and indications for bleeding from the great vessels? Does this evacuation, if based on solid clinical indications, put a stop to these symptoms? If these questions are answered affirmatively, by experience, bleeding must be performed in spite of a deficiency of red globules. How do we know that this deficiency is an absolute contraindication? Is not pregnancy a physiological state? If the globules are constantly lessened in it, there is a

law, a need connected with the fact. It does not then present the character of a disease. It is certain that the globules are less important in nutrition than some other elements, as fibrin. These formative elements, these plastic parts, in which the blood of a woman ought to be rich during gestation, are in excess; there is a sort of plethora. The hæmatosic power may be manifested by an excess of formation in other elements than the globules; and this is precisely what takes place in these special circumstances.

Yet it is certain that bleeding is abused in pregnancy. If the knowledge of the fact of the diminution of the corpuscles has no other effect than that of restraining such an abuse, it cannot be too strongly recommended to physicians to bleed in this case only when neither time, nor patience, nor substitutes, are successful against the symptoms of plethora.

In the first period of pregnancy, many women fall into a state analogous to chlorosis; it is also certain that in the second half, many become plethoric and suffer from troubles which only bleeding can relieve. Is a diminution of globules an absolute reason for depriving them of this benefit? We think not, in spite of the specious facts of anatomism. This system, driven from the pathology of the living tissues, re-enters by the side of the liquids, and for some time has been plaguing us with all the errors of which medicine thought itself purged. Many liberals declaim against anatomism, who will have to bear its yoke all their lives.

One of the most interesting and useful points of view for studying plethora, is that taken by Stahl. The movements and modifications of the apparatus of hæmatosis and circulation, according to age, form one of the most important subjects of general pathology and therapeutics. There are contained the most convincing proofs of our doctrine; and they are furnished by Stahl, who has systematically considered this apparatus only a pump and a sieve, but who, notwithstanding, overflows with admirable observations to prove the contrary.

How can such important modifications, revealed by such spontaneous and independent phenomena, occur in an apparatus which is purely passive, and receives only foreign impulses? How can we imagine that in such an apparatus acts can be performed which, far from submitting to the law of the other parts of the system, impose their own upon it? And what, then, is the sanguine temperament, if it does not spring from the dominant influence of the circulatory apparatus upon all the others? How, again, does a passive apparatus, receiving everything from without and drawing nothing from itself, impress its character upon all the rest, even on the parts from which it is supposed to receive its materials and its action?

It is in persons of this temperament, who, as we have repeatedly said, are not all robust and rosy, that it is desirable to know how to direct and modify the movements of the circulatory apparatus at the different ages.

We cannot better close than by quoting the opinion of that great physician who founded the medical doctrine of plethoras, congestions,

and hæmorrhages, and who laid down the laws for bleeding in such cases:

"Profusiones sanguinis vagas, sine temporis et affectuum morbosorum exquisita observatione, nulla ætas ferre potest. In ipsis morbis, raro locum commodum, nedum ullam necessitatem et vix unquam ullum memorabilem usum habent.

"De moderatis autem, opportuno tempore, justo et conveniente loco, et præservativo magis quam curativo, ordine atque scopo prudenter institutis, ventilationibus sanguinis, non solum, in quadragenariis et quinquagenariis, sed usque in septuagesimum annum perite adhibendis, totus ob Autore discedo: si nempe ille etiam tales ventilationes seu venæ sectiones molestas in genere, talibus ætatum gradibus, nocituras interpretetur.

"Fæminino sexui, post cessationem per ætatem mensium, in constitutione corporis vegeta, habitu pleno, plethorico, et pleno atque lauta diæta et otiosa insuper et deside vitæ ratione, animi autem iracunda intemperie varia sanitatis decrementa evenire, passim observatur. Tanto magis, si fœminæ, progressa ætate, liberiori atque largiori evacuationi menstruæ adsuetæ fuerunt.

"Tales fœminas nihil usquam æque præservat ab impendentibus valetudinis turbationibus, quam justo tempore et justo loco instituta, moderata sanguinis ventilatio. Nihil magis medicationum variarum necessitatem præoccupat; aut idoneis remediis, faciliorem bonum successum et effectum quasi præparat, et aditum planum atque viam pandit.

"Viros, circa quadragesimum aut quinquagesimum annum ætatis, ischiadici et coxendicum dolores, gonagra, podagra, magis legitimis initiis invadunt. Augescunt et insolescunt, etiam ulterioribus annis: hæmorrhoidalia pathemata iisdem temporibus ludunt scenas suas, vel occultius, vel manifestius. Nephritis etiam, præcipue jam calculosa, in eadem tempora incidit.

"Talibus quantum conducant sanguinis ventilationes temporibus et locis opportunis, ego certo scio, qui tali remedio, exemplis luculentis, aliquot viros conspicuos, ita a podagra liberavi, ut ad 8, 10, 16, 20 annos, a malo, nec non amplius tacti, nedum vexati etiam hodieque, largiente divina gratia, liberi vivant: ad aliquot supra 60, imo 79 annos.

"Exemplum, Deo sit laus, me ipsum sisto: cœpi venæ sectioni me addicere, medici vel consilio, vel consensu, anno ætatis meæ decimo septimo. Continuavi hujus usum bis per singulos annos. Præterito mense novembri 1727, ingressus jam sexagesimum nonum annum, venæ sectionem admisi centesimam et secundam, nunquam sine levamine corporis, et subsecuta velut alacritate virium, ad ipsum sensum percepta. In corpore gracili magis quam robusto, tot annorum decursu, benedicente Deo, sanus certe a morbis qui lecto affigunt liber et immunis, levi coxendicum dolore aliquoties tactus, sed qui, nec in publico versandi remoram objecit, neque multorum dierum pertinaci duratione notabilem molestiam creavit.

"Non urbes, sed regiones, provincias, quin regnum nominare possum; ubi de tali meo consilio in quadragenariis, quinquagenariis et ultra viris,

locum et usum nacto, gaudia atque gratulationes Deo benedicente celebrantur: et exoptatæ valetudinis manifesta levamina sentiuntur: quæ diversis artificiis, hoc consilio seposito, ita inclinavit, ut aliquoties propioris gravissimi exitus metus mentes perculerit."

We have not the systematic reasons of Stahl for advising bleeding as a preventive of chronic non-fatal affections, which are developed in men from the beginning of virility down to old age. We doubt if the continual nervous superexcitation of the agitated life of our large cities, in France in the nineteenth century, would tolerate such frequent bloodletting. Stahl paid tribute to the mechanical ideas of circulation which Cartesianism imposed upon him. He had built his entire system of pathology upon the irregularities of the course of the blood, here viscous and stagnant, there rapid and more fluid. We can see the necessity of evacuating the vessels frequently, to remedy such vices of circulation.

At the side of the systematically mechanical Stahl there was, fortunately, another Stahl. The latter suspected irritability; he declared that the observation of the natural progress of acute diseases, of the successive formation of chronic diseases and their transformations, was the pathology itself and the torch of therapeutics; following Hippocrates, he regarded prophylaxis as the true, the great medicine, and if he had come two centuries later he would have been capable of founding it.

The successive predominance of sanguine congestion in different apparatus of the system, according to the different ages, which the genius of Stahl had so admirably observed, and which Stahl systematically so ill applied, is a final proof, not only of the life of the circulatory system considered in its totality, but as composed of an assemblage of small vascular systems belonging to each organ. It is beyond doubt that each department of the capillary system possesses special properties, according to the organ to which it is distributed. The only things possessed by all in common are the heart, the large trunks and their chief divisions.

In closely analyzing each apparatus, the vessels become an essential part of it, and their properties are necessarily diversified, according to the functions which the apparatus fulfils. Each of them has its circulatory system, which may have its own affections, independent of the general system of circulation to a certain degree. This is the physiological meaning of Stahl's great observation.

In the doctrine of the special life of the organs, as sketched by Van Helmont and revived by Bordeu, who did not generalize its principles, and therefore failed to draw all its inferences, each organ is regarded as a little whole, a sort of animal living its own life, which has its distinct circulatory apparatus like another different animal.

In order to apply this conception to the higher zoölogical species, it must be modified, so that this multitude of minor systems shall have but one centre and regulator, charged with ensuring the harmony and unity of the general system. But, in the lower orders, this action requires little modification; it is almost rigorously true. The works of Edwards,

Quatrefages, etc., upon the vascular system of the mollusca, show a sort of federative circulation in these animals. Each organ has a circulatory centre, and vessels of various anatomical structure. These organic differences correspond to functional differences. Professor Charles Robin has said that, in the case of the fishes, the texture and form of the vessels vary singularly in the different organs, so as to form little independent vascular organs, as it were. Besides, anatomists have observed that in man the capillary vessels possess a great variety of arrangements in their ultimate distribution, variable patterns, which are very definite and constant in each organ. Anatomy, physiology, and pathology, therefore unite to form for partial congestions or plethoras a theory entirely different from that which is commonly taught, and with which the hearer is ignorantly satisfied.

Capillary bleedings, performed in simple or inflammatory congestion of an organ, have no meaning except in our theory, and therefore have none in the Harveian system of circulation. From the latter point of view, general bleeding is the only legitimate kind, and ought to be the only salutary kind. So when iatromechanics ruled systematically in therapeutics, phlebotomy alone was practised. Capillary bleedings are to the vascular system of an organ that which general bleedings are to the great circulatory system. Their respective effects are also the same. Thus Broussais was consistent with himself when he, a partisan of the primitive localization of diseases, gave much more room in his system to local than to general bleeding.

Each organic department of the great circulatory system is, as regards this apparatus, in the same relations of relative dependence and independence in which the great circulatory apparatus stands in regard to all the others, especially that of digestion.

There are persons in whom partial congestions or plethoras may be durable and intense without the general system of the circulation being shaken or entering into sympathy; and others in whom this association is made most readily. Conversely, certain persons cannot experience the least febrile movement or overexcitement of the general circulation without the special vascular apparatus of a great many organs being seized by local febrile plethora which complicates the general fever with a greater or less number of congestions. The latter may present special indications independently of those which should be drawn from the fever or the state of every system. In other persons the contrary is true, and none of the small circulations respond to the excitement of the great. In a third case one local plethora (morbid or otherwise, but almost always morbid) arouses a crowd of others which respond to it, without any observable intermediate link of febrile state, or any excitement of the great circulation.

Any one used to reflecting upon these facts with an independent mind will see in them the justification of the general ideas professed in this study of plethora. What arguments might we not form in favor of this

doctrine, from the observation of the various kinds of pulse in the diseases, and in that of all the circulatory anomalies?

The facts on which the iatromechanicians so confidently rest to prove the passivity of the vessels in circulation, the apparent inertia of the arteries and veins in vivisection, is, we can tell them, a feeble basis, which better-founded experiments are every day destroying.

The proper life of the vessels once demonstrated, a new era will open for physiology and medicine. But the reformation which will follow in these two sciences will only then be complete and intelligible, when the second truth, complementary to the first, shall be proved, namely: that the nerves, as related to the nervous centres, are no more conductors of a fluid discharged by those centres than are the vessels inert tubes for passively conveying the waves of blood driven by the heart. The latter is only the regulator of the circulation, the central organ representing this multiple function, the unity of which it assures and maintains. Is not this what the nervous centres also do in regard to all the nerves and sensitive and motor apparatus, of which they contain all the properties in an eminent and representative way?

It is to comparative anatomy and embryology that the task belongs of completing these demonstrations, and of thus creating a new physiology in which nothing shall remain of the old except the facts.

CHAPTER VI.

EVACUANTS.

I. EMETICS.

§ 1. *Vegetable Emetics.*

Ipecacuanha.

Dysentery.—Pison, who first made ipecacuanha known, calls it "Sacram anchoram, quia nullum præstantius ac tutius, in plerisque alvi fluxibus, cum vel sine sanguine, compescendis, natura excogitarit remedium." Its reputation in the treatment of dysentery and fluxes was so great that it was termed the "anti-dysenteric root." This property was recognized almost without question down to the end of the last century, and was stated in the writings of almost all the best authorities. Given in season, that is, during the first few days of the disease, when the discharges are bloody and there is no sign of gangrene of the mucous membrane, it quiets the colics, lessens the number of stools and the amount of bloody discharge. The remedy is given three or four times, at intervals of six, twelve, twenty-four, forty-eight hours, according to the effect of the first administration. It is safe to give it for one or two weeks or more, if the symptoms are not very severe, and if the general health and, especially, the digestion are nevertheless greatly disturbed.

The effect of ipecac in dysentery is more certain if it causes purging. When it does not purge, it has less effect, and Cullen even denies that it has any; he considers its action to be due to its laxative property ("First Lines of the Practice of Physics," vol. III., p. 115).

The mode of administration should be studied with care; and if in our day it is charged with inefficacy or danger, by those who neglect the method laid down by their predecessors, the blame falls on themselves

Pison (see Cullen, "Mat. Med.," t. II., p. 477) directed 8 grammes (ʒ ii.) of the root, infused or boiled in 120 grammes (ʒ iv.) of water; if necessary, this dose was to be repeated. He seemed to rely chiefly on the purgative effect, but regarded vomiting as also useful. Degner ("Dissent. bilios.," p. 131) gave to adults 2 or 3 grammes (gr. 30—45) of the powder. Pringle ("Dis. of the Army") gave 1·20 gramme (gr. 18), and for strong adults added 5 or 10 centigrammes (gr. 0·7—1·5) of tartarized antimony. If the colics were very violent, he gave 25 centigrammes of the same pow-

der (gr. 4) every hour till diarrhœa followed. Hillary ("Air and Diseases of Barbadoes") gave 15 centigrammes (gr. 2·2) every three hours, till purging followed. Cleghorn's method ("Diseases of Minorca") hardly differs from that of Hillary.

Helvetius gave ipecac as follows. From 4 to 8 grammes (ʒ i.—ii.) of broken ipecac were put into 250—500 grammes (ʒ viii.—xvi.) of boiling water, and steeped twelve hours. This infusion was given on the first day in several doses; it usually caused vomiting, which was aided by drinking warm water. The remainder was then infused several times in the same way; the second and third time it did not usually cause vomiting, but stools unlike those of the preceding days; they contained less blood and epithelium, resumed consistency, and soon contained bile and became properly fæcal. Spielmann and Delioux de Savignac replaced the infusion by the decoction, adding to it aromatic substances, and make the drug last three days as before. This Brazilian treatment, used with prudence by our colonial physicians, has been of the greatest use. M. Bourdon, in a sporadic case and three chronic cases, substituted injections of ipecac (*Polychronie*, Thèse de Paris, 1874).

Diarrhœa.—To the simple diarrhœa which accompanies a saburral condition of the stomach (which we will explain in the general article on Evacuant Treatment), ipecac puts an almost immediate end. In this case it is given in an emetic dose, 1·20 gramme (gr. 18) in four doses with ten minutes' interval between each.

But in chronic diarrhœa, when there is no reason to think that it depends on tuberculous phthisis or simple ulcerations of the mucous membrane, ipecac is given in small doses, 5 or 10 centigrammes (gr. 0·7—1·5) every two hours, in a proper vehicle, so as neither to cause vomiting nor purging.

MM. Monnard frères, physicians in our African possessions, added calomel and opium to ipecac in chronic diarrhœa. They use the following:

℞. Calomel	30	centigrammes	(gr. 4·5).
Ipecacuanha	60	"	(gr. 9·0).
Opium	10	"	(gr. 1·5).

M. F. pil. ix. First day, four pills in the morning, from hour to hour; two in the evening. Second day, the same. Third and fourth days, four pills. Fifth day, two in the morning only. The treatment rarely lasts more than a week. Suspend it, if salivation occurs in a few days. Give also an opiated draught at night.

Diarrhœa of children.—We find this complaint greatly benefited by one daily dose of the following powder:

℞. Calomel	0·01	gramme	(gr. 0·15).
Ipecacuanha	0·05	"	(gr. 0·75).
Sugar	1	"	(gr. 15).
Sydenham's laudanum	1 drop.		

Bourdon has been very successful with this affection in newly-weaned children by using injections prepared as follows by M. Legrip: Take 5 grammes (gr. 75) of powdered ipecac, boil three times consecutively, using 80 grammes of water (℥ iiss.) each time; mix the waters, and boil down to ℥ iv. This fluid is given in two injections on the same day. The number of injections required for a cure varies from 3 to 12 (Chouppe, *B. de Thérapeutique*, 15 juin, 1874).

Asthma.—Catarrh.—The influence of ipecacuanha on the respiratory organs is very remarkable. We know at Tours and Saint-Germain-en-Laye, two pharmacists who had attacks of asthma whenever the bottle of powdered ipecacuanha was opened in their shops. In the *Transactions philosophiques abrégées* (t. II., p. 69) an exactly similar case is given. The pathological laws which we gave under Substitutive Treatment explain, to a certain point, the good effects of ipecacuanha in nervous and moist asthma; but, whatever the explanation, we must admit the fact. Experience shows that in chronic catarrh, accompanied by nervous symptoms, ipecacuanha, in very small and very frequent doses, aids expectoration and lessens the oppression; in dry, nervous asthma the attack is sometimes at once arrested by a puke of 1½—2 grammes (gr. 22—30). In habitual dyspnœa, even when connected with pulmonary emphysema, or a cardiac disease in an early stage, the habitual use of pastilles of ipecac gives relief, which cannot be explained by the secretory revulsion upon the gastrointestinal mucous membrane, since when thus given it rather constipates than purges.

There is another application of the emetic effect, which is very common, in which the act of vomiting is made to exercise a sort of massage upon the lung. This singularly helps expectoration in young children, especially those at the breast, who cannot spit. Ipecac perhaps also has an expectorant and a decongestive action on the lung.

For adults we very often use this remedy when the bronchial secretion is abundant with a certain atony of the bronchi: for example, in general acute bronchitis, in capillary bronchitis, in the relapses of chronic bronchitis which constitute moist asthma, when associated with pulmonary œdema, etc. This remedy is, so to speak, the rule in the bronchitis of emphysematous patients, and is almost always followed by speedy improvement in the disease, while it almost immediately lessens the dyspnœa; we shall speak again of it under Emetic Treatment.

Whooping-cough.—The results are equally good here. In the first month, it is well to vomit children every other day with 40 or 50 centigrammes (gr. 6—7½) taken in one dose; smaller doses will be useful later. This will not cut down the disease from two and a half or three months to two weeks, but will make the attacks shorter and less frequent, will lessen the frequency of pulmonary inflammation, and will keep up the appetite, which is, we think, extremely important.

Phthisical diarrhœa.—Dr. Bourdon communicated to the Société de thérapeutique (séance du 25 mars, 1874) the good results he derived from

injections. M. Féréol likewise succeeded, at the Maison de Santé, by using a decoction of 5 grammes (gr. 75) in 250 grammes (Oss.) of water. We have also used this prescription, and have found it always valuable when the patient had not reached the end of the hectic stage, that is, nearly the agony. We also used on the first day a decoction of 5 grammes (gr. 75) in half a pint of water. On the next day a second injection was made with the same powder in the same quantity of water, and on the third, it was treated again. We do not mean that the decoctions all had the same value; there is a considerable difference between the first and the others; but, as the diarrhœa was often arrested the first day, it was economical to use the ipecac again. The diarrhœa, thus arrested, did not return for several days, and in certain conditions for several weeks. This is readily seen to be a precious resource for consumptives.

M. Bourdon has used the same remedy for twelve phthisical patients troubled with night-sweats, and has checked them several times.

Puerperal state.—If the Brazil root deserves the name of a specific, in a certain sense, for dysentery, it is no less heroic in the puerperal state, or rather, the diseases which complicate it.

In a state of things such as exists in our country, where pathological anatomy has invaded pathology, it is rather unusual to claim a place in nosology for that which is called "the puerperal state;" but, singular as is this denomination, we are forced to adopt it for want of a better, and our readers will perhaps agree with us when we have explained ourselves.

Pregnancy, though a physiological state, produces a profound systemic disturbance. At the beginning the menses are suppressed, the breasts enlarge and the areolæ turn brown; the blood is impoverished, the red globules diminish, the white globules increase, the fibrin is modified and seems to increase, and this anæmia is often betrayed by a bellows-murmur at the base of the heart.

The appetite is greatly altered, vomiting occurs, the liver becomes fatty, the heart increases in volume. The urine contains considerable amounts of calcareous phosphates. The nervous system and the intelligence are exalted or depressed and strangely perverted. At the moment of parturition, a sudden change occurs, accompanied by circumstances of the most disturbing sort. The abdominal viscera had been crowded; the fœtus is suddenly discharged, and the circulation is at once relieved of considerable embarrassment. A very abundant hæmorrhage always occurs at confinement: and to this add the exhaustion caused by the acute pain and prolonged efforts.

This combination of circumstances is ordinarily enough to place the system in a bad condition. But this is not all; the placenta, violently detached from the uterine surface, leaves a suppurating wound, for the lochia are a true suppuration; while an active febrile fluxion to the breasts occurs.

We ask if there are many morbid scenes as complex as that of parturition; and if the woman is not in a very peculiar state, in which she is accessible to a thousand causes of disease, and suffers a multitude of disorders of various severity?

We use the term "puerperal state" to designate this group of special conditions which surround the newly-delivered woman.

We say special conditions; and this is not hard to prove. First, parturition, that very special morbid cause, would suffice of itself to constitute the specialty of the puerperal condition; but if we descend from causes to effects, we shall see that the influences of the puerperal state upon the economy are all special. For greater simplicity, let us take the pathological order. In what other case do we see a phlegmasia of the pleura, peritoneum, pericardium, meninges, pass almost instantaneously to suppuration and destroy life with lightning rapidity? In what conditions of the economy do we see all the veins of the system simultaneously inflamed? If it is replied that these accidents are seen (though very rarely) in other cases than that of parturition, we reply that this rarity, as compared with the frequency in parturition, prove the special nature of the latter still more clearly.

The chief characteristic of the puerperal state is the tendency to be influenced by morbid causes which the system would easily have resisted in any other circumstances.

Experience shows that almost all the slight symptoms which go with the puerperal state are banished by ipecacuanha; we do not speak by the authority of books, but from what we have seen and done. For a great many years, while we attended women at the Hôtel-Dieu of Paris, including a great many accouchements, we never failed to give ipecacuanha to patients recently delivered, whatever the local affection they were suffering from; and we can here say that we never saw the least bad symptom result from this practice; on the contrary, in the majority, we obtained cure or a decided improvement. We saw this practice followed by Récamier; it was used by this excellent practitioner for nearly forty years at that hospital.

The slight troubles of the puerperal state are mostly gastrointestinal phlegmasias, characterized by anorexia, bitterness of the mouth, nausea, constipation and diarrhœa; in the generative organs, suppression of the lochia, subacute metritis, inflammation of the cellular tissue of the iliac fossa, or the peritoneal culs-de-sac; in the thoracic organs, bronchial catarrh, subacute pneumonia. These troubles rarely fail to disappear, or to be greatly simplified after the use of 1·3 to 1·5 grammes (20—23 grains) of ipecac, taken in four or five doses, at intervals of ten minutes. But when there is a very extended local lesion, as an inflammation of the uterine sinuses, a general phlebitis, a grave peritonitis, a very intense pneumonia, a meningitis, ipecacuanha often moderates but hardly ever stops the trouble, even when given at the very outset. But in a puerperal epidemic that reigned at the Hôtel-Dieu in 1782, Doublet was remarka-

bly successful with emetics of ipecac given at the commencement of the disease, and repeated several times in the course of the affection (*Anc. Journ. de méd.*, t. LVII., p. 448 et 502), and more lately, Désormeaux proved the efficacy of this medicine in an epidemic of puerperal peritonitis of most fatal character in the Maternité of Paris, where the remedy was given while the first morbid symptoms were appearing.

Hæmorrhages.—The anti-dysenteric properties of ipecacuanha placed it among astringents, wrongly as we think; it was thought proper to try it in hæmorrhages. Baglivi calls it "infallibile remedium in fluxibus dysentericis aliisque hæmorrhagiis;" others, including Barbeyrac, Gianella, and particularly Dalberg (Murray, "App. méd.," t. I., p. 822), praise it for menorrhagia, hæmoptysis, and excessive hæmorrhoidal flow. We have repeatedly given it successfully in uterine hæmorrhages, but usually in cases connected with the puerperal state.

Hæmoptyses.—We continue to use ipecac in emetic doses in pulmonary apoplexy and hæmoptysis. We direct the patient to be as quiet as possible, to observe absolute silence, to repress the slightest effort at cough; we allow nothing in the way of effort beyond breathing. It would seem as if hæmoptysis would reappear in increased amount during emesis, but, in almost all cases it stops. This may be explained by the fact that, in animals poisoned by emetine, M. Pécholier has found the lungs remarkably bloodless.

Gastric embarrassment ("*embarras*").—This complaint, or rather the subacute catarrhal hepatitis so called, is one of the most frequent indications for emetic treatment. We will speak of it under Emetic Treatment.

Polygala.

We have placed this root next to ipecacuanha, though no author has classed it with emetics; Cullen, in his "Materia Medica," considers it as purgative only. Our reasons are the following:

The experiments of Bretonneau (of Tours) have shown that the two have almost identical properties, if identity between two drugs be possible. He found that when applied to the skin deprived of epidermis, the cellular tissue, or the conjunctiva, the powder of polygala caused a violent local inflammation, exactly like ipecac; that animals vomited immediately after swallowing it; that if placed in the rectum or vulva it caused a violent inflammation of the mucous membrane; that in man, it was an emetic like ipecac, but required about three times as large a dose.

Our predecessors in medicine found exactly analogous properties in the two plants, excepting in dysentery, in which polygala was not tried; the latter was not used for the troubles of the puerperal state, but its purgative, pectoral, and diuretic properties were universally admitted, as in the case of ipecacuanha; in our own experiments we have found

no special virtue in polygala. We will, however, indicate briefly what preceding authors have said.

Tennent, a Scotch physician, who practised several years in Virginia, had seen the Indians using polygala with advantage in cases of rattlesnake bite. As this poison causes grave inflammation of the organs of respiration, Tennent conceived that the remedy might be of use in acute chest complaints due to ordinary causes. He gave polygala in acute pleuro-pneumonia, taking care to bleed once first. He had remarked that polygala vomited and purged. When his works became known in France, Lémery, Duhamel, and Jussieu, who were far from being physicians, gave to his ideas a sanction which to us seems unimportant; but Bouvard, Linnæus, Perceval, Detharting, also cited observations which proved that polygala, if not valuable in acute pleuro-pneumonia, was at least useful in chronic catarrh.

According to Bretonneau, polygala has a special action on the inflamed mucous membrane of the air-passages, in which it modifies and increases the secretion. A great many observations showed him that, immediately after the administration of polygala in fractional doses, the mucopurulent discharge of chronic catarrh, either simple or complicated with tuberculous pulmonary phthisis, became more fluid and abundant. The suspension of the medicine was followed by a change to the opposite, so immediately as to leave no doubt. This is particularly the property which has led to the addition of polygala to calomel in croup, especially when dryness of the mucous surfaces, as indicated by the dryness of the cough, seemed to have become the chief obstacle to the expulsion of the false membranes (Bretonneau, "Traité de la Diphthérite," p. 241). Archer, Hardford, Valentin, and others before Bretonneau praised its virtues in croup; but as their diagnoses were very bad, we can base nothing on their statements.

Violets.

The roots of the different species have almost identical properties; we will speak only of v. odorata.

The roots are singularly like those of ipecacuanha, but are finer and whiter; this physical resemblance extends to their internal properties.

Bretonneau's experiments showed that the powder of the root, placed on the denuded skin or the mucous membrane, gave rise to exactly the same symptoms as powdered ipecac or polygala.

Linnæus stated that these roots were substitutes for ipecacuanha, but the experiments of Coste and Willemet ("Mat. méd. indig.," p. 6) showed that powdered violet root in the dose of 2 grammes had caused emesis and three alvine discharges; that 3 or 4 grammes (gr. 45—60) vomited as many as six times. They thought that it might be a useful substitute for ipecacuanha, as an emetic; they even ascribed to it virtues in dysentery, another point of resemblance to the Brazil root.

It is very likely that the ideas of Coste and Willemet are well-founded; for a recent chemical analysis has demonstrated in the violet root an alkaloid analogous to emetine, which Boullay proposes to call émétine indigène ("Mém. de l'Acad. roy. de méd.," tom. I., p. 417).

The roots of pansy (v. tricolor), wild pansy, heartsease, have emetic properties like those of v. odorata. The infusion of the whole plant is said by Bergius ("Mat. méd.," p. 709) to purge, and sometimes to vomit; the dry plant is a very gentle purge for children, when given in a decoction of 16 grammes (℥ ss.) to a pint of water.

From these properties may spring the popular notions as to its virtues, which have prevailed for centuries; for the wild violet is thought to be one of the most potent depuratives in the materia medica. Matthiole ("Comm. in Dioscorid.," p. 822), Fush ("Hist. stirp.," p. 804), Bauhin ("Hist. plant.," t. III., p. 547), relate various things of the powers of the leaves and stalks of wild pansy in chronic cutaneous diseases. But the plant seemed to be forgotten until Starck ("De Crusta infantium ejusque remedio," Francof. ad Mæn., 1779) performed a series of experiments which showed that it had a remarkable value in affections of the skin; he ordered it chiefly in the affections vulgarly called "milky" in children, popularly comprised under the generic term "gourme," which may be impetigo, or eczema, or more rarely a lichen, or a true favus.

Murray ("App. méd.," t. I., p. 789) gives a numerous list of physicians who have found advantage from the use of wild pansy in treating the crusta lactea of children. Examples are not wanting to show its curative powers in various affections of the hairy scalp in children and adolescents.

The majority of authors who have written on this important point of therapeutics observe that the disease increases remarkably at the beginning of the treatment; also that the urine becomes extremely fetid in most cases, whether that the crisis occurs through the urinary passages or that the pansy gives a fetid odor to the urine, as turpentine gives the smell of violets.

Haase ("Dissert. de viola tricol.," Erlangen, 1782), who spoke with perhaps hasty enthusiasm of wild pansy, and who pays so solemn a tribute to its virtues in the above diseases, considers it as the best remedy for dartres in general, that cohort of skin-diseases which has received so many denominations from modern dermatologists.

Other physicians there have been who found in it but few curative properties, and some who found none; whether that some exaggerated greatly, or that others used less care and patience than was desirable in their experiments.

Murray, however ("App. méd.," t. I., p. 792), throws his imposing authority into the scale, and declares that he has himself found wild pansy useful in the circumstances indicated by the authors above cited.

We must add that the remedy has been used in chronic rheumatism, constitutional syphilis, and all organic diseases requiring a depurative (Murray, loc. cit., p. 793).

Mode of administration, and doses.—Starck gave to children wild pansy boiled in milk; he did not state the dose. Wendt directed a handful of the herb to a quart of milk. Murray (loc. cit.) prescribed for a child of one year 8 grammes (ʒ ii.) to 192 grammes (ʒ vi.) of water, to be reduced considerably by boiling; a suitable quantity of the decoction is put in boiled milk for the day's use. Broths are made with this milky decoction. Decoctions are also made with 32 grammes (ʒ i.) of dry pansy, or a handful of the fresh, to 1 kilogr. (quart) of water, reduced to half a pint. To give a flavor, it is poured, while boiling, over anise-seed, coriander or fennel. The powder can also be given in the dose of 8 to 16 grammes daily, mixed with honey; the extract in the dose of 4, 8, even 16 grammes (ʒ i.—iv.); the juice of the fresh plant is prescribed in the dose of 125, 200, 250 grammes (ʒ iv.—viii.) daily.

Asarum.

The root and leaves are very powerfully irritant. Placed in contact with the denuded cutis or the mucous membrane, they cause a very acute local inflammation, exactly like polygala, ipecacuanha, and violet. It also makes an excellent sternutatory, like the latter plants, and is often used for this purpose.

Before the discovery of tartar emetic and ipecacuanha, powdered asarum was the most usual emetic. Linnæus proved that the leaves, in fine powder, had more energetic properties than ipecacuanha, which was confirmed by Loiseleur-Deslongchamps. It purges at the same time that it vomits.

Nothing special is noted by authors in regard to its properties, except that it has often been used with a culpable purpose as an abortive.

The leaves and root form a sternutatory which excites the olfactory mucous membrane very violently, and has been used in obstinate headaches, and to recall to the nostrils an habitual discharge, the cessation of which coincided with the development of a new disease. It has even been used as a topical irritant of the external meatus to cure deafness.

Apomorphia.

Physiological action.—The muriate has been given by the mouth, and by injections into the subcutaneous cellular tissue. The doses used in men have usually been 3 centigrammes by the mouth or one by subcutaneous injection (gr. 0·45, gr. 0·15). In the latter case a one per cent. solution is first made. This solution is incompletely limpid, a part of the salt remaining undissolved. If it be injected, apomorphia does not irritate the subcutaneous tissue, nor even form a lump. If a perfectly limpid solution is insisted on, muriatic acid may be added, but in as small a

quantity as possible, since an acid solution might be an irritant. The solution changes quickly in water, which is not surprising if we remember that apomorphia is obtained by subtracting from morphia two equivalents of water, and that this unstable substance, in the presence of water, tends to take up the water it had lost. Hence in practice the solution should be made at the moment when we wish to perform the injection, and solutions made in advance must be suspected.

Apomorphia, used as an emetic, seems to confine its action to the stomach and not to affect the intestine, for diarrhœa is not observed, as after the use of ipecac or tartar emetic. In much larger doses it does not appear toxic; 205 centigrammes have only a temporary effect on dogs; Kohler, of Halle, even claims that the fatal dose begins with 0·4 gramme (gr. $6\frac{1}{6}$).

In man the dose required to produce vomiting begins at $\frac{1}{2}$ centigramme and goes up to 3 centigrammes (gr. 0·077—0·46); the medium dose for adults seems to vary from 10 to 15 milligrammes (gr. 0·15—0·22). The solution has no local irritant effect and subcutaneous injection is not painful. In five or ten minutes the phenomena of absorption begin. If the dose injected is not enough to cause vomiting, the patient turns pale and his circulation becomes slow; we have seen the pulse fall from 72 to 48. Then he becomes faint, sweats abundantly, the eye becomes dull, the strength fails, the pulse becomes feeble as well as slow.

These symptoms might excite fear of syncope, but very fortunately they are transient, and the pulse soon rises. The other symptoms disappear little by little, and in an hour's time the patient is relieved and enjoys a very comforting rest. This sedative action will not fail to be used in therapeutics; and we can already say that it has had the most happy effect on a patient with hæmoptysis, which was so abundant and persistent as to be alarming.

When the dose causes vomiting, the symptoms are a little different. There is not lipothymy without nausea, as in the previous case; the nausea is very marked, but lasts a very little while, from three to five minutes, and may even be absent. Some experimenters say that vomiting occurs at once without nausea. In dogs this may be true, for they vomit with the greatest ease; they can perhaps vomit voluntarily.

The vomiting is rapid, but of moderate intensity; its usual effect is simply to empty the stomach, and the contents rarely include bile. The act lasts but a short time, and is usually followed by a marked repose, sometimes by a little sleep.

In brief, there is sedation of the circulation, vomiting, no diarrhœa, influence on the respiration and circulation null, or almost none. As regards emesis, the action is prompt, limited to the stomach, brief, followed by repose.

Treatment.—The above properties lead to the inference that apomorphia would be the best of antidotes if a solution could always be kept ready. A watery solution changes quickly; and if papers of the drug

are kept ready, they are found to be slow of solution in water. Perhaps glycerine will be found a better vehicle to preserve it; we have had muriate of apomorphia dissolved without adding muriatic acid, in glycerine, by a gentle warmth, and have thus obtained a very limpid solution of the color of aquamarine, in the proportion of one per cent., which lasted some days without changing. A Leipzig druggist, Hermann Blaser, has invented a permanent solution, made with syrup of sugar, which needs only the addition of water when required for use.

It is plain that the remedy is of particular value in cases of poisoning, for children, or patients in delirium or coma.

Gastric embarrassment.—When the saburral condition complicates the phlegmasiæ, bronchitis, erysipelas, rheumatism, apomorphia has produced vomiting, but has brought up only glairy matters contained in the stomach; the warm water given by the mouth at the moment of vomiting has not brought on the bilious evacuation. This fact shows the truth of the ideas of Rabelais, who derided those that supposed the tongue to be the mirror of the stomach, and thought a thick layer of saburra could be found on the mucous membrane of the latter organ. One single patient threw no bile until a second dose was given on the day following. Nevertheless the patients were relieved. It is not necessary therefore to replace tartar emetic and ipecacuanha in gastric oppression by apomorphia.

Pulmonary embarrassment.—When apomorphia has been used to simply provoke efforts at vomiting, that is, massage of the lungs, the effect has been satisfactory. It has been so in patients with chronic bronchitis and emphysema, hæmoptysis, pulmonary œdema, and whooping-cough. We will particularly note that in a case of M. Siredey's, with catarrhal asthma, which had become refractory to the action of ipecacuanha, tartar emetic, and even sulphate of copper, apomorphia produced efforts at vomiting, and the expulsion of the viscous fluids contained in the bronchi.

Hœmoptysis.—We have obtained a most remarkable success by treating two patients with severe hæmoptysis with the subcutaneous injection of apomorphia. The sort of massage which vomiting causes was powerfully seconded by the sedative action which apomorphia has upon the circulation.

Poisoning.—After introducing his fingers into the mouth, the physician has no better evacuant than apomorphia.

In brief, apomorphia acts solely by producing vomiting, causes neither diarrhœa nor lasting sedation of the circulation, and consequently no consecutive enfeeblement; it may therefore, in lack of any other emetic, be a resource when we desire to save the patient's strength.

§ 2. *Mineral Emetics.*

Tartar Emetic.

Physiological Action.

Emesis.—This substance is the most energetic emetic in the materia medica. In the dose of 1 centigramme, and up to 15 centigrammes at most (gr. 0·15—2·25) it produces vomiting which varies in amount according to the nature of the subject and the disease. The action is rapid; usually not more than ten minutes elapse from the administration before the first vomiting occurs. The discharge is repeated at intervals of various length, according to the patient's susceptibility. A few colics soon appear; then serous stools, usually scanty; but it is remarked that the purgative effect is marked in inverse ratio to the rapidity and frequency of the vomiting—which is easily understood.

The vomiting is accompanied by more straining and effort than that caused by ipecacuanha. There are, however, persons, in whom the contrary is the case.

When given by the mouth, the mechanism of its effect seem very simple. The irritant action of tartar emetic on the mucous membrane of the stomach, it is said, causes a reflex current which, ascending by the pneumogastrics, traverses the medulla and returns by the motor filaments of the spinal accessory, descending with the motor fibres of the same pneumogastric.

But tartar emetic may produce vomiting equally well when introduced in other ways. Magendie caused dogs to vomit by putting it on a blister. Richardson, by making them breathe antimoniated hydrogen. The injection into the veins or subcutaneous cellular tissue also causes vomiting. All these experiments, which seem at first to shake the first theory, rather confirm it, for in all these cases, whatever the route by which it is introduced, it is poured upon the mucous membrane of the stomach by the gastric glands. This fact seems established by the experiments of Kleinmann and Limonowitch, who, as M. d'Ornellas says, found tartar emetic in the first matters vomited.

Unluckily, there is an experiment performed by several physiologists, which destroys this fragile structure. If the theory is true, vomiting should not occur when tartar emetic is put into the stomach of an animal whose two pneumogastrics have been cut in the neck, since thus the route for the centripetal impression is cut; but nothing of the sort occurs, and the animal vomits exactly like those whose pneumogastrics are intact. It is then necessary to abandon this seductive theory, and await one which stands the test better.

Purgative effect.—In this complex action, stools are often produced; and antimony was formerly often used as a purgative. Goblets and bottles of antimony were once made, into which wine or simple water was poured at night, and was drunk the next morning, producing

more or less purging. Small balls were made of it, which were swallowed and passed with several evacuations; such a ball, preserved in families, was known as the "perpetual pill." This method is entirely abandoned at present.

In the dose of 5 centigrammes (gr. $\frac{3}{4}$) in a quart of water, it causes little vomiting, and a gentle continued purging. In a dose twice as large, in a quart of water, or better, tartaric lemonade, and given by glassfuls every half-hour, more vomiting and purging is obtained.

Irritant action.—Tartar emetic is one of the most energetic topical irritants.

When placed in contact with the mucous membrane of the eye, 5 centigrammes (gr. $\frac{3}{4}$) will immediately cause redness, and soon inflammation, so active that we have often seen dogs lose their sight in consequence of one application. Inflammatory accidents of equal violence are produced when it is placed in contact with the mucous membrane of the genital organs, the nose, the mouth, or on a sore.

We have injected a solution into the lungs of several horses, always producing a violent phlegmasia of the pulmonary mucous membrane and parenchyma. The same experiment made by Schœpfer has resulted similarly.

Washing with solutions of tartar emetic, frictions with ointment containing it, rapidly produce on the skin a pustular inflammation which has been made of service. When we desire to irritate the skin, an ointment is preferred in which from 4 to 8 grammes (ʒ i.—ii.) are incorporated with lard or cerate 30 grammes (ʒ i.); with this, the point where irritation is desired is rubbed. Or a quantity of the powdered drug (say 2 to 4 drachms) is sprinkled upon a plaster which is kept applied to the skin, one, two or three days.

The eruption produced by friction with antimony has a very special character. At first, small sparse accuminated pustules are seen, with the skin between free from inflammation; if the treatment ceases, the inflammation ceases, and no more pustules are developed; while those which began to appear grow only on the day following the suspension of friction; but if we persevere a confluent eruption soon follows, of great flattened pustules, extremely painful, and speedily covered with brown crusts which gradually fall after the frictions are suspended, and leave on the skin as indelible traces as those of the most destructive small-pox.

The eruption of the pustules is not uniform in time, but usually occurs in two or three days. The actual state of the cutaneous tissue exercises quite a notable influence on the development of the eruption; which is earlier and more abundant in children and women than in adult men, and more so in the latter than in old men with dry skins, like parchment. The eruption may fail to appear regularly and constantly. M. J. Guérin, who has made interesting investigations upon this point, says that certain morbid states may form an obstacle to its appearance, and gives the three following rules:

1. In many internal diseases there exists a state of the skin which makes it refractory to the pustulating effect of tartar emetic at the points which correspond to the seat of the affected organ.

2. Applications repeated for from ten to forty days fail to produce pustules at that point; yet they do appear around this region.

3. In spite of the entire absence of pustulation, sharp deep pains, which resisted all sorts of sedatives, yield immediately to antimonial ointment.

The pustules appear on the spot rubbed, or around it, or even far from it. Autenrieth first, and Bretonneau, noted the appearance of secondary pustules on certain parts of the skin and mucous membranes, especially of the genitals. These transient pustules usually appear after the desiccation of the local ones, and rarely precede them. Delens and Mérat, doubtless by way of exception, report having once seen them develop on the fourth day of the application, before the local eruption, on the genital parts, or rather on the fold of the groin in an old woman. Autenrieth seems to think (and M. Guérin has lately maintained the same view) that these distant pustules are due to absorption, and a sort of antimonial saturation; but Bretonneau has shown that they are produced by the direct contact of the salt, which is brought to the spot by the movements of the body, the clothes, and most frequently by the hands; he has demonstrated the presence of tartar emetic accumulated mechanically in the fold of the groin.

Guérin has offered new arguments to prove the absorption by cutaneous surfaces, especially the appearance of certain dynamic phenomena, and hyposthenization, which he observed in persons submitted to antimonial frictions. But Dr. Poulet, of Plancher-les-Mines, seems to us to have successfully refuted him.

His first objection is that these dynamic phenomena, and especially the vomiting, are extremely rare, quite exceptional as following antimonial frictions, and that there is every reason to suppose them a pure coincidence. He then observes that no one has mentioned in these cases pustules of the pharynx, or anything resembling this antimonial angina, which is so common when the medicine is swallowed. Finally, he insists on a last proof, which seems to us quite decisive against cutaneous absorption, even in cases where certain grave, general symptoms would lead us to suppose it, that is, the absence of the metal in the urine. Now, every one knows that if tartar emetic is introduced into the stomach, and the system retains the slightest trace of it, the kidneys have special elective eliminative functions, and its existence in the urine is most easily proved.

If the epidermis is removed, or the application is made to leech-bites, a very intense local inflammation is developed in a few hours, with the formation of little, deep eschars.

The rapidity with which this inflammation develops, the vehemence of the local symptoms, have led to the use of this energetic remedy when

a visceral disease is to be displaced, and the fluxion brought to the skin for fear of leaving it permanently in an important organ. A large eruption is especially useful in chronic disease of the thoracic organs, such as chronic catarrh, whooping-cough, and pleurisy.

Irritant action by inoculation.—This method is too little known and used. It was first invented by Dr. Lafargue, of Saint-Émilion. He proved that he could introduce a great number of remedies into the system, by means of a prick of the lancet, exactly as in vaccinating; his chief efforts were directed to show the value of narcotics like morphine and belladonna. The author thinks his method ought generally to be preferred to the endermic method, of which it is an extension or modification, especially when a local sedative effect is desired, as in neuralgias. But, in spite of some drawbacks, the endermic method has retained its advantage, both as a revulsive and as a method of introducing remedies into the system. M. Lafargue in his numerous experiments did not neglect tartar emetic, and found that inoculation with a very concentrated solution gave in a few minutes a papule as large as a lentil, which in twenty-four hours changed to a pustule like that of acne. The same was found in inoculation with croton oil. He consequently proposed to replace Autenrieth's ointment by antimonial puncture, which produces a less painful eruption, limited to the affected part, and of the exact extent desired, since it necessarily depends on the number of pricks.

This method did not become very popular; it was afterward taken up by Dr. Debourge of Rollot, who added an important modification which seems to us to increase its efficiency. Instead of letting the pustules produced by inoculation dry up rapidly, Debourge thought it desirable to increase the size of the pustules for certain purposes, and to let them suppurate a certain time. For this purpose he invented the following procedure: with a little miniature brush, or better, a small wooden spatula, he applies to the pustule, on the day after the inoculation, a little antimonial paste, or the watery or oily solution first used; this application is repeated thrice in the twenty-four hours, and must be continued from two to six days, according to the intensity or depth which it is desired the local inflammation shall have. When there is urgency, the pustules may be covered every hour with a new layer to hasten their development. There is another way of accelerating their progress, and giving them increased volume, which consists in slightly scratching the epidermis with the lancet, through which scratch a certain quantity of antimonial salt can be introduced. To avoid spreading it to other parts, it is prudent to cover the pustules with a disk of oil-silk, or even an adhesive plaster, if needful.

In four or five days the inoculation produces pustules, varying in diameter from 1½ to 3 centimetres (0·6—1·2 inch), according as the simple prick is employed, or subsequent simple or multiple scratches, or in various directions, as in the form of a star.

When the pustules, submitted to these successive inoculations, have

reached a certain development, they are dark or violet in color, surrounded with a red areola of various depths of shade; they rest on a very hard and extensive inflammatory engorgement: in a word, they present most of the features of furuncle, or even anthrax; the suppuration is long, and acts as a true and powerful issue. Debourge, who gives all these details, thus states the advantages of this modified inoculation: "We can localize at will the development of the pustular eruption; we constantly obtain the desired number of pustules and never more than we want; they are put where we think them most useful; they are spaced at will, with intervals proportioned to the size we intend them to grow to; they are made of the size which seems fit, whether small, almost insignificant, or very extensive, constituting true anthrax."

It is certain that antimonial inoculation, especially when thus performed, must form a very powerful revulsive agent; the author has made many trials, and reports a certain number of cures. Doubtless, these facts are not all equally conclusive; but certainly there are some cases, especially one of gastralgia with obstinate vomiting, a very painful sciatica, and perhaps a neuralgia of the heart with some symptoms of angina pectoris, in which the formation of ten or twelve pustules, *loco dolenti*, had a large share in the cure which quite rapidly followed the treatment.

Among the numerous indications for antimonial inoculation mentioned by the author, we particularly note the case of erectile tumors, nævi materni, and other cutaneous excrescences. In these cases the inoculation with antimony may advantageously replace that with kine-pox in persons previously vaccinated. In spite of some real advantages, it would be easy to state some disadvantages connected with this procedure, so serious that other and more common means of revulsion will always be preferred, for their greater convenience of application; but we, nevertheless, ought to recognize the fact that this new method may legitimately stand by the side of those which daily render such service in therapeutics, as blisters, issues, moxas, cauterization with red-hot iron, etc.; and it is easy to see that circumstances may arise in which this inoculation, especially as modified by Debourge, must find special indications, and obtain the preference above other analogous methods.

In conclusion, we will mention an application which we have made in order to recall suppressed hæmorrhoids, or to establish them when nonexistent; a short notice of which is published in the *Journal des Connaissances médico-chirurgicales* (3e année, 1836).

We place in the rectum, for one, two, or three days in succession, a suppository composed of one drachm of cacao butter, in which is incorporated 15, 20, or 30 centigrammes (gr. 2·2—4·5) of tartar emetic. This quickly melts, when the salt causes a fluxion which is often followed by the reappearance of the piles. It is rare that it is necessary to use it three days in succession.

The contact of tartar emetic with all parts accessible to sight having

caused so violent an inflammation, it is natural to suppose that the tissues contained in the splanchnic cavities are similarly affected; and the autopsy shows that the gastrointestinal mucous membrane is acutely irritated, like all the other tissues.

The action of the salt upon the tissues which it touches is so rapid, that pustules may form in the throat in consequence of antimonial medicine swallowed in pneumonia.

The cutaneous eruptions caused by tartar emetic administered internally are rare and unimportant.

Poisoning.—This occurs in two ways: 1, by swallowing; 2, by external application alone.

1. *Poisoning by internal administration.*—When given in a single poisonous dose, its first effects are the emetic action. The patient next complains of pain at the stomach, weakness, vertigo, and even syncope. There is heat in the throat, and difficulty of swallowing. Then comes purging; the stools often contain blood; the urine is scanty. Calorification is soon altered; the extremities are cold, the pulse infrequent and soft. The skin is often covered with a cool, clammy sweat, which in four or five days is replaced by a vesiculo-pustulous eruption like that produced by the salt applied to the skin. By degrees the oppression increases; the patient collapses as in cholera, is immovable and cold. From time to time there is a little agitation, and then easy vomiting, and the patient falls into a state of inertia from which he is only roused by a few hiccoughs. At last the temperature continually sinks, the pulse stops, and death occurs in five or six days in the adult, or a few hours in a child.

This is the ordinary form of poisoning; but sometimes there is no vomiting at the beginning, and the patient has only a few stools, falls into an algid state, has a few convulsions, and dies. At other times the emetic action is more marked, and the patient's efforts, by relieving him of the great part of the poison, save his life.

Great criminals—among whom we must unfortunately name Palmer and Pritchard—have given the salt in small and frequent doses. In this case the disease is strikingly like cholera, excepting the icterus, the syncope, and the pustular eruption, and an irregular course marked by a kind of exacerbations.

2. *Poisoning by external administration.*—"A lady suffering from a small sore on the breast allowed herself to be led to consult, in June of 1859, a person known in Paris as Doctor Noir, who pretended to have a specific for cancer. He had her apply a white ointment; and in a few days she died with all the symptoms of violent poisoning. The analysis of the preparation was made by M. Roussin, who found it composed of equal parts of lard and finely-ground tartar emetic. Death was the consequence of the absorption of this enormous quantity of the drug through the sore on the breast" (Tardieu, "Étude médico-légale et clinique sur l'empoisonnement," 1867).

Treatment of poisoning.—If the patient has not vomited before the

physician arrives, he should take immediately a large quantity of lukewarm water, and the uvula should be tickled. At the same time, powder of cinchona or any other bark should be prepared; the decoction or tincture may be given with still more benefit. Decoctions of tea, gall-nut, catechu, cut with milk, will act similarly. All these decompose the salt; they are to be continued, even after the greater part of the poison may be supposed to be vomited. Opium will soon be proper, and even bleeding, or the local application of leeches, if the inflammatory state of the alimentary canal seems to require it. Of course, soothing drinks are to be given when it is thought proper to stop giving astringent decoctions.

Symptoms analogous to those of tartar emetic may be caused by wine of antimony, metallic antimony in powder, sulphuret of antimony, kermes, unwashed antimoniate of potassium, etc. But the symptoms rarely have the gravity of those which may be caused by a large dose of tartar emetic. The treatment, however, is to be exactly the same.

II. CATHARTICS.

§ 1. *Vegetable Cathartics.*

Family of the Euphorbiaceæ (Croton Tiglium, Spurge, Fontainea Pancheri, Castor Oil, Oil of Jatropha Curcas, Oil of Aleurites Triloba, Oil of Anda, Mercurialis Annua).

Croton Oil.

When placed in contact with the skin deprived of epidermis, it causes a very energetic burning, and presently a very active local inflammation; when rubbed on the whole skin, it causes a vesicular inflammation, producing a therapeutical external inflammation quickly, and with less pain and discomfort than if cantharides had been used.

Nevertheless, though this irritant effect is now quite frequently employed, its irritant action upon the mucous membrane of the intestinal canal is the one chiefly used.

The passage of the oil into the mouth and pharynx, though it lasts but an instant, leaves on the tongue, and particularly the throat, a sensation of heat and asperity which nothing can relieve. It is remarkable that in the stomach it produces little more than a slight warmth.

After a time, which varies in proportion to the dose, and especially to idiosyncrasies, there are acute colics, followed by a diarrhœa, and a severe stinging at the margin of the anus.

We do not know exactly the mechanism by which croton oil acts on the intestine; the first notion is that it irritates the mucous membrane as it does that of the throat and mouth, or the skin. It is worth while to make experiments in this direction, as our present ideas are inadequate.

Lauder Brunton (quoted by M. Labbée, *Journal de thérapeutique*, 25

août, 1874, p. 627), operated as follows: he exposed the small intestine of dogs, and passed four ligatures which enclosed three loops of intestine. In the middle loop he placed croton oil in various doses. With $\frac{1}{100}$ of a drop, he found, after four hours, 1·02 gramme of fluid; with $\frac{1}{10}$ of a drop and 10 grammes of alcohol, 4·80; and with ten drops, 10·80 grammes, the lateral loops containing only a little mucus. M. A. Moreau's results were quite different; at the end of 24 hours after the introduction of 20 drops, there was nothing but a whitish varnish on the mucous membrane, and no catarrhal secretion.

We said that croton oil produced active colics, indicating that it excites the contractility of the intestinal muscles. Experiments on animals have shown a certain increase in peristaltic action (Legros and Onimus, *Journal de Robin*, 1869).

The dose needed for producing an energetic purgation is $2\frac{1}{2}$ centigrammes for adolescents, 5—15 centigrammes for adults (gr. 0·37—0·75—2·2). The dose ought, in general, to be larger for women than for men.

The time required to purge is very variable; sometimes half an hour, sometimes twelve or twenty-four hours. This inequality is observed in respect to other effects. A given dose, in two persons of the same sex and apparently of the same constitution, sometimes causes superpurgation, sometimes hardly one stool.

We, therefore, make it a rule to give it only in divided doses, 5 centigrammes every hour, for example (gr. 0·37), until the colic gives warning of a coming effect. Otherwise, we run the risk of causing severe accidents, or of losing the desired effect.

Uncertain as it is, it is extremely energetic, and is, therefore, precious whenever evacuations are absolutely necessary.

As an injection, croton oil causes purging, but much less than when given by the mouth. It is seldom thus used, on account of its irritating the rectum and anus.

It is said to purge when applied to the skin. Professor Andral performed at La Pitié in Paris, a series of experiments, which M. Joret has reported ("Recherches thérapeutiques sur l'emploi de l'huile de croton tiglium," thèse de Paris, 1833; and *Arch. gén. de méd.*, 2e série, t. II., 1833). In six cases, it produced no purgative effect when mixed with oil of sweet almonds and rubbed upon the abdomen. Of nine patients rubbed with the pure oil, only one was purged, though in several cases twenty drops was used. Hence Andral concludes that the purgation observed in the one patient was due to some unobserved cause. Rayer states that he obtained many discharges by pouring one or two drops on a surface denuded by blisters. This experiment needs repetition, and a constant result, in order that we may rely on the effect.

Mode of administration, and doses.—The dose has been stated in grammes instead of drops, contrary to usage; for the weight of a drop depends on the shape of the vessel it is poured from, and the temperature. It should never be given pure, for a very simple reason: if given

in such small doses it would remain in the mouth or œsophagus, and certainly would never reach the stomach or intestines. Even when mixed with sugar-water or ptisan, it causes a very disagreeable heat in the throat, and often vomits. The best form is that of a pill, which, enveloped in wafer-bread, honey, or preserves, is easily swallowed, and reaches the stomach without its taste being noticed. Silvering the pills usually retards the purgative effect.

For external use, when we wish the oil to produce a vesicular eruption on the skin, it is rubbed on in amounts which necessarily vary, according to the extent of surface which we wish to irritate. For a moderate surface, as the front of the sternum, the epigastric fossa, 20 or 40 drops may be used, either pure or mixed with four, ten, twenty times its weight of oil of sweet almonds. This friction should be made with a glove, to avoid the risk of inflaming the backs of the fingers. The person who rubs often has a vesicular eruption on the face, without any direct transfer of the drug to the latter.

Dr. Ernest Boudet has noted an eruption of the scrotum occurring when different parts of the body are rubbed; this is probably due to a transference of the oil.

Fontainea Pancheri.

According to Heckel, the seeds when swallowed produce abundant vomiting and purging, like those of croton or castor oil. The oil from the seeds is more or less irritant, according to the process used in extraction. That got by simple pressure acts like croton oil, though less vigorously; that by an alcoholic or ethereal solvent is more irritant, and acts on the skin with more intensity than croton oil. Given in the dose of 2 drops, in a pill, it causes abundant stools with severe colics, and rarely vomiting (Heckel, Thèse de Montpellier, 1870).

Oil of Spurge.

Like most plants of this family, spurge has irritant properties, the principle of which resides in all parts of the plant. The juice, the cold infusion of the roots, stem, or leaves, is sometimes used in the country as a drastic purge or an irritant epithem. But the purgative principle chiefly resides in the seeds.

These properties of the seeds have been known for ages; but they have been little used except by rustics. Dioscorides used them as purgatives (lib. IV., cap. CLXVII.), giving seven or eight, and Rufus ("De purgantibus," p. 18), as many as ten. Alston, in his "Matière médicale" (vol. I., p. 444), speaks of an English physician who used it for this purpose in his own case. But other authors in large numbers (see Murray, "App. medicam.," t. IV., p. 101) considered the seeds as a very dangerous

poison. It followed that this purgative was not used by physicians, and remained in the domain of quacks and empirics.

At the end of the year 1823, Barbier, of Amiens, extracted some of the oil contained in the seeds of the fruit of spurge, and gave it to his patients in the dose of ¾—1 gramme (gr. 12—16); he found that in this dose it has a purgative effect analogous to that of 5 or 10 centigrammes (gr. 0·75—1·5) of croton oil, or 30—47 grammes (℥ i.—iss.) of castor oil.

Since then a large number of physicians have given this native purge, and have corroborated Barbier's results by their own.

The dose of oil of spurge for children is from 20 to 25 centigrammes (gr. 3—4); for adult men 75 to 150 centigrammes (gr. 12—22); for old men and adult women, from 1 to 1½ gramme (gr. 15—22). It is ordinarily given in emulsion, like croton oil. It may also be mixed with thirty or forty times its weight of oil of sweet almonds.

Castor Oil.

Though the purgative effects of the castor bean were known centuries ago, it was thought poisonous, and physicians never gave it. The extraction of the oil and its use as a purgative was hardly thought of until toward 1767 (Cauvane's "Dissertation on the Oleum Palmæ Christi, seu Oleum Ricini, or, as it is commonly called, Castor Oil, its Uses," etc., 2d. ed., 1769).

It was, however, not well known in Europe until the translation of Cauvane's work, made in 1777 by Hamart de la Chapelle, and the works of Odier, of Geneva, published in volume XLIX. of the old *Journal de médecine.*

The oil is chiefly used as a purgative in England and North America; in France and the rest of Europe it is less frequently used, though there are few practitioners who do not prescribe it quite often.

We have had occasion to observe the action of the seeds on men. Two years ago, in 1872, a young man entered the Hôtel-Dieu with a choleriform affection produced under the following circumstances: one of his comrades, desiring to play a trick on him, offered him some of the seeds, saying that these pretty seeds were nice American almonds. The trusting young man ate twelve seeds, stripped of the outer membrane, and found them somewhat flat, and a little rough, in taste. No sooner had he swallowed them than his friend told him that he had been "sold," and would be severely purged. The patient ate as much dinner as usual, but was immediately afterward tormented with very abundant vomitings, the last of which contained an abundance of bile. This was followed by stools, at first bilious, then mucous, to the number of about 40 in the space of 20 hours.

When we saw him, next day, about one o'clock P.M., he had just the

appearance of a person in cholera, or at least cholera morbus. The face was pale, the eyes sunken and surrounded by lividity, the nose and tongue without heat, the skin cool, the belly retracted, and no urine had passed since the day before. His condition, however, was improving, the stools were becoming fewer, and all the symptoms were less severe: he recovered in a few days of rest.

After taking castor oil there remains in the mouth an oily, acrid, and nauseous taste, which may be lessened by means which we will state hereafter.

The transit through the stomach is difficult, and there is often nausea, sometimes vomiting. But when this period is once past, the purging is gentle and almost free from colics. Stools are passed in an hour or two, in which the oil may easily be seen floating like fat in broth. These stools are abundant, produce no tenesmus or burning of the anus, and contain a large proportion of bile. The discharges usually last five or six hours.

Castor oil is less purgative than the seeds, as may be seen from the previous account. Sonbeiran thought this due to the fact that the oil escaping from the press contained comparatively less resin than remained in the marc.

Mialhe reports various therapeutic effects obtained with an emulsion of the fresh seeds, which quite supports this view; for 10 grammes (gr. 150) of the seeds deprived of the husks produced an emeto-cathartic effect which lasted nearly three days, and could not be relieved by opiates, cold aërated drinks, or cataplasms. An emulsion made with half that quantity produced 28 vomitings and eighteen alvine discharges. (We should add that the purgative effect of the seeds is not constant.) A third emulsion, containing only 1 gramme (gr. 15) of the seeds still produced very marked emetocatharsis. From these facts he concludes:

1. That the oleoresinous principle discovered by Sonbeiran in the seeds exists in very small amount in the oil, but is all present in emulsions.

2. That the ricini of France contain a large proportion of the acrid emetocathartic principle which is proper to a great many plants of the family of the Euphorbiaceæ.

3. That the emulsion prepared with 20, 30, or 50 centigrammes of the seeds (gr. 3, 4½, 7½) is perhaps the most agreeable purgative to the taste that is used at this day, provided the emetic action ceases completely when the dose is so far reduced.

The oil is given in the dose of 8 grammes (℥ ii.) to young children, 15—30 grammes (℥ ss.—i.) to adolescents and adults.

A great many contrivances have been used to cover its nasty acrid taste. The one most commonly in use is to give it in a hot drink of agreeable flavor, as hot broth free from fat, infusion of coffee or chiccory, tea, herb-tea, infusion of balm, mint, cloves, and cinnamon. It is also given in lemon or orange juice as follows: the juice of a whole fruit is

put into a glass, then the oil, and then a little hot water, all of which is quickly shaken and drunk quickly; this procedure has the advantage of leaving in the mouth nothing but the taste of lemon-juice, thus avoiding the disagreeable persistent taste of oil. The oil is sometimes, though rarely, given in a covered spoon or in capsules.

Emulsions are made with the beans, after Mialhe's process, or by beating the oil with the yolk of an egg or mucilage of tragacanth; these emulsions are flavored with tincture of lemon or orange or acidulated syrups, with tartaric or citric acid, etc.

Parola, following Gubler, has proposed an alcoholic tincture and an ethereal tincture.

Finally, the oil may purge in very small doses, *e. g.*, a teaspoonful, in cases of obstinate constipation where purgatives of all kinds are ineffective. It is also given in injections, but does not seem to us to have an effect, and we do not advise it.

Oil of Jatropha Curcas.

The seeds of this plant, known by the name of "gros pignons d'Inde" (Barbadoes nuts), contain an oil almost as acrid and violently purgative as that of croton tiglium. This oil, as regards its activity, holds a mean between the latter and oil of spurge. It is rarely used in medicine; and this we think a mistake, for it is almost as useful as croton oil.

It is often used in America as a hydragogue; also to falsify castor oil, or, at least, to give it activity. This culpable fraud may give rise to dangerous accidents.

This oil is given in half the dose of oil of spurge.

Mercurialis Annua.

This is a plant of the family of the Euphorbiaceæ, like the preceding; we mention it only as we are speaking of the family, for its properties are not energetic. The older physicians used it as a purge, particularly in dropsy; its extract, according to Lemolt, of Bourbonne, purges in the dose of 4—8 grammes (ʒ i.—ii.). In medicine, only one preparation is used—the "miel mercurial," or better, "miel de mercuriale" (honey of mercurialis), used for injections in the dose of 60—120 grammes (ʒ ii.—iv.). In this dose it is quite energetic; but as apothecaries usually add a little senna, it is hard to say whether the latter is not the efficient agent; yet we must add that the miel de mercuriale of the hospitals, which is correctly made, purges in the dose of 60 grammes (ʒ ii.):

Laxative Injection.

℞. Miel de mercuriale..... 60 grammes.
Decoction of marsh mallow..... 500 "
(Formulaire des hôpitaux.)

Family of the Convolvulaceæ (Jalap, Turpeth, Scammony, Soldanella, Mechoacan).

Jalap.

The root, which is the only part used, was first brought to Europe about the beginning of the seventeenth century. From that time it has been used as a purge, and has held quite an important place in medicine. It is quite an energetic purgative when given in powder. The powder is insipid, but leaves in the pharynx a feeling of acridity, sometimes lasting several hours. The dose is from 1 to 3 grammes (gr. 15—45) or more.

The resin is much more used, and is given in the dose of 20—80 centigrammes (gr. 3—12) according to age and the requirements of the disease. Some persons require a double dose; in others the smallest quantity causes superpurgation.

The active principle resides in the resin, which is insoluble in water; we cannot therefore rely on the decoctions or infusions of jalap, while alcoholic tinctures are very active. The famous "German brandy," "Leroy's medicine," "Guillé's anti-glairous elixir," etc., are only alcoholic tinctures of jalap with some other purgative substances.

The very slight taste of jalap makes it valuable in infant therapeutics. It is mixed with equal parts of powdered sugar and calomel, in which form children do not dislike it; it may be incorporated with honey, or electuaries, or confitures.

The same is true of the resin, which can also be emulsionized in water with the yolk of an egg.

The root has hardly any odor when in bulk, but if powdered it has a nauseous smell. The powder has local irritant properties; if respired it causes sneezing and cough. Félix Cadet de Gassicourt found it equally irritating to the peritoneum and the pleura of dogs. Vulpian and Armand Moreau injected an alcoholic solution of the resin directly into the intestinal cavity, and proved that it had a very special action upon the mucous membrane of the large intestine, and increased the peristaltic movements, which is quite in agreement with what is seen in man after taking jalap by the mouth; there are colic, tenesmus, and mucous stools. Félix Cadet de Gassicourt injected it into the veins of dogs, and obtained scarcely any effect with 0·45 gramme of resin (gr. 6·75) and little with 1·30 gramme (gr. 19·5).

This purgative passes into the milk, and if given to a wet nurse, purges the child.

It has but little action upon the herbivora.

M. Labbée (*Journal de thérapeutique*, 25 septembre, 1874, p. 709) reports that Hagentorn has extracted from the resins of jalap and scammony an active principle which he calls *convolvulin*. According to Hagentorn, this is a glycoside with acid reaction, acting neither by in-

unction nor by intravenous injection, and requiring to be mingled with the bile in order to act.

Turpeth.

This has been used as a purgative much longer than jalap. It grows in abundance in the East Indies; the Arabs use it very often, as we learn from their writings.

The powdered root is colorless, almost tasteless. It purges like jalap, in a little larger dose. The resin is quite as active as that of jalap, and is given in the same doses.

Scammony.

The Greek physicians used the root, and knew its purgative and hydragogue properties. The Arabs had great confidence in it; and it formed a part of a great many electuaries, which are now very properly abandoned.

The gum-resin which is sent from the Levant is a purgative which has properties like those of the resin of jalap; but as about a third of its weight is inert matter, it has a little less activity. It is given in the same way as the resins of turpeth and jalap.

Obesity.—Most of the treatments for obesity consist of purgatives and a regimen in which water and starch are reduced to a minimum. M. Dancel gives in the morning, once or twice a week, a capsule containing two grammes of tincture of scammony, which acts so quickly as not to disturb the lunch (*déjeuner à la fourchette*). If there is also constipation, a pill must be taken at night containing 0.15 gramme (gr. $2\frac{1}{4}$) of scammony and 0.10 gramme (gr. $1\frac{1}{2}$) of medical soap. If there is also dryness of the mouth and heat of the throat, and exaggerated sensibility of the skin, the following drink is taken an hour after the medicine.

Water	125 grammes.
Tartaric acid	0.60 "
Bicarbonate of sodium	1.50 "

This is drunk while effervescing, the excess of tartaric acid being left at the bottom of the glass.

The diet is as follows:

It is not well to eat in the morning; or at most, half a cup of black coffee may be taken.

For breakfast, take roast or broiled meat, without seasoning, to tempt the appetite; for, according to Hippocrates' advice, it is necessary to support strength with as little food as possible. Fish or eggs may be added. As little as possible of vegetables; a little potato, haricots, chiccory. All other starchy or sugary food must be proscribed, and pastry absolutely

avoided. The dessert shall consist of dry cheese with almonds or other dry fruits; all uncooked fruit except grapes is also contraindicated.

Bread is to be eaten as little as possible, because it makes one drink, and water is, of all foods, that which should be most cut down in the treatment of obesity. Yet bread is not entirely forbidden, and M. Dancel allows 500 grammes (about 1 pint) per day. Soups and broths are forbidden, likewise tea, etc.

The greatest difficulty consists in making the patient endure the thirst; and all efforts must be made to restrict the amount of water drunk to 800 grammes (about 1¾ pints) per day. Finally, let him rise early, and walk about two hours in the morning.

Soldanella.

The convolvulus soldanella has the same properties as jalap and scammony. The leaves, roots, and extracted resin are employed. It is little used.

The fixed oils, like the resins, are absorbed by the same chemical reactions, that is, by the aid of alkalies. Claude Bernard's work on the function of the pancreatic juice in the digestion of fatty substances is well known. The association of alkalies with resins singularly aids the action of the latter; the acids which form insoluble compounds with them should be rejected, as also the substances which easily turn acids, as sugars and starch.

Mialhe, on these grounds, advises the association of scammony and resin of jalap with magnesia, potassa, soap (see his "Traité de l'Art de formuler"). He also recommends that liquids be swallowed directly after the resin, so as to carry it past the pylorus as soon as possible, and remove them from the action of the acids of the stomach; finally, for several hours after swallowing the drinks, all other liquid should be abstained from, in order not to dilute the alkaline intestinal fluids too much, since the saponification takes place best in contact with its concentrated alkaline salts (Mialhe).

Aloes.

Hæmorrhoids.—The secondary effects of aloes have suggested its use for recalling hæmorrhoids, when their suppression gives rise to severe symptoms. For this purpose it is given in small doses, repeated daily for a month or more. It is usually given in pills of 5, 10, 20, or 30 centigrammes (gr. ¾, 1½, 3, 4½), taken at the beginning of supper, and sometimes at the morning meal also; which cause one or two copious stools, and a prompt, but slight irritation of the rectum that is efficient in recalling the hæmorrhoidal discharge. In persons who do not easily bear these pills, they are replaced advantageously by suppositories of cacao

butter, containing 30—60 centigrammes of aloes (gr. 4½—9), introduced daily into the rectum. This is said not only to recall the congestion, as we said above, but even to be able to originate it. It is not always easy to obtain this latter result. We have very often tried, but always failed. We have in a certain number of cases caused acute irritation of the extremity of the intestine, an uncomfortable weight in the lower bowels, sometimes even a considerable flow of blood through the hæmorrhoidal vessels; but we never could develop hæmorrhoidal tumors unless the patients had had them before. But we do not contest the numerous facts reported by the best authorities; we only are inclined to think that a transient fluxion of the vessels of the rectum has not always been distinguished with sufficient care from a hæmorrhoidal flux proper; and on the other hand, we admit that irritations, even if transient, of the end of the intestine at last bring on hæmorrhoids, almost of necessity, as is seen in riders, in calculous persons, in habitual constipation, etc. Antimonial suppositories are much more certain in their effects, and often recall hæmorrhoids.

Amenorrhœa.—Women cannot long use aloes without pain in the kidneys and a sensation of uncomfortable pressure in the womb. Hence the remedy has been given in cases where the menses appear slowly, or in insufficient quantity. In chlorotic girls much advantage is derived from associating a very small amount of aloes with a large proportion of iron; but, though at the age when the menstrual flow is a condition of good health it is proper to call a fluxion of blood to the uterus, we always run a great risk, says Fothergill ("Medical Observations and Inquiries," t. V., p. 173), in giving aloes for the same purpose to women at the change of life. In the latter it causes metrorrhagia and various grave affections of the rectum or the genito-urinary organs.

Schönlein and Aran have recommended aloes for amenorrhœa, given several days in succession in the following injection: Aloes, 10 grammes (gr. 150); medical soap, 4 grammes (ʒ i.); mucilage, 30 to 60 grammes (gr. 450—900). Aloes in injection has been successfully used by Aran for uterine catarrh, when the inflammatory action is nearly extinct. Gamberini has used aloes with success for chronic gleets; he injects alcoholic tincture diluted with 15—30 parts of water three times a day, and cites cures thus obtained in two or three weeks in persons who had been treated in vain by many other remedies.

What we have just said plainly shows the trouble which the continued use of aloes may cause to pregnant women, to calculous persons, or those plagued with retention of urine or vesical catarrh.

Congestions.—The readiness with which an acute transient irritation may be caused in the pelvic organs furnishes a precious resource of daily use in diseases of the head and chest, which are severe, though without profound structural lesions. We have seen Esquirol, at Charenton, imparting a beneficial modification to an old tendency to cerebral congestion; Olivier (of Angers) has also obtained very good effects in the treat-

ment of certain paraplegias. We have cured headaches which the most energetic, general, and local treatment had not lessened. The same treatment has greatly aided us in combating, in young persons, especially females, those pulmonary congestions which often occasion the development of tubercles.

Affections of the digestive tube.—Aloes has its action in a great number of diseases of the digestive apparatus. All observers agree that it stimulates the digestive functions when taken in small doses at mealtimes, provided there is no phlegmasia of the stomach. Does it do this by directly stimulating the surface of the intestine? by mechanically relieving the alimentary canal of excrementitial matters with which it is in contact? or rather, by provoking a more abundant and special secretion of the liver, as Dr. Wedekind thinks? This practitioner, to whom we owe curious observations on aloes, maintains that the substance does not act directly on the intestines, but is absorbed, and stimulates, in a special manner, the liver, increasing its secretion. He finds proofs of his opinion in the slowness of its effects, the nature of the stools, which are all bilious and of a special odor, and in the fact that, when given in an injection, aloes does not irritate any more than warm water, but purges after eight or ten hours, when it has acted on the liver (*Bulletin des sc. méd.* de Férussac, t. XII., p. 79). Following this view, Guillemin has used aloes for epidemic cholera, when the secretion of bile seemed suspended, and which seems to improve when the dejections begin to acquire color. Some attempts were made, and seemed successful, but their small number forbids any inferences. It still appears that in the Indies and Poland, preparations containing aloes are useful in cases of cholera morbus (Guillemin, "Considérations sur l'amertume des végétaux:" Thèse de Paris, 1832, No. 24).

The extreme bitterness of aloes has given it the reputation of a febrifuge and anthelmintic. Its febrifuge virtues are now admitted by hardly any one, but some physicians maintain that it is one of the most powerful agents for killing and expelling worms, whether applied to the belly in the form of cataplasms made with the fresh juice of the plant (as Thomas, of Salisbury, directs), or given in pills or draughts. But Grantz ("Mat. méd. et chir.," t. II., p. 61) and Murray ("Appar. medic.," t. V., p. 254), oppose this opinion, upon the authority of Redi ("De animalculis vivis in animal. vivis," p. 156), who saw lumbrici live four days in a very bitter solution of aloes. But how is it that they did not see that the worms, even if not poisoned, might be carried off by the secretions which aloes provokes?

External use.—Aloes was formerly used by surgeons in a great variety of circumstances; it is a pity that so valuable an external remedy has been abandoned to the veterinarians—perhaps it will some time be resumed. It is used at present simply in collyria, and to revive foul ulcers or fistulous passages.

Doses and mode of administration.—When an energetic purgative

action is desired, aloes is given in the dose of fifty centigrammes to two grammes (gr. 7—30); it is rarely used for this purpose unless intestinal worms are to be expelled. But when the physician intends only to regulate the stools and cause a sanguine flux to the pelvic organs, the doses previously mentioned need rarely be exceeded.

We are accustomed to give aloes at the beginning of a meal, thus avoiding colics more surely; but with many persons the purgative effect occurs in six, eight, or ten hours, and disturbs sleep; in this case aloes should be taken at the moment of retiring, three or four hours after the evening meal. It is useful to cover the pills with gold or silver leaf if we wish to retard the action; this precaution is indispensable when they are taken at meals, and if neglected, there is risk of indigestion, which may be slight, but ought to be avoided.

It is impossible to state here, in an exact manner, the dose of the various aloetic elixirs and pills, for which the formulæ are given in all the pharmacopœas; small doses should be used at first, and the treatment regulated by the individual susceptibilities. But it may be stated in general that the addition of alcohol renders aloes much less purgative, so that a dose of elixir or tincture, in order to produce a given effect, must contain twice as much aloes as would be required if given in any other vehicle.

Sores are dressed with the tincture by a brush dipped in the liquid and passed over the surface; or pieces of cotton are soaked and laid on the place. M. Delioux de Savignac has used the treatment with success for dressing a certain class of ulcers, particularly bedsores.

Family of the Cucurbitaceæ (Colocynth, Elaterium, Bryony).

Colocynth.

Physiological effects.—The active properties of colocynth were known to all antiquity; it produced, in large doses, superpurgation, often dangerous, or even fatal; in small quantities it was a pretty sure purgative.

Orfila's experiments on living animals showed that colocynth caused violent purging, and often a bloody secretion on the surface of the intestine; but as Orfila at the same time tied the œsophagus of the dogs on which he experimented, nothing positive can be concluded from his works on the subject, for it is impossible in such a case to estimate the effect of this circumstance in causing the animal's death. When a dog takes enormous doses of powdered colocynth without ligature of the œsophagus, the animal always simply vomits and purges, and recovers quickly.

In man it is the same; the ingested substance is largely vomited, and produces other symptoms in proportion as it is not vomited. But if retained, it causes violent colics, very frequent stools, bloody discharges, tenesmus, and most of the nervous symptoms which accompany cholera

morbus. We know of only two cases of death from large doses of colocynth, one reported by Orfila ("Toxicol.," t. I., p. 696), the other by Christison in his "Treatise on Poisons" (p. 524, French).

The facts given by Fordyce ("Fragmenta chirurg. et med.," p. 66), that by Tulpius ("Obs.," lib. IV., cap. XXVI., p. 218), the account given by Christison, and the observations collected by Caron, d'Annecy, and reported by Orfila, show that if such enormous doses may cause death, they usually cause only painful vomiting and abundant catharsis.

While toxic material is supposed to be contained in the alimentary canal, very copious watery draughts must be swallowed, and repeated enemata given; afterward, prolonged general baths, emollient applications, starchy drinks, and especially opiates, quickly disperse the pain and local inflammation.

Therapeutic effects.—The immediate effect of colocynth, given by the stomach, is to produce colics and diarrhœa. Given in an injection, it acts in the same way, and must, therefore, be classed as a purgative.

A large dose of colocynth causes nausea, vomiting, sharp colics, and frequent stools. The stools, at first feculent, become almost immediately serous, and most often bloody. The secretion of blood at the surface of the mucous membrane is hardly ever an alarming or persistent symptom; it occurs even when the purgation has no immediate, general bad effects; the drug has, therefore, been classed with *panchymagogues*, that is, those which cause the secretion of all the elements of the blood and all the humors.

Colocynth stands by the side of bryony, aloes, and the drastic purgatives from the family of the convolvulaceæ; but its extreme violence, the pains it causes, and, above all, the uncertainty of its preparations, led Murray ("App. méd.," p. 583 et seq.) to proscribe it as a purge. This absolute exclusion will, doubtless, seem too severe to physicians, who all know how little we can calculate in advance the effect of purgatives; who know that the most energetic drastics sometimes cause no pain to persons who are thrown into a dangerous state by a simple laxative; whence it follows that we can never have too many remedies to reach a given aim, and should never be in haste to reject one because it is rarely useful.

The mucous membrane is not the only avenue for introducing the active principle of colocynth; it purges, when the alcoholic or aqueous tincture, or the fresh pulp, or the powder mixed with water, or water and alcohol, is placed on the skin of the abdomen (Hermann, "Mat. méd.," p. 335). Those who triturate and handle it for a long time are also purged. Its power as a vermifuge is doubtless due solely to its purgative action; Redi proved that it did not kill worms, for he saw lumbrici living fourteen and twenty hours in a very strong infusion of colocynth (Redi, "De animalculis," p. 161). In Italy and certain parts of Spain, it is a popular custom to apply poultices of colocynth, garlic, and absinthe to the abdomen of children plagued with worms; we do not know with what success.

The drastic action of colocynth has led to its being classed with emmenagogues. Van Swieten (*vid.* Grantz, "Mat. méd.," t. II., p. 165) used it as such, combined with inert powders, so that the patient took only an eighth of a grain every three or four hours. To fulfil this indication, injections of colocynth would, doubtless, be preferable, since, as Dioscorides states (lib. IV., cap. CLXXVIII.), they provoke a discharge of blood from the hæmorrhoidal vessels. But the abortive power of colocynth is, unhappily, too well known, and it is painful to confess that it is used as an instrument of crime by our own profession, pharmacists, midwives, and herbalists.

The use of colocynth in a great many painful, chronic diseases, such as gout, rheumatism, neuralgia, constitutional syphilis, was particularly advised by Dalberg, Tode, and some others (see Murray, t. I., p. 588); but facts do not prove that it has, in these cases, any more effect than other drastic purgatives.

The anti-blennorrhagic virtue of colocynth was first known to empirics; it afterward became adopted by physicians. Colombier states that several soldiers cured themselves of an acute blennorrhagia by swallowing a whole fruit in one or two doses ("Code de méd. militaire," t. V., p. 420). Fabre, in his "Traité des Maladies vénériennes," t. II., p. 368, particularly praises the tincture, made as follows:

℞. Colocynth in coarse powder.....	45	grammes	(℥ xiss.).
Cloves (No. 3).....	4	"	(℥ i.).
Star aniseed.....	4	"	(℥ i.).
Saffron.....	0.60	"	(gr. ix.).
Acetate of potassium.....	30	"	(℈ l.).

Digest for one month in 600 grammes (℥ xix.) of alcohol.

Fabre gave of this tincture 8 grammes (℥ ii.) in 60—90 grammes (℥ ii.—iii.) of Spanish wine, for three days in succession, fasting; he waits on the fourth day, repeats for three days more, and waits one day again; thus until 20 or 25 doses have been taken. One hour after taking the dose, two or three glasses of ptisan of barley and dog's grass must be taken. If colics appear, emollient ejections must be given. This treatment, excellent in somewhat chronic blennorrhagia, has been too much neglected of late. But there is at Paris a coarse man without any title to practice medicine, who has acquired among the people, and even many persons of very high rank, a great and lucrative reputation for the cure of clap by a specific, which is simply a vinous tincture of colocynth.

Elaterium and Bryony.

The *root of elaterium* is emetic, and also causes abundant alvine discharges; the ancients used it chiefly for dropsy. In a small dose it was thought useful in the treatment of obstructions. Dioscorides and

Avicenna gave it in the dose of 75 centigrammes (gr. 12) as a purge; Fallopius (" De purgantibus," lib. LV., p. 122) gave as much as a drachm.

Externally, the root was used in fomentations or cataplasms to resolve œdematous engorgements of the limbs. But the root has long ceased to be used in substance; the pharmaceutical name of elaterium is applied to an extract prepared from the juice of the fruit. This extract has energetic purgative virtues. Sydenham considered it one of the most powerful hydragogues (" Op. omn.," p. 488). Many others after him (Murray, " App. med.," t. I., p. 597) praised it still more highly. It fulfils all the indications for drastic purgatives.

There are differences in the statement of the proper dose, which plainly arise from a difference in the preparations. While Dioscorides allows from 25 to 50 centigrammes (gr. 4—7½), Fernel gives as much as a gramme (gr. 15), while Sydenham limits it to 17 centigrammes (gr. 2½), and Boerhaave to 20 (gr. 3).

The uncertainty of the effects of this substance, and the difficulty of getting a good preparation, must make its use unpopular, especially as, like colocynth, it violently inflames the tissues it touches, as shown by Orfila's experiments (" Toxicology ").

An active substance is extracted from elaterium, called elaterin. Lauder Brunton injected into a loop of the intestine of a dog, in the manner of Armand Moreau, 6 milligrammes of elaterin, and found after four hours a secretion of liquid, amounting to 6.8 grammes (gr. 104).

The root of bryony, like colocynth and elaterium, may properly be ranked with irritant poisons. This is proved most abundantly by the experiments of Orfila ("Toxicol. gén."): 10 grammes (gr. 150) of powdered bryony introduced into the cellular tissue of a dog's thigh caused violent inflammation, acute pain, and death in sixty hours; and 15 grammes (gr. 230) introduced into the stomach of another, killed him.

Applied to the skin, the pulp of the root of bryony causes a phlegmasia, analogous to that produced by mustard or, rather, ranunculus.

In spite of its activity (though less than that of colocynth), bryony has been recommended by Loiseleur-Deslongchamps as one of the most certain native purges, in the same rank as jalap. He has shown that from 1·30 to 2 grammes (gr. 20—30) of the powdered root is necessary to produce a well-marked purgative effect in the adult. The effect is still more certain if an infusion is given, made of 8 grammes (ʒ ii.) steeped a long time in 180 grammes (ʒ vi.) of water.

Women in the country take injections of bryony root for some days when they wish to arrest the secretion of milk in the breasts (Barbier, " Mat. méd.," t. III.).

Black Hellebore.

When the materia medica was poor, certain remedies, now forgotten, were treasures; one such is black hellebore.

The reputation of this plant was immense; its virtues in the treatment of mania were celebrated in the writings of the physicians and poets of antiquity.

The root, the only part formerly and at present used, is found to have the irritant properties of the other plants of the same family. When bruised in the fresh state, and applied to the skin, it causes a very severe local inflammation. Internally, it acts like an acrid poison, as shown by numerous experiments of the toxicologists. In a smaller dose, the internal use causes vomiting and diarrhœa; and as the local effect and the gastrointestinal inflammation last a good while, it is easy to see that energetic derivation to the intestinal canal has been useful in the treatment of certain neuroses and affections of the brain. Its value is also known in certain dropsies, in obstinate and extensive dartres. Finally, its emmenagogue and abortive properties are shared by all active purges.

According to M. Marmé (*Zeitschrift für rationelle Medizin*, H. et Pf., t. XXVI. and *Gaz. méd.*, 1867, p. 27), the roots and radical leaves of black, green, and fetid hellebore contain, in a formed condition, two active, non-volatile principles, of the class of the glycosides: helleborin and elléboréine; fetid hellebore also probably contains a third volatile principle. These two substances act as poisons on animals, and probably on man, while the oil of the root of hellebore ceases to act when the glycosides are removed.

Elléboréine is more active when procured from green hellebore; it has an irritant local action sufficient to produce in animals ulcerous enteritis. When it kills in a large dose, it does it by paralyzing the heart.

Helleborin, a little less soluble than the preceding, has an irritant action like that of elléboréine, but less pronounced. In a large dose, it does not act like the preceding, but like narcotics; it first causes excitement of the nervous system, then coma. At the autopsy, there is found hyperæmia of the nervous centres, and sometimes even apoplectic foci.

Senna.

This is one of the most certain and common purgatives. Whatever Mérat and de Lens may say, it causes more severe colics than most other remedies of the same class. These are more acute if the person is constipated. It is remarked that senna does not cause serous evacuations like those which directly irritate the digestive mucous membrane; the discharges are more feculent; and it seems as if the peristaltic movement had been so increased as to make all the contents of the small intestine

descend rapidly without any increased discharge of the biliary, pancreatic, and mucous fluids.

This mode of action explains the frequency of colics; it is manifest how, when the intestine is full of hardened fæces, the contraction of the muscular layer of the colon occasions more or less painful pressure.

The other muscles of organic life contained in the pelvis share in the contraction communicated to the intestine by senna. The bladder contracts more vigorously; and accoucheurs, by injections of senna, arouse the contractions of the uterus, if too feeble during or after labor.

The investigations into the active principle of senna are not complete, but furnish some interesting data. Prolonged boiling removes its purgative properties; the extract obtained by concentrated alcohol is inactive, while the part not dissolved in the alcohol remains purgative. The action of the infusion upon the intestinal muscles has led to its use in constipation. M. Grillon, an apothecary at Paris, encloses half a gramme of the powdered leaves in a little tamarind pulp and covers the whole with a layer of chocolate. These bonbons, more agreeable than senna prunes, may be given at meals, or at bedtime, and produce the next morning a natural stool as podophyllin does, but more quickly. It is sometimes useful to alternate them. The active principle enters the milk of nurses and purges the infants.

The infusion, placed as a fomentation on the abdomen, may purge.

The leaves and seed-vessels may be given: 1, in powder, which is very disagreeable, unless a bolus is made with honey and some aromatics; 2, in infusion, rarely in decoction, in water, which is the more usual way; 3, in extract, which, being very inactive, is mostly abandoned.

Senna forms a part of a multitude of purgative preparations.

To children we usually give it with prunes; a compôte of twenty or thirty is made according to the culinary art, in which from 8 to 16 grammes (ʒ ii.—iv.) of the seed-vessels, in a little bag of coarse linen, is boiled during the last half-hour.

Rhubarb.

Rhubarb is not actively decomposed by digestion. The bitter and coloring principles pass into the blood, which is proved by the yellow tint of the urine of those who take rhubarb. The perspiration is often yellow. It is the same with nurses' milk, which, besides a yellowish tint, acquires bitterness and slightly laxative properties which may be useful in some cases.

The powder, infusion, and decoction of rhubarb are gently purgative. They cause no colics, and do not weary the stomach or intestine; for while the other purgatives usually lessen the appetite and cause a painful malaise, rhubarb relieves the functions of the stomach, and stimulates the system rather than depresses it.

These special properties are explained to a certain point by the analy-

sis of the root. The purgative principle is combined with tannin and a bitter element, both of which have an incontestable tonic effect.

Rhubarb first purges, and afterward binds. This proves, not that it is astringent (as is said), but only that its action is purgative; for of the evacuants there are some which have a very transient action, while others modify the intestinal secretions in a more continued way. Constipation is always more likely to ensue in proportion as the purgative has a transient action; and neutral salts are followed by constipation as much as rhubarb, though they cannot be administered interchangeably.

The tonic properties of rhubarb caused it to be classed by the ancients with warm purgatives, which it was dangerous to give during inflammatory diseases. It is extremely suitable for adynamic cases, where evacuants are often required.

The reputation of rhubarb has of late fallen, though quite undeservedly. We have, however, made a good many experiments with it in hospitals and our private practice, which confirm the statements of the ancients.

Rhubarb has been recommended almost exclusively in diseases of the digestive organs. It is indicated in apyretic dyspepsia succeeding acute disease, and accompanied by bitterness of the mouth, slight pain at the epigastrium, and constipation; in that following excesses in eating, venery, or watching; in those of the chlorotic, of nervous women, of hypochondriacs. It has been advised in bilious diarrhœa, that is, that form of acute enteritis which provokes no febrile reaction, is unaccompanied by redness of the tongue, and throws the patient into a state of prostration greater than the gravity of the disease had led us to expect.

Dysentery.—In the treatment of epidemic dysentery, rhubarb has been used by so many men of weight that one must believe them. The case is not as it is with a great many other affections, the diagnosis of which was formerly inexact; here the malady is so palpable, and its signs are so marked, that error is impossible. Almost all the authors of the last two centuries agree that rhubarb is one of the most useful remedies in dysentery. There is no disagreement, except regarding the period of the disease for giving it. Some, as Degner ("Hist. Dysenteriæ biliosocontagiosæ," p. 140 et seq.), recommend it at all the periods of the disease; others prefer to give it at the beginning (Tralles, "De opio," sect. III., p. 187); some, when the dejections are no longer bloody (Zimmermann).

We will not speak of the supposed value of rhubarb in some diseases of the kidneys. This opinion was founded on the color assumed by the urine after the administration of rhubarb, rather than on positive experiment.

The anthelmintic virtues have been proved by Forestus ("Oper.," lib. XXI., obs. 32, p. 357), by Rivière ("Praxis med.," lib. X., p. 502), and by others. Pringle ("Diseases of the Army," p. 111) associated it with calomel for intestinal worms.

Doses.—The powder, as a tonic, is given in the dose of 30 to 50 centigrammes (gr. 4½—7½) at each meal; as a purgative, in that of 1·30, 2, 4 grammes (gr. 20, 30, 60). For an infusion we use at least 6 or 8 grammes (ʒ iss.—ii.) in a pint of water. For simple maceration a double quantity is required.

The watery extract has hardly any virtue; the alcoholic is a drastic purgative in the dose of 60—100 centigrammes (gr. 9—15).

Some physicians advise patients to chew rhubarb and swallow their saliva; they prefer this method to all others.

Podophyllin.

Constipation.—This is a chronic, that is, constitutional, disease. It therefore depends on the patient's temperament, regimen, way of living, and the diseases which he has previously had.

At first it has many forms, and may strictly be considered as a want of sensibility in the mucous membrane, which fails to warn the nervous system that it is time to command an evacuation. Sometimes it proceeds from a weakness in centrifugal action, as in paraplegia. Sometimes it is due to atony of the intestinal muscles, insufficiency of the secretions, etc., but in the course of time all these are mingled, and it becomes very hard to retrace the order in which these functions have been successively lost.

The remedies for this state are of several sorts.

Some arouse the sensibility of the rectal mucous membrane, which no longer commands the needful reflex action; such are foreign irritant bodies, from the parsley stalk used for children at the breast to suppositories of cacao butter, of medical soap, of honey hardened by boiling, and cool or even cold injections.

A second series is intended to supply a lack of intestinal secretion. It includes clysters of a pint of fluid, or more, with the addition of mucilaginous substances like the decoction of flaxseed, marshmallow root, the yolk of egg, or oil in emulsion. Or the intestinal secretion is excited directly by purgatives, usually the salts of soda; sometimes calomel or castor oil. Or the diet is composed largely of boiled herbaceous vegetables, Graham bread, figs, mustard-seed, café au lait, etc.

A third set act more specially on the muscular coat of the intestines; as drastic purgatives, aloes, colocynth, gamboge, rhubarb. We often prescribe the following pills:

℞. Aloes.....
Extract of colocynth...
Extract of rhubarb....
Gamboge.....
āā 1 gramme=15 gr.

Extract of hyoscyamus ..... 25 centigrammes=gr. 4.
Essential oil of anise..... 2 drops.

M. F. pil. xx.

Others arouse intestinal contraction by tobacco. Many smoke on waking, simply to procure a stool. Others try to bring on intestinal contractions by going daily at the same hour and making great efforts at expulsion. A fourth set attempt to arrest spasm, rather than to excite the muscles, by using belladonna.

In spite of all these rational methods, a cure is rarely effected, and the patient generally has to use daily injections, which is in particular the lot of all Parisian women, or rather, all women in large cities.

Others begin by consulting physicians, use in succession all the time-honored prescriptions, then turn to old women's remedies, and, soon tired of these, surrender themselves to the promises of the fourth page of the daily paper, and to charlatans, homœopaths, somnambulists, etc.

Podophyllin has the advantage of provoking stools without purging. The patient takes his pill at bedtime, and next morning has a normal operation. The remedy almost always acts, either the first day, or at all events, the second or third. It sometimes causes slight colics, of short duration; if they increase in intensity, they may be stopped by slightly lessening the dose of the medicine.

Podophyllin is also valuable as not fatiguing the organs, and as acting a long time without losing its effect. All who have had to treat constipation continuously know that that is the rock on which most remedies are wrecked. They not only cease to act after a few days, but they make the constipation more obstinate. This especially happens with preparations containing aloes or some equivalent.

Podophyllin is also perfectly well borne by the stomach, and is therefore precious in dyspepsia due to constipation. It does not act on the uterus as aloes does, and hence is very useful in the constipation of pregnancy, or in uterine diseases. It is even used with safety during the menstrual period.

Like all other purgatives, it is less active in bedridden patients; but it retains all its activity with paralytics who cannot walk. It has the great advantage, that it enables the hour for the passage to be fixed, at the time of making the toilet, for instance; so that when the patient is once settled in his chair he need not be plagued with this necessity during the day—a trial which is the worse, as such patients can rarely control the desire, and often foul themselves.

Old men are equally favorably affected, and are soon freed from the cerebral congestion and irritability which accompany constipation.

The precision with which podophyllin fulfils an indication is the reason why it has been so readily adopted. Those who formerly recommended it wrongly offered it as a purgative, in which character it is much surpassed by many other remedies.

We cannot too highly recommend it for constipation. It has been greatly praised by Ramskill (1861), Habershon (1862), Van den Corput (1864), Schmidt (1866), and J. Hughes Bennett (1869).

We began with this formula:

℞. Podophyllin..... 0·02 gramme=gr. 0·3.
Extr. belladonna..... 0·01 " =gr. 0·15.
Powdered belladonna root.... 0·01 " =gr. 0·15.

These pills had the disadvantage of making the throat dry, and were given up. We now use the following formula, which seems to us the medium dose for an adult :

℞. Podophyllin..... 0·03 gramme=gr. 0·45.
Powder of Jamaica ginger ... 0·05 " =gr. 0·75.
Oil, }
Gum tragacanth, } ..... q. s.

We have them also made with one and two centigrammes.

Experience has shown us that the medium dose for an adult should be 3 centigrammes. This is what we commonly use, but all practitioners know that the same dose may not always agree with every one, and it may need to be modified to suit temperaments. In some it at first purges freely; it is then sufficient to increase the interval between doses, giving it only once in two or three days, and soon the dose of 3 centigrammes gives only natural stools. If podophyllin continues to purge, we lessen the dose to two or even one centigramme (gr. 0·3, 0·15). But if it does not act, we must not increase, but rather lessen the dose to two or one. This inaction is often due to a too energetic operation, causing a sort of contraction, which may be avoided, and a more regular evacuation obtained by a smaller dose.

When the stools are regulated, we try to give podophyllin only every other day, then every three days, and at last only on days when there is no stool. We thus cure ordinary constipation; but there are some of a rebellious sort in which the medicine cannot be abandoned.

As regards the adjuvants of podophyllin, there is a natural one, consisting of sugar, which forms stable combinations with the resins. We will here mention the saccharate of cubebs, which we owe to M. Delpech, and which is very useful to us in membranous angina and croup. As between crystallized sugar, milk sugar, and honey, we prefer honey, which keeps the pills longer without hardening. This is very important; for when a pill is old and hard, it passes the entire digestive tube without being attacked, and thus loses all its physiological properties, becoming a simple foreign body.

We add to it a little ginger on account of the tonic effect which aromatic bodies produce upon the large intestine. With the same object, Van den Corput associates with his formula a little of the essential oil of fennel or cinnamon; also, as Ramskill does, a little carbonate of sodium, in accordance with Mialhe's theory of the action of resinous purgatives.

Habershon also claims that the extract of cannabis indica lessens the colic; and with this object we add extract of belladonna, which we had long used for constipation. We prefer at present to give podophyllin alone, until we are quite sure of its value in the numerous and complex conditions which produce constipation.

In higher doses, from 5 to 15 centigrammes, podophyllin is purgative; the addition of chloride of sodium [? carbonate] is said by some to increase its activity, while lactic acid lessens it. We are not very sure about this point, for the experiments we have made to ascertain the value of podophyllin as a purge, do not seem as satisfactory as those upon scammony, jalap, and other purgatives which we use daily.

All these results regarding podophyllin have been recently confirmed by Demarquay and Marchand (*Bulletin de thérapeutique*, 1874).

Acute articular rheumatism.—Dr. R. F. Dyor has used in this complaint, for five years, a mixture of podophyllin and a small portion of Dover's powder. The dose of the former is sufficient to procure discharges; the author says that it must be frequently increased for this purpose. He afterward uses the alkalies, but returns to podophyllin if the pains increase (*American Journal*, July, 1874; *Revue des sciences médicales*, t. IV., p. 620).

Gamboge.

Placed in contact with a raw surface, gamboge causes quite intense local inflammation, due perhaps to the mechanical irritation of the powder rather than to its stimulant action. We are led to think so by having often seen Bretonneau, of Tours, put powdered gamboge into the eyes of dogs, without causing anything more than a little very transient local pain. We therefore hesitate to consider it an irritant poison, and think that it acts only indirectly upon the digestive mucous membrane.

In the dose of 25 or 30 centigrammes (gr. 4—5) it usually gives rise to acute colics, followed by abundant serous discharges. It is then justly placed with the most energetic drastic purgatives.

It is rarely given alone, but usually in conjunction with calomel, aloes, or other substances equally purgative.

The extreme activity of gamboge recommends it in cases where a very abundant serous discharge is desired, as in dropsy. Hence it is regarded as one of the most powerful hydragogues. With gamboge given in emulsion for several days in succession in the dose of ¼—1 gramme per day (gr. 4—15), various serous effusions occurring in Bright's disease are sometimes very rapidly absorbed.

The drastic properties of gamboge have recommended it in a multitude of chronic cases, where it is often useful to set up a vigorous derivation to the digestive mucous membrane, as in paralysis, asthma, and pulmonary catarrh.

Finally, it is regarded as an active vermifuge. Madame Nouffer's

celebrated remedy for tape-worm is simply a combination of vermifuges and purgatives. The patient first takes from 8 to 12 grammes (ʒ ii.—iii.) of the powdered root of male fern; when it is supposed that the worm begins to be stupefied by the drug, a purgative bolus is given, in which gamboge plays the chief part.

§ 2. *Mineral Cathartics.*

Cream of Tartar.

We have intentionally placed this substance after the vegetable cathartics, for it really forms the connecting link between these and those of mineral origin.

Cream of tartar is a weak and uncertain purgative. It is given dissolved in ptisans, in a decoction of the pulp of tamarind or cassia, to keep the bowels free. It was formerly used for this purpose in bilious affections, dropsies, affections of the liver, etc. Its acidity has caused it to be classed with the temperants and hæmostatics, and certainly it renders some special services. Thus, while all other purgatives increase the menstrual and hæmorrhoidal discharges, this one moderates or even arrests them; if, then, a woman suffering from uterine hæmorrhage needs to be purged, we should use cream of tartar, unless we wish to run the risk of increasing the flow of blood.

For a considerable action, a dose of 60 grammes (ʒ ii.) is required; half of this is enough for a simple laxative action. The feeble solubility of this substance makes it necessary to give it mixed with the pulp of prunes or tamarinds. As a temperant, it is given in the dose of 8—16 grammes (ʒ ii.—iv.).

The neutral tartrate of potassium is hardly used at present; it purges in the dose of 15—30 grammes (ʒ ss.—i.).

Tartrate of potassium and sodium is given in the dose of 30—60 grammes (ʒ i.—ii.), and was formerly much used.

Mild Chloride of Mercury.

The protochloride of mercury (muriate of mercury, mercurius dulcis, calomel, aquila alba) is one of the most common purgatives, and one of the most indispensable.

Three protochlorides are distinguished in pharmacy, and the distinction is very important in therapeutics. The one known as "précipité blanc" [not "white precipitate"], is obtained by mixing two solutions both acidulated with hydrochloric acid, one of nitrate of mercury and one of common salt, and washing the precipitate carefully; the other is known as "calomel préparé à la vapeur," and is made by passing the vapors of the

protochloride and the bichloride through the vapor of water, where they condense without uniting, the bichloride remaining in solution and the protochloride in the form of impalpable powder, which must be carefully washed. The third is made by sublimation, and is not used in medicine.

Though chemical analysis discovers no difference between the well-washed precipitate and that prepared by vapor, there is nevertheless a great difference in their therapeutical action. The precipitate, used as a purgative, causes acute colics and acts with great violence; while calomel, cæteris paribus, is much less active and causes little colic in general. The precipitate is reserved for surgical purposes exclusively, while calomel is given internally.

We have to speak only of the purgative effects of calomel, its special mercurial powers having been stated under the head of mercury.

Calomel is a convenient purgative, as being perfectly tasteless; it is therefore the one most frequently given to children. The doses needed to produce evacuations are extremely variable; one may safely say that a given effect is produced by doses related to each other as one to ten. One person is purged by 5 centigrammes (gr. 0·75), while another of the same age and sex, and apparently in the same conditions, will have the same number of discharges with 50 centigrammes (gr. $7\frac{1}{2}$).

But if a single dose is very unequal in its purgative effects, it is not so with fractional doses. Five centigrammes (gr. $\frac{3}{4}$) mixed with sugar, divided into ten parts, and taken from hour to hour, almost invariably purges. This method has the great advantage, that the quantity is never large enough to cause accidents, while doses of half a gramme or a gramme, though not by any means certain purges, often cause very severe salivation.

The purging is long-continued, lasting usually twenty or thirty hours, and in children, sometimes longer.

The color of the stools is very remarkable. The first dejections are like those produced by other purges, as respects color; but when the calomel has passed the whole length of the canal, the fæces acquire a green color like that of spinach. This color is sometimes not observed on the day of administration, when the purgative action has been slight; we then see on the next day, or the day after that, green stools, which retain that peculiarity for two or three days.

It is possible that the color is due to the special influence of the calomel on the liver, and, indirectly, on its secretions. This would to a certain extent explain the happy influence of calomel in affections of the liver, which has so often been proved by physicians in tropical lands.

Magnesia.

Physiological action of its preparations.—Calcined magnesia is chiefly used as a purge. It is taken in sugar-water; as it is nearly tasteless, it is easy to take. It very rarely causes nausea; and the evacuations it causes are usually preceded and accompanied by few colics.

It seems to us necessary to insist for a moment on the nature of these evacuations. They are feculent, to use a common expression of the English physicians; that is, they are nearly of the consistence of liquid porridge; in which they differ from those produced by neutral salts like the sulphates of sodium and magnesium, which give serous discharges.

The action does not begin until long after the ingestion of the magnesia. It is usually given at bed-time, and the patient is not usually purged until the next morning, that is, eight or ten hours afterward. It is very rare for magnesia to act in less than six hours; but it is very common for its effect to be retarded till sixteen, twenty, twenty-four, and even thirty-six hours have passed. It is very remarkable that the purgative action lasts much longer than is the case with apparently much more energetic evacuants.

Those who have given little study to its mode of action have generally a very false idea of its activity and of the proper doses.

In 1835, we made at Hôtel-Dieu some comparative experiments upon sulphate of sodium and magnesium. We found that 2 grammes (gr. 30) of calcined magnesia produced in a good many patients as large a number of evacuations as Glauber's salt, but much more slowly than the latter. When we gave 30 grammes (℥ i.) of sulphate of sodium per day, for several days in succession, and at other times 4 grammes (ʒ i.) of magnesia, we remarked that the purgative action diminished from day to day in the former case, while in the latter it increased; and while the former caused no considerable trouble of the gastrointestinal mucous membrane, magnesia produced a true phlegmasia, as shown by the mucous, sometimes bloody discharges, and the tenesmus which soon follows. The effects of magnesia are not always so severe, but we believe we may state that we have always, or with few exceptions, found them more considerable than those of the neutral salts.

Experiments have been lately made upon animals for the purpose of explaining the mechanism of the action of magnesia. Armand Moreau placed in a loop of intestine, previously closed by two ligatures, a concentrated solution of sulphate of magnesia (15 or 20 per cent.), and found that this produced a very abundant secretion (*Académie de médecine*, 5 juillet, 1870, and 12 septembre, 1871). The experiment was repeated by Jolyet (*Soc. de biologie*, 1867), and by Vulpian, upon dogs, with or without curara ("Leçons sur l'appareil vaso-moteur," p. 495, 1874).

It follows that the salt of magnesia, applied directly to the mucous membrane, causes an abundant secretion, and that a double current is produced which suggests the phenomena of endosmosis. It is not surprising that a double current should exist when the solution has a greater density than that of blood, or that there should be a true dialysis. For crystalline substances penetrate into the blood, and cause the non-crystallizable to leave it. In fact, magnesia is absorbed and passes into the blood first and then into the urine; magnesia may be found in the urine of a person who has taken 40 or 50 grammes of Epsom salt. It is there

precipitated by the ammoniacal phosphate of sodium, which gives a precipitate of ammoniaco-magnesian phosphate. The whole is not eliminated on the same day, for magnesia is found in the urine on the next day and the day but one after the purgation (Vulpian, ibid., p. 508).

If, instead of injecting sulphate of magnesium into the intestine, we throw it into the veins in the dose of 3 grammes (gr. 45), it is found more toxic than twice that dose of sulphate of sodium (Jolyet et Cahours); but it does not appear that it purges—or not so constantly as Claude Bernard had supposed ("Agents toxiques et médicamenteux," p. 185, 1857).

Can we purge by injecting sulphate of magnesia subcutaneously? M. Luton (*Bulletin de la société médicale de Reims*, 6 août, 1873, p. 120) claims that he obtains this effect regularly with 10 centigrammes (gr. 1½) injected under the skin; but this is doubtless a mistake, for M. Gubler and others have repeated the experiment without success.

Therapeutic action.—Calcined magnesia has been used as an absorbent in acidity of the stomach and in pyrosis. It is given for this purpose in the dose of ¾—1¼ gramme (gr. 12—20). This amount saturates the excess of acids in the stomach and assists the stool without exactly purging. But the experiments of Claude Bernard inform us that the alkalies and alkaline earths have the power of increasing the gastric secretion when given in excess; hence the indication, not to give large doses at one time, unless we wish to purge.

This slight laxative effect is of much use in the treatment of certain gastralgias; whether the pains referred to the stomach are really seated in the transverse colon, and are due to an habitual accumulation of hardened fæces, when magnesia acts only as a laxative; or whether, by saturating the acids in the stomach, it eliminates a permanent cause of disturbance of the stomach.

The lithotriptic powers of magnesia were fully stated by Hoffmann: "Omnibus lithotripticis præferenda, censeo terra alcalina usta" (Cent. I., cap. LV.). But in our time Brande and Horne have shown by chemical and clinical experiments, that decarbonized magnesia in the dose of ¾—1 gramme per day, opposes the morbid formation of uric acid, and is superior, in the treatment of gravel, to the sub-carbonates of sodium and potassium (Mérat et de Lens: "Dict. de mat. méd.," t. IV., p. 182).

Mode of administration, and doses.—Calcined magnesia, as an absorbent, is given to nursing infants in the dose of 10 or 20 centigrammes (gr. 1½—3) twice a day; a little later, 20—40 centigrammes (gr. 3—6); to adults we may give from ¾ to 2 grammes (gr. 12—30). As a purgative, the dose for nursing infants is 30 or 40 centigrammes (gr. 4½—6); for adolescents, 1½—2 grammes (gr. 22—30); for adults, 4—8 grammes (ʒ i.—ii.).

As a purgative, the sub-carbonate of magnesium (white or English magnesia) is as good in every respect as the decarbonized; on this point we have made many experiments, which have absolutely proved it.

As an absorbent, and in the treatment of gastralgia, their effects are almost identical. We cannot say whether it is the same in regard to lithotriptic power; experience must decide this point. Its therapeutic applications are the same as those of calcined magnesia.

The neutral carbonate was not in use; but for a few years past, some French pharmacists have prepared a purgative water known as saturated magnesian water. A bottle of this purges almost as much as one of Seidlitz water, and the taste is equally disagreeable. To purge a child, 60 to 100 grammes (ʒ ii.—iii.) are mixed with the same amount of sugared milk.

Bicarbonate of magnesium.—Four grammes (ʒ i.) of this salt serve to compose what is known in the druggists' shops as "eau magnésienne gazeuse." One bottle of this is usually enough to purge slightly. This purgative, of an agreeable taste, should be recommended to susceptible persons.

Sulphate of magnesia is a gentle purgative, very sure in action; the dose is one or two ounces. It is usually prescribed dissolved in a bottle of artificial soda water, which makes it more pleasant to take. It is then called artificial Seidlitz water. The quantity of the salt to be contained in each bottle is stated in the prescription. It has, also, properties analogous to those of the sulphate which we are about to speak of, and which the reader may apply to the former.

Sulphate of Sodium.

Physiological action.—The purgative action is very rapid, often occurring in three or four hours. The stools are serobilious, occur in rapid succession, and usually cease twelve hours at most after the administration of the remedy. The short duration of the organic modification experienced by the mucous membrane is of great importance, and we shall see how it has been applied.

Sulphate of sodium, however long administered, does not cause gastro-intestinal irritation, except in very rare cases. This valuable property permits its use for several months without compromising the health. It is only remarked that an obstinate constipation, lasting a good while, follows the diarrhœa caused by the salt.

When the crystals are placed upon the mucous membrane of a loop of intestine, they dissolve in the mucus; then the membrane reacts, becomes red, and pours out an abundant secretion (Jolyet et Cahours, loc. cit.).

If a concentrated solution is placed in a closed loop of intestine, an abundant secretion is obtained (A. Moreau, loc. cit.). In such a case we may suppose, as in the case of magnesia, a dialytic exchange between the saline solution in the intestine and the liquids in the blood-vessels.

Claude Bernard stated that sulphate of sodium injected into the blood purged as well as when swallowed ("Leçons sur les substances toxiques

et médicamenteuses," p. 85, 1857). This experiment, when performed by Aubert and Rabuteau, gave negative results ("Mémoires de la Société de biologie," 1868, p. 21). Armand Moreau and Vulpian made the experiment, and could obtain no evacuation (A. Moreau, Jolyet et Cahours, *Archives de Physiologie*, 1869, p. 113; Vulpian, "Leçons sur les vaso-moteurs," pp. 514 and 516). A. Moreau proved only that sulphate of sodium, when injected into the veins, was much better borne than sulphate of magnesium. There may be question as to the dose, as we have seen that magnesia injected into the blood or subcutaneous cellular tissue purged more easily than when in a large dose.

A continued use of sulphate of sodium has been chiefly made in bilious diarrhœa, epidemic dysentery, and chronic diseases of the skin and brain.

Phosphate of Sodium.

This is an easier, and perhaps a more inoffensive cathartic than sulphate of sodium; its taste is not bad, and even children take it readily. It causes no colics, and gives serous and bilious discharges like Glauber's salt. It is less active than the latter, and should be used in a dose one-third larger. It is used in the same circumstances, and in the same way as sulphate of sodium.

Sulphate of Potassium.

This salt is found in various vegetables and certain mineral waters. It is a purgative, but requires a less dose than the sulphate and phosphate of sodium, which is chiefly due to the fact that it contains no water of crystallization. It is much more irritant in its effects, giving rise to quite severe colics and a sensation of heat which the others do not cause. In truth, we do not see that it fills any special place, and should be willing to see it banished from the materia medica, in favor of the sulphates of sodium and magnesium and the phosphate of sodium. Yet it has been particularly recommended for lying-in women, as the best remedy for drying up the milk, and avoiding the accidents which follow childbirth; we do not think that, even in this special case, it is preferable to the three salts which we just now proposed to substitute for it.

The dose for a purgative action is 12—16 grammes (ʒ iii.—iv.), which it is not desirable to exceed. Four grammes (ʒ i.) in a bowl of ptisan, for nurses who desire to dry up their milk.

EVACUANT TREATMENT IN GENERAL.

In the literal sense of the word, every medicine which excites a discharge of any sort is an evacuant. Thus emmenagogues, diuretics, sudorifics, sialagogues, epispastics, emetics, purgatives, etc., are evacuants. But usage has more especially reserved this sense for emetics and cathartics.

We shall speak first of emetics, and the indications for these heroic remedies; then of cathartics and their use.

Emetics and Emetic Treatment.

Let us first study rapidly the causes and the mechanism of vomiting.

The stomach is, undeniably, contractile; but is this contractility sufficient to effect vomiting? Here the physiologists begin to disagree; some ascribe to it an exclusive influence, while others deny it any sort of influence, and place vomiting under the control of the convulsed expiratory muscles; the larger number adopt a mixed opinion, and think that while the stomach contracts upon the materials it contains, the expiratory muscles come to its aid, but with much greater power.

Two principal facts may be considered as admitted, namely, spasmodic contraction of the stomach and convulsive contraction of the expiratory muscles; the first act directly dependent on the nerves and muscles of organic life, and the second on that of the nerves and the life of relation. These two are rarely isolated, but act together; so that when the stomach contracts, the convulsion of the expiratory muscles follows immediately, and conversely, when the latter become convulsed, the stomach contracts in turn.

There are certain causes of vomiting which attack the stomach exclusively, others which act only on the nervous system of the life of relation, and a third set which have a mixed action.

In saying that emetics produce contraction of the stomach directly, we imply that these movements occur through the medium of the pneumogastric nerve, the nervous centres, and the spinal accessory nerve. In proof of this we have that which occurs under the influence of ipecacuanha, which, in its irritant action, seems to act by direct excitation, and yet the effect is null if the two pneumogastrics have been cut. The stimulation therefore follows the course we have indicated.

This is a first form of mechanism: excitation of the centripetal fibres of the pneumogastric; transmission of this excitation to the centre, and return by the fibres of the spinal nerve which form the motor part of the pneumogastric. Radiating from the centres, the stimulus is distributed synergically among the expiratory muscles and those of the stomach.

The stimulations, after reaching the medulla, follow definitely the same route to the stomach, but it is otherwise with the centripetal current. Not all the excitations to vomit originate in the stomach; for instance, in the case of vomiting which is produced by disagreeable impressions on the senses, especially those of sight and smell.

A third method of vomiting is that which starts from the nerves which give the sensation of the solidity and fixity of the ground which supports us; as sea-sickness, where vomiting is produced at the moment when the ship plunges, ceasing to support us as it were; the vomiting caused by the seesaw, etc.

At other times vomiting originates in one of our viscera, or in the blood itself, as is supposed to be the case in certain poisonings, as uræmia.

Of digestive but not gastric causes, there are the tickling of the uvula, strangulation or obstruction of the intestines, hepatic colics. To these add pregnancy, uterine diseases, iritis, etc.

The nervous centre itself may form a point of origin, as in the vomitings of meningitis, cerebral apoplexy, certain cases of encephalitis with or without tremor, etc.

We cannot classify the emetics according to these different mechanisms; and there may be still other processes which we do not know.

Where, for instance, can we place the primitive action of tartar emetic and apomorphia? Not in the stomach, since if the two pneumogastrics are cut, the vomiting equally occurs. And if not in the stomach, is it in the blood, or in all the centripetal nerves, a special excitation of which may terminate in vomiting? Or may it be in the motor nerves which, causing the expiratory muscles to contract, cause expulsion of the contents of the stomach? Are there any emetics which act like the cough of phthisical persons after dinner, or the efforts of expulsion in hepatic or nephritic colic? It is possible, but we do not know it.

We are then obliged to abandon the old division of emetics into four classes—irritants of the stomach, of the centripetal or central nervous system, of the blood, and of the nerves of expiration. Better to avow one's ignorance than to affirm and propagate errors.

Let us study vomiting by itself, independently of the provocation.

At the moment when vomiting is about to begin, the respiratory muscles of the chest and diaphragm stop at the beginning of the movement of expiration, and the glottis closes as in an effort; at the same time the expiratory muscles of the walls of the abdomen contract and press the abdominal viscera on all sides. The stomach, violently compressed, might empty itself either into the duodenum or the œsophagus, but the duodenum takes part in the common pressure, and the materials, not being

able to pass the pylorus, escape with violence through the cardia and are hurled forth from the mouth.

Meantime the gall-bladder, also compressed, vomits into the duodenum—to use a figurative expression which is still very exact—and this intestine discharges into the stomach. Hence bilious vomiting; for the first discharges do not usually contain bile.

To explain vomiting and the afflux of bile and intestinal matters into the stomach, an antiperistaltic movement has been named, which no one has experimentally proved, and is not necessary in order to understand the phenomenon. Observe that the intestines may be considered in the present case as a pipe with only one open end; the liquids contained must escape if the pipe is violently compressed. The peristaltic and antiperistaltic action are singularly abused; purgatives, it is said, increase the peristaltic movements, and therefore urge matters to the large intestine; emetics act in the opposite direction, so that when a medicine which is ordinarily emetic purges, and when a cathartic vomits, a sort of error of action had to be supposed; and if, as usually happens, the emetic purged after causing vomiting, it was no longer an error of action, but a change of action that must be supposed. A sorry explanation!

There are included in the act of vomiting other phenomena, not special, but natural to every sudden violent effort. Such are cerebral and pulmonary congestions, ruptures and separation of the abdominal aponeuroses, abortion, return of hæmorrhage, etc.

We now turn from the mechanical part of vomiting to considerations of another order.

When the emetic is irritating, it exercises upon the stomach and certain other viscera, independently of the act of vomiting, an effect which it is very essential to understand. The gastric mucous membrane when irritated becomes the seat of a considerable sanguineous fluxion, and all the vascular system of the cœliac trunk remains turgid, as we see a panaris, a whitlow, or even acute rheumatism of the wrist, producing a very remarkable swelling of the arterial and venous vessels of the entire limb. This is observed in the administration of ipecacuanha; and we may at once calculate the power of the diversion of blood which can be effected by the simultaneous congestion of the liver, spleen, pancreas, and stomach.

But certain emetics have a different effect; they increase the secretion, not only of the mucous follicles, but also of the liver and pancreas; and this increase may be considerable, if we can judge by the salivary glands, when the gums are irritated by mercury or a high-flavored food. This explains the disproportion often observed between the liquids ingested and the matters vomited. Further on, in treating of the indications for emetics, we shall see the consequences that should follow from the above propositions.

It remains to speak of the general effects of emetics. This is not confined to the derivative effect, but includes a powerful modification of the

nervous system, in which it causes disturbance which extends to the whole economy.

This nervous disturbance causes secondarily a state of syncope and malaise quite analogous to that produced by bleeding, and manifested by pallor, tendency to fainting, small pulse, feebleness of respiratory murmur, cold extremities, sweating, relaxation of the sphincters and the voluntary muscles. All the organic harmonies seem to dissolve, and life appears to be near its end. The patient is very intolerant of this state, and rarely consents to remain in it for any considerable time. Yet it is sometimes a very interesting therapeutical point to prolong lipothymy in a patient. The value of it is easy to see. First, it is one of the most energetic immediate sedatives, to which only bleeding and cold can be compared; but bleeding produces a spoliation which forbids it being used long or frequently, while the disturbances of vomiting check the nervous actions only, and leave the system in all its functional capacity. But if we maintain the sedative influence, by repeating the remedy, the patient will be in the case of one who has lost blood freely but is able to repair the loss at once, since the reaction and the harmony will be re-established as soon as the physician chooses. Emetics are, therefore, a potent antiphlogistic remedy which takes the place of bleeding to great advantage. Apomorphia in the dose of five milligrammes (gr. 0.075) in subcutaneous injection perfectly fulfils this end.

Among the numerous inflammatory diseases there are some for which one rapid bleeding suffices, not curing the disease, but banishing possible accidents; and there are others which require repeated bleedings.

In the first case the affection is superficial, and the transient sedation produced by an emetic suffices to arrest the symptoms; as in children, in acute catarrhs and a multitude of other affections which generally last but a very short time. When a disease, without being severe enough to put life in peril, lasts very long, as whooping-cough, the repeated use of emetics causes almost daily a sedation sufficient to prevent the inflammatory complications from becoming dangerous.

But when the inflammation is deep, requiring an abundant loss of blood to check it, and the disease is such that violent reactions rapidly occur, emetics lose their applicability, and then they ought, like pneumonia, to be used in a certain way, according to the method of Rivière, or that which we shall hereafter give under controstimulant treatment.

This indication is also applicable to hæmorrhages; and we recommend it particularly in hæmoptysis.

The special duty of emetics, as antiphlogistics, is to produce only a very temporary enfeeblement, without despoiling the system. Bleeding reduces the system to a state of debility which lasts much longer, so that, for children, who generally bear bleeding very badly, and for young women who often experience profound changes of health after loss of blood, emetics ought to be preferred whenever there are no formal contraindications.

Observe that, in most cases, the effect of emetics is more potently antiphlogistic than that of moderate bleeding; for the latter despoil the system, but only render absorption more active without giving the effect of syncope, and, consequently, without immediate sedation; emetics, on the contrary, almost always have the sedative action which we analyzed above. There are a great many affections of moderate severity in which full bleeding cannot be really applied, and emetics must be preferred.

We just now said, when comparing moderate bleeding with vomiting, that the former only acted by despoiling the system a little, contrary to emetics.

But it is well to notice that emetics also possess a distinct spoliative effect; for on the one hand, by producing congestion of the abdominal vessels, and on the other, by increasing the secretion of the mucous membrane and the glands, they divert a quantity of blood proportioned to the abundance of the secretions, and thus have a spoliative effect, analogous to, if not identical with, that of bleeding.

This view of emetics, as a substitute for bleeding, will not, perhaps, be shared by a majority of pathologists; and we think it necessary to insist on the mechanism of their action.

As soon as the heart's movements become weakened, and a less amount of blood is thrown into the vessels, the inflamed or simply congested tissues receive so much less blood; and if the species of demi-syncope which accompanies vomiting is prolonged, the principal elements of inflammation will necessarily be wanting, and it will have to retrocede. But there is another powerful cause of the cessation of inflammatory fluxion, namely, stupefaction of the nervous system, which would of itself suffice to extinguish, or at least greatly to modify a phlegmasia. If we now add to these two causes the fluxionary concentration which occurs on the part of the gastric viscera, we find the three most powerful curative elements united against the phlegmasia: lessened supply of blood in the inflamed part, direct sedation of sensibility and contractility, derivative revulsion.

The ancients, who exaggerated the importance of crises, and explained too many cures by them, thought that emetics acted chiefly by causing a diaphoresis which, in this case, ought to be considered as critical. But observe that the sweat of a person vomiting has by no means the character of critical sweat, so admirably indicated by Hippocrates: "Sudor ille optimus qui die critica febrem exolvit, utilis autem qui levat. Malus vero frigidus; aut qui solum circa collum et caput exsudat" (Coac. 572); that it has, on the contrary, the character of bad sweats, as is evident from the second part of the passage quoted; and if we add the chills which alternate with sweat during vomiting, and the maxim of Hippocrates, "A sudore horror non bonum" (Aph. 4, sect. 7), we shall be convinced that the sweats which accompany the act of vomiting are, on the contrary, of the class of those which true Hippocratists would have con-

sidered as bad, while really critical sweats are always preceded by a febrile movement, during which coction takes place; they are warm, general, durable. Critical sweats may take place after vomiting; it quite often happens that, when the fever of coction has lasted long enough, and the crisis is either retarded or prevented by a complication which the emetic drives off, a crisis, usually by sweating, immediately follows the medicine. But more commonly the crisis, whatever be its nature, occurs after the reactive fever which usually follows the syncopal stage of vomiting.

This reaction almost always occurs, unless the emetic is given under pathological circumstances in which nothing could arouse the vital functions.

This power of emetics to arouse a reaction is very often used in therapeutics. Emetics are then a two-edged weapon, for sedation and for reaction. There is something in this alliance which at first shocks, and it seems as if we desired to invent facts to suit our theories, though we really are endeavoring to do the opposite.

If we take the great sedative, cold, we see general reaction succeed sedation. So, after the faintness of vomiting, there is a sort of general fever, the form and duration of which varies according to the way the emetic is given.

If the emetic produces a state of syncope which, though very marked for a few moments, is soon dissipated, the reaction is decided, strong, and takes the form of a light attack of inflammatory fever; but if the faintness lasts several hours, one, two, or three days, as happens when fractional doses of tartar emetic or ipecac are given, the reactional fever does not appear, the spring of the nervous system seems relaxed, in a word, incitability is extinguished. Emetics, therefore, are given, according to the indication desired, whether sedative or excitant, in one of these two ways; in measles, for instance, tartar emetic or ipecacuanha is given to excite a fever with sweating, and fluxion to the skin, if the eruption comes out badly; while emetics are also indicated in those inflammatory complications of the thoracic organs which are so often encountered in the disease. In the former case, one dose is given, which causes two or three discharges directly; in the latter, emetics are given several days in succession, in divided doses, in order to lessen the inflammatory fever and moderate the pulmonary inflammation.

The efforts to vomit are unpleasant, but they are sometimes of use. Among the undesirable points are those common to all violent efforts —hernia, rupture, hæmorrhage; but these may be partly avoided if the patient is made to drink large quantities of warm drinks, so that the muscular efforts may exhaust their action on the full stomach. But though, in general, vomiting with violent straining should be regarded as harmful, yet there are exceptional cases where the effort is useful; as when poison has been swallowed, or a foreign body is stuck in the gullet, or croupous false membranes nearly close the larynx. In this case we may

hope to empty the stomach completely, and to provoke the expulsion of the false body or the false membranes.

Gastric embarrassment.—Hitherto we have, so to speak, only skimmed the medical history of emetics; but these agents, till the end of the last century, and particularly in the 17th and 18th centuries, filled so important a place in medicine that it is well to state the conditions in which physicians were almost unanimously agreed upon their efficacy.

They were given with the object of evacuating saburra, bile, the percant humors which filled the stomach, and caused morbid troubles of various degrees.

First, what is meant by "saburra?" It formerly denoted the pasty fetid layer which covers the tongue of certain patients, and also a viscous and pultaceous secretion, supposed to line the mucous membrane of the stomach, and even of the small intestines.

Rabelais turned this theory into ridicule, as may be seen in chapter XXXIII. of the second book.

"A while after this the good Pantagruel fell sick, and had such an illness in his stomach that he could neither eat nor drink; and because one mischief seldom comes alone, he had got also the hot piss, which tormented him more than you would believe. His physicians, nevertheless, helped him very well, and, with store of lenitives and diuretic drugs, made him piss away his pain." We will not continue the gravel, but take up the treatment of the gastric disorder.

"You must understand, that, by the advice of the physicians, it was ordered, that what did offend his stomach should be taken away; and therefore they made seventeen great balls of copper, each whereof was bigger than that which is to be seen on the top of St. Peter's needle at Rome, and in such sort, that they did open in the midst, and shut with a spring. Into one of them entered one of his men, carrying a lantern and a torch, lighted, and so Pantagruel swallowed him down like a little pill; into seven others went seven country fellows, having every one of them a shovel on his neck; into nine others entered nine wood-carriers, having each of them a basket hung at his neck; and so were they swallowed down like pills. When they were in his stomach, every one undid his spring, and came out of their cabins; the first whereof was he that carried the lantern; and so they fell more than half a league into a most horrible gulph, more stinking and infectious than ever was Mephitis, or the marshes of Camarina, or the abominable unsavory lake of Sorbona, wherof Strabo maketh mention. And had it not been that they had very well antidoted their stomach, heart, and wine-pot, which is called the noddle, they had been altogether suffocated and choked with these detestable vapors. After that, with groping and smelling, they came near to the fecal matter and the corrupted humors. Finally, they found a montjoy or heap of odor and filth; then fell the pioneers to work to dig it up, and the rest with their shovels filled the baskets; and, when all was cleansed, every one retired himself into his ball.

"This done, Pantagruel, enforcing himself to a vomit, very easily brought them out; and by this means was he healed."

This ridicule was directed against those who, considering the tongue as the mirror of the stomach, thought that the thick coat covering it indicated a similar one in the stomach, and the treatment consisted in decrassating (so to speak) the gastric mucous coat.

This error has come down to our time. Stoll believed in this accumulation of bile in the stomach. "Nos crudum, plerumque amarescentem, apparatum in ventriculo et ejus vicinia collectum, bilem vocamus" (*Ratio medendi*, aprilis, 1776, Ed. Duplain, Paris, 1787, p. 20).

The word gastric embarrassment is, in fact, a very bad word, for in its literal sense it is a synonym of indigestion; either the oppression during the act of digestion, or the atony after the act.

Having combated this ancient hypothesis of the saburral and bilious coating of the stomach, we have now to examine the present hypothesis, which designates a subacute catarrhal affection by the name of gastric embarrassment or saburral condition. This theory does not please us much better. If it is true, the stomach ought to contain a greater than the normal quantity of secretion. But if such a patient is vomited by a subcutaneous injection of apomorphia, what is found in his stomach? Is it bile, as Stoll supposed? No. Neither is it an exaggerated secretion of gastric juice. The liquid is not acid; it has neither the transparency nor the other characteristics of gastric juice. Is it stomachal mucus? This is possible; but at all events there is very little of it, and it might also be saliva, which is, on the whole, more probable.

To make sure that the stomach has been well emptied, we give a quantity of tepid water, which is presently thrown up in the condition in which it was swallowed.

We are now forced to admit a catarrhal affection, with a perverted but not increased secretion. After vomiting, the patient is not relieved, unless he has had bilious discharges; he is, however, quite often relieved by simple efforts at vomiting. We must then reconsider our ideas; the saburral form of *embarras* does not generally produce an increase of stomachal secretion; the bilious form supposes a bilious catarrh added to that of the stomach.

These remarks become more striking if, instead of simple gastric embarrassment, we have the saburral state accompanied by fever or a phlegmasia. What, in fact, is gastric remittent fever, if not an affection of the liver with polycholia? What is the gastric or saburral state, complicating phlegmasias, except a biliary catarrh? What remedies act better than the true cholagogues in such cases?

Now as regards the etiology,—Do people get gastric embarrassment by eating innutritious, coarse food, which fatigues the stomach in the act of digestion? Rarely; the chief cause is good living, very substantial and nourishing food; not poor meals, but good dinners, composed of rich, appetizing and abundant food. The wines and liquors, which are such

potent factors, act more on the liver than on the stomach. We certainly do not mean that the liver is alone attacked, and the stomach remains unaffected; but we believe that, if there be an affection of the stomach, that of the liver is more considerable.

The rapid coming on of the heat of summer is another cause, which furnishes support to our view. At the end of May, while the temperature is rising, the system requires less and less effort in order to maintain its own heat, and hence lessens its calorific functions, which diminishes the liking for meat, and increases the desire for vegetable food. If at this time the heat comes on suddenly, instead of gradually, we may be sure of seeing gastric embarrassment, and the doctors will be busy from morning to night with prescribing the cholagogue emetics, ipecac., and tartar emetic.

Is not the trouble of the stomach in this case evidently complicated with hepatic embarrassment? The patient is encumbered with his materials for calorification, accumulated in the liver, and his need is for relief from this over-load.

The patient is thirsty, but his thirst is only quenched by acids, which free and cleanse the mouth. He has no appetite, all substantial food disgusts him, warm food gives him nausea, and nothing is more agreeable than iced drinks. He wants fresh air. In a word, instinct leads him to cease accumulating material for calorification, and to expend what he has in all these ways.

Thus everything leads us to consider gastric embarrassment as hepatic embarrassment; and the evacuants, especially those which unload the liver, find here their formal indication. This rôle of the liver, as a magazine for heating material, if unknown to physicians, has not escaped the popular instinct, for during severe cold weather people do not purge themselves unless forced to do it.

Paludal intoxication.—It was formerly almost the universal custom to vomit and purge a patient on commencing the treatment of autumnal intermittent fevers. It was thought that the bile was turgescent after the hot season, and that it was well to evacuate it before giving cinchona. This reason was probably bad, but we ought to examine the practical result. Bretonneau made certain experiments upon this point at the hospital of Tours. He vomited and purged some patients before using cinchona, and treated others without previous evacuations. The results were very different. The fever, in the former case, was cut off more quickly and surely than in the latter; the appetite and strength returned sooner. Thus was established a precept of great importance, always to purge and vomit in intermittent fevers, except in extremely rare cases, where there are evident contraindications.

The same might be said of puerperal fever; we have already noted the advantages which might accrue from the use of emetics in treating the diseases which follow parturition. But tartar emetic is much less suitable than the Brazil root in puerperal fever, whether because it acts too

violently, or that ipecac has quite special properties which do not depend on its emetic action alone.

Dysentery.—The above observation is true of dysentery. Emetics, in general, are indicated only in certain forms; ipecacuanha succeeds in almost all. It may be stated that ipecac should be given in all cases of acute dysentery, and to all women who suffer from the accidents of the puerperal state; while tartar emetic should be given only in the special case where there are symptoms of what was formerly called bilious fever, As regards the mode of action, we think that ipecac cures by substitution—of which more, when we speak of purgative treatment.

There are other diseases in which emetics are plainly of use; of such are spasms, but only those in which there are severe disturbances of the voluntary muscles. Thus, hysterical spasms are benefited by emetics, perhaps acting as sedatives, perhaps because in these circumstances they must be considered as agents of perturbation, or because, by engaging the activity of the nervous centres of organic life, they divert the excess of influence which seems to have momentarily invaded the brain.

Syncope, or at least the tendency to lipothymy which accompanies vomiting, is made useful in medicine to check hæmoptysis which threatens to be immediately fatal, or hæmorrhage after surgical operations, or to aid in the reduction of hernias and dislocations, or to assist the passage of a calculus through the ureters or urethra.

With these immense advantages there are some disadvantages. The remedy often causes a violent inflammation of the gastro-intestinal mucous membrane, even a peritonitis. The efforts to vomit may rupture the stomach, tear the diaphragm, cause hernia, hæmorrhage or abortion.

We must add, that pregnant women may vomit most violently without aborting, and that pregnancy is not, therefore, a contraindication for emetics.

Very little remains to be said regarding the mode of administration of emetics. They should always be given in the liquid form, or if insoluble, suspended in a large quantity of warm water. This is essential; it lessens the distress, and prevents the remedy, which is always irritant, from attacking limited portions of the mucous membrane and there producing injury. Warm drinks, like tea (but never aromatic), are to be given as long as the patient is troubled with a wish to vomit, and continued for some time longer, to aid the purgative action.

It is usual to prepare the patient by giving him less to eat on the day before, and slightly nutritious drinks like chicken or veal tea, barley or oat water, ptisans like boiled lemonade, prune water, decoction of tamarind or cassia.

The emetic is ordinarily given in the morning fasting, unless the call is urgent.

The patient must never be made to vomit while an evacuation is taking place which may be properly called critical: such are sweating and diuresis; but when these secretions do not give relief, when they

seem to be connected with the state of the disease, and not a resolution of it, we need not hesitate to give the emetic.

In general, we must never make women vomit during menstruation; but when the menses are laborious, or scanty, or a metrorrhagia supervenes under the influence of a bilious state, the emetic must be given in spite of the uterine flux. Stoll even advises not to deny a pressing demand for an emetic, during a normal menstrual discharge, and declares that the remedy, far from injuring, assists in the discharge of the function.

A hernia must not forbid the remedy, but strong mechanical support must be used while it is acting.

A singular precept has been stated, to the effect that emetics may cause cerebral congestion in children, and cerebral hæmorrhage in old men. We do not know whether this has occurred in the practice of observing physicians, but we have never seen anything of the sort, and have repeatedly seen cerebral congestion, complicated with what used to be called the saburral or bilious state, persist after bleeding and yield to an emetic; whether the remedy in this case struck at the very immediate cause, or that the revulsion and sedation due to the emetic sufficed to avert the encephalitis directly.

Cathartic Treatment.

Under the generic title of cathartics are comprised all agents which cause diarrhœa. Those which evacuate slightly, without colic, were formerly called laxatives; those which purge violently, drastics; those of medium activity, minoratives.

The etymological sense of the word "cathartic" [purgative] is not very well known. Some claim that the word is simply a synonym of "evacuant." Such products as the fæces, urine, menses, were considered as impurities, and their evacuation as a purgation; drugs which solicit or aid these discharges were cathartics. But when humoral medicine rules pathology, we see discharged, mingled with the urine and stools, certain humors which were regarded as the cause of diseases; it was then supposed that the "peccant humors" were drawn off by diuretics, and particularly, by those which gave rise to diarrhœa; and the term cathartic then had the double sense of evacuant and purifier. At present, although all the humoral theories of our predecessors have been swept away, and though one must now be a solidist under pain of ridicule, the name of cathartic has yet been retained for remedies which solicit diarrhœa, without implying the sense that the ancients gave.

In order properly to understand the mode of action of cathartics, it is well to detail some curious experiments made by Bretonneau and his successors.

Applying various cathartic substances to the denuded skin and the

mucous membranes, Bretonneau found considerable differences. Some irritated slightly and briefly, others produced deep local inflammation: some seemed to be as inert as an emollient decoction. The neutral salts were in the first class, the purgative euphorbiaceæ in the second, while the third included the mucilaginous-saccharine cathartics, and the great part of those which are extremely drastic, as gamboge, aloes, jalap, scammony, turpeth, senna, etc.

It was first inferred that the cathartic action, however energetic, might be perfectly independent of the local irritant action; that, consequently, purgatives had different modes of action. Thus, while the euphorbiaceæ produced upon the gastrointestinal mucous membrane an inflammation analogous to that on the skin, and consequently a supersecretion of the liver, pancreas and mucous membrane, the convolvulaceæ had originally no irritant action upon the mucous membrane, and their purgative effects had to be ascribed to another cause. Finally, the neutral salts caused a transient afflux of mucus and bile and pancreatic juice in the alimentary canal, and only a very transient irritation of the inner tegument.

If we now examine the local secretions as affected by agents which may increase them, we shall see that certain sialagogues have no power except by causing inflammation of the gums, and the rest of the mucous membrane of the mouth; such are the mercurials, and all the topics which have the power of causing local inflammation. The analogous cathartics are the euphorbiaceæ, the antimonials, ipecacuanha, violet, etc. In this case the secretion of the liver and pancreas is solicited by the inflammation of the duodenum, as that of the salivary glands is by phlogosis or ulceration of the mouth.

The sialagogues also stimulate the mucous membrane actively, but superficially; certain salts, tobacco, pepper, pyrethrum, act thus. The analogous purgatives are the neutral salts, mustard-seed, etc. [For the latter, see in vol. I., under Irritants.]

Certain remedies excite the salivary secretion very actively, without possessing any local irritant action, without causing any irritation of the buccal mucous membrane; among these are the substances of strong taste, like sugar, the bitters, pimento, and many essential oils. The analogous purgatives are the mucilaginous-saccharines, jalap, aloes, senna, etc.

Do the stomach and intestine, as regards the liver and pancreas, hold the same relation as the mouth to the salivary glands? It is impossible to answer categorically, but analogy permits us to think so; even direct observation would seem to prove it: for if, as is evident, the purgatives which we have just named possess no irritant properties, how can they excite a supersecretion of the glands annexed to the intestine, unless by acting sympathetically on those glands, as sapid bodies act on the parotid, independently of all irritant local action?

But nervous irritation alone, independent of other causes, may also excite an abundant secretion of saliva, as is seen when the recollection or

desire of a dish makes the mouth water; in the same way a moral cause, joy, and still more, fear, may cause a sudden diarrhœa, as acute as that due to a drastic cathartic. Yet we dare not say that this form is analogous to the species of salivation we just mentioned; it is, perhaps, analogous to sweat, which, under the influence of moral emotions, may suddenly drip from the surface of the body. But a nervous diarrhœa must be admitted, like a nervous sweat.

Experiments made upon animals bear witness entirely in this direction. If we cut all the nerves which go to a loop of intestine, as Armand Moreau did—that is, if we separate the ganglia situated in the thickness of the intestinal membranes from the general nervous system—a considerable discharge of liquid occurs into the intestine. It is not proved by this experiment that this flow is the necessary consequence of a disturbance of circulation; it is perhaps due to a primary influence of the nerves upon secretion. Yet we should not forget that the surgical injury of the nerves of the intestine rapidly modifies the mode of circulation. If the peripheral end of a cut splanchnic nerve be excited by electricity, there is a contraction of the mesenteric vessels. But if the central end of the depressor nerve be excited, these vessels are dilated. Exposure to the air produces an effect resembling this hyperæmia, which was used by Cohnheim in studying the intimate phenomena of inflammation.

Destruction of the mesenteric ganglia of the great sympathetic causes bloody diarrhœa, a true dysentery.

We will now mention the experiments made to determine the theory of the action of cathartics.

An old theory, that of Poiseuille, declared that saline purgatives act only by endosmosis. Claude Bernard, who studied this theory with care, did not accept it, and remarked that though, where saline purgatives are introduced into the intestinal cavity, there are conditions which render it probable, a considerable difficulty soon meets us. It is to be expected that mineral and crystallizable substances should have a purgative power proportioned to their exosmotic equivalent. Sugar, for example, ought to have a very marked purgative effect. Claude Bernard concludes thus: "Ingenious as may be the mechanical explanations of the phenomena of life, satisfactory as may be the experiments on which they rest, they do not explain certain actions, except on the condition of neglecting a larger number" ("Leçons sur les effets de substances toxiques et médicamenteuses," 1857, p. 85).

This theory has been succeeded by another, which has made some noise. It was put forth by Thiry ("Vienna Academy of Sciences," 1864, quoted by A. Moreau), of Vienna, and soon afterward by Radziejewski, of Berlin, and was to be applicable to all cathartics.

Recognizing that the migration of fluids in the intestine, whether alimentary or not, took place more rapidly under the influence of purgatives, these authors thought that their action consisted purely in an acceleration of the peristaltic movements, expelling the intestinal liquids

before they had time to be reabsorbed. This theory is untenable, and is refuted by Moreau.

Moreau has repeated to us an experiment of Thiry's, which we will mention. Thiry invented a very ingenious proceeding, which unfortunately has no future. Anæsthetizing a dog, he made a cut in the linea alba, through which he withdrew from the abdomen a piece of the small intestine, 40 or 50 centimetres long (16—20 inches). He made two sections, so as to separate completely a loop of intestine. Then he united the upper to the lower end by apposition of the membranes, and re-established the continuity of the intestinal cavity. The loop was then closed at one end, and the other end was sewn to the orifice of the abdominal wall, thus making a kind of external cæcum. He hoped to find in this loop of intestine something equivalent to a gastric fistula, which might enable him to follow step by step the chemical transformations which usually occur in the intestine. Unfortunately, he had not foreseen what happened; the loop, deprived of its digestive functions, rapidly atrophied, and the results were almost nothing.

Armand Moreau has repeated the experiments under less unnatural circumstances. He simply isolates, by two ligatures, a loop of the small intestine of a dog, about 15 centimetres long (6 inches), into which he injects 20 cubic centimetres of a solution of sulphate of magnesia ($\frac{1}{5}$). In a few hours the animal is killed, when a quantity of liquid is found in the loop, about ten or fifteen times greater than that which was introduced. It is evident that there is intestinal hypersecretion (*Société de thérapeutique*, 23 juillet, 1870).

Vulpian repeated these experiments, upon dogs previously curarized or morphinized. He likewise found, that, contrary to Thiry's theory, there was no increase of the peristaltic movement. On the other hand, Vulpian found a large quantity of catarrhal liquid, ropy, mucous and whitish, in which the microscope showed epithelial cells with vesicular nuclei, blood-globules, leucocytes, many moving granulations and vibriones. He also found that, while this exosmotic current was passing, a part of the saline solution was absorbed and eliminated by the urine (*Société de biologie*, 17 mai, 1873).

Moreau also endeavored to ascertain the influence which certain bodily conditions may exercise upon the action of purgatives. Under the action of morphine, he found it suspended (*Compte rendu de la Société de biologie*, 1868, p. 214). This experiment ought to bring back to our mind Poiseuille's theory of osmosis, although he proved that the conditions of endosmosis are modified by operating with salts of morphine, even upon dead bodies (Vulpian, loc. cit., p. 518).

A few words upon the effect of purgative injections. Experiment shows that injections have not only a local action, but by reflex action produce a certain stimulation of the rest of the digestive tube. Vulpian's experiments have placed it beyond a doubt in regard to purgative injections (l. c., p. 522). But we will go further, and say that one of the prac-

tical results brought about by the discovery of Cyon's depressor nerve has been the demonstration that the physicians of Molière were probably right in treating fevers and phlegmasias by the precept "Primo, clysterium donare." This practice, which ridicule overthrew, may, in future, be judged less severely if it is proved to cause a derivation of the circulation which the new discoveries of science enable us to comprehend at present.

Therapeutic Use of Cathartics.

Constipation.—The first idea that occurs to the patient and the inexperienced physician is, to purge when there is constipation. An immediate relief is obtained, and the objectionable symptom is removed so quickly and cheaply that the injury from the treatment is hardly understood; and yet we have but to study the mechanism of constipation, to be convinced that, if purgatives are indispensable in certain cases, they are hurtful in many others.

Constipation may be caused by a mechanical obstacle to the passage of the fæces. If this is placed so high as not to be attainable from the rectum, a remedy is evidently wanted to make the matters more liquid, so that they may pass through a narrower place; if the obstacle is close to the end of the intestine, it is evidently proper to remove it first, and purgatives form only a means of postponement.

But the constipation is most commonly due to a state of atony of the large intestine, which may have several causes, and may affect the mucous membrane alone, or the muscular and mucous coats at once. The muscular atony is produced under the influence of many causes; the chief of these is the retention of stercoral matter. This is at first voluntary, as is especially observed in women, who accustom themselves to resist the spur which warns them of the necessity, and, before long they do not go at all except under a pressing necessity. Hence, two inconveniences: increasing insensibility of the anal extremity of the rectum, and abnormal accumulation of fæces in the large intestine. In women the first retention is not always voluntary; the development of the womb in gestation, at first in the pelvis, where it compresses the rectum, prevents the bolus of excrement from descending so as to excite contraction of the terminal fibres of the intestine; and afterward, above the superior strait, it compresses the iliac portion of the colon, and impedes the course of the fæces.

The chronic displacements and engorgements of the uterus have exactly the same effect as gestation; but they have another action, which is very remarkable.

Women suffering from chronic uterine displacement and engorgement, can make no violent efforts without increasing their discomfort; they instinctively refrain from doing so, and at last become really unable to contract the abdominal muscles with energy. It follows that the fæces are pushed on almost exclusively by contractions of the muscular coat, and

the intestine is never completely emptied. The muscular coat becomes dilated, and the large intestine at last forms a sort of string of crooked detours, based on a structure which is normally rudimentary, but here take a development analogous to that observed in the solipeda.

There is a law in physiological dynamics, that the muscles lose energy in proportion to the mechanical elongation of their fibres; so that when at the extreme point of elongation, reduced to a sort of membrane, they have scarcely any appreciable contractility. Thus we see in the corpses of those who have been long constipated, the large intestine flaccid and distended like a pouch, while in those who went regularly to stool, the calibre of the intestine is completely closed up, and moulds itself in a way upon the small amount of matters contained. There is another portion of the larger intestine which may become the seat of an analogous dilatation, namely, the rectum above the sphincters. This passage is distended in the form of an amphora, the neck representing the upper part of the rectum, the belly the swollen, lower part, and the foot the anus. This change of texture has several causes, which are analogous to those already named.

When the bolus of excrement descends into the rectum, and the natural call is resisted, the fæces at last accumulate in large quantity, and distend the intestine mechanically; if there is a contraction at the anus, caused by a hæmorrhoidal swelling, a schirrous induration, a syphilitic affection or a spasmodic contraction due to a fissure, the same effect is produced, and the dilatation, at first temporary, is at last continuous.

It is very plain that, to remedy the symptom itself, that is, constipation, purgatives are always indicated, and will, very evidently, produce an immediate and satisfactory effect; but the use of cathartics is itself a cause of constipation, according to the law of reaction so universally applicable in the system.

The energy with which the system reacts against modifying agents is always inversely proportioned to the repetition of the action of the modifiers, so that the use of purgatives at last renders the mucous membrane of the digestive canal more and more insensible to their action, and still more so to the natural agents (the fæces) which are constantly in contact with their walls.

Far from benefiting constipation, cathartics increase it, and at last render it almost incurable.

Constipation due to the habit of resisting the calls of nature will yield to the contrary habit; that is, the patient should go to stool whenever invited by the slightest sensation of a call. But if this need is not felt, a well-directed volition will suffice to restore the lost function. The last statement requires some details.

The social acts, the exercise of the voluntary movements, the senses, etc., are not the only ones which are under the control of the will; the appetites also are subject to the will, for by the will we can control our habits to a certain extent. We generally regulate our life in such a way

that we remain sixteen or seventeen hours without eating or drinking, being the interval that separates the dinner of one day from the breakfast of the next; during this long time there is no desire to eat. If we think we ought to change our habits, to eat a little on waking and a little before sleeping, hunger will be felt four times a day, though it was felt only twice formerly; and the same is true of sleep and the venereal appetite.

Now the need to go to stool may become, and in fact does become, a habit. It is perceived at the same hours, like the need to eat; and a resolute will is sufficient in order to reach this result.

The essential point in treating constipation is, then, to induce the patient to go daily to the water-closet, once only, at the same hour, and not to leave it until he proves inability. If he fails two days in succession, he then takes, during the session, a pint of cold oily injection to aid in the escape of the mass. If these means are continued, it is rare that constipation fails to be cured, unless due to an organic lesion.

But if the desired result is missed, if the muscular coat is so flaccid that it cannot be made to receive, even for a few minutes, the stimulus necessary to aid the expulsory effort of the abdominal muscles, purgatives must be used; but only as an auxiliary; they evacuate the intestine, and consequently make it possible for the muscular coat to shrink, as much as its feeble contractility allows. This alone suffices to give it some energy; but at the same time, we must use remedies which have the power of augmenting its contractility, such as the tonics or stimulants, nux vomica, or cold water injected into the intestine. The astringents aid in this, though in a different way.

But constipation, as we said before, may be produced by atony of the mucous membrane. This atony is chiefly due to the abuse of local stimulants, which at last exhaust the brownian incitability, and make the tissue unfit to react to its natural modifiers. Warm injections and cathartics are the most common cause of this; the mucous membrane, with its secretions incessantly stimulated by the heat and the cathartics, ceases to pour forth the products of secretion as soon as these stimuli are withheld. Hence results a dryness, which prevents the fæcal mass from slipping out, and which is aggravated rather than improved by cathartics. In this case, cold and tonic local applications must be especially used (see above, Podophyllin).

Diarrhœa.—This affection may be located in the duodenum, the small intestine, or the large intestine. The duodenal form is almost always connected with gastric embarrassment. It is due to over-excitement of the mucous membrane, which at first increases the secretion of the numerous follicles, and then that of the liver and pancreas. This is the form to which the name of bilious diarrhœa has been especially given during the last two centuries. As the stomach is almost always affected at the same time, there is no appetite; if the patient eats, the food is rejected, or passes through the intestinal canal without being digested.

The phlegmasia usually extends in this case to the entire small intestine, when the follicular secretion may become as free as that of the glands, and there is considerable diarrhœa. When, on the contrary, the irritation is confined to the ileon, the diarrhœa is due less to exaggeration of the glandular secretion than to that of the follicles, and is less abundant. The dejections are bilious, though less so; for though the hepatic and pancreatic discharges are chiefly caused by irritation of the duodenum, they depend in part upon that of the stomach and ileum.

Diarrhœa caused by acute irritation of the large intestine is always less abundant, though the colics are more acute, and dejections are usually more frequent.

But if irritation of the mucous membrane of the stomach, duodenum, and small intestine may excite the liver and pancreas, the pancreatic and biliary juices may in turn cause a phlegmasia of the mucous membrane, in the rigorous sense intended by Stoll.

We first suppose a primary duodenal inflammation, which increases the secretion of the liver and pancreas ; the product of this secretion, pouring in great waves into the large and small intestine, must, by its strange presence, cause acute irritation, and then the bile is truly the cause of the enteritis. But this cause, though manifest, has not the singular importance which Stoll and Tissot assigned to it.

Thus far, we assume only an acute erythematous inflammation of the mucous membrane, and not a pustulous phlegmasia or chronic irritation; for the remedies which are useful in the first case are less so in the second.

In acute diarrhœa accompanied by symptoms like those of gastric embarrassment—usually a remittent fever, sometimes very intense—the emetics, and more particularly the emetocathartics, produce an almost immediate cure, which is not obtained so readily by any other treatment. When the same form of diarrhœa exists, and the vomiting and pain in the stomach, and fever, are not very considerable, purgatives suffice, without the previous use of emetics. And if the general reaction is very strong, and there are symptoms of inflammatory fever, preliminary bleeding may be useful, and a purge terminates the cure.

The cathartic, we think, acts here not because it evacuates the bile, but only because the local irritation which it causes takes the place of a morbid inflammation; this is another consequence of the law which we stated above, under Substitutive Treatment.

But the selection of a cathartic is important; it is essential to avoid those which act violently or too long. The neutral salts are particularly indicated; for, while strongly irritant purgatives usually increase the gastrointestinal phlegmasia, the salts modify the mucous membrane in a due degree, and suffice to extinguish a superficial inflammation.

But when the diarrhœa is caused by a pustular inflammation of the small intestine, purgatives have no power over the principal affection, whatever Dr. Larroque may claim; for the eruption has a fixed period, like variolæ, erysipelas, scarlatina, and other exanthemata. A large ex-

perience in hospitals will prove that purgatives do not arrest the development of the dothinenteric eruption, any more than antiphlogistics or tonics do; but they are beneficial to the general condition, either by opposing a substitutive topic action to the inflammation, which extends from the crypts to the surrounding mucous membrane, or by the depleting effect of the continual evacuation of the biliary, pancreatic, and mucous fluids, or else by a continual renewal of the fluids in the intestine which may make them less irritating.

If the experiments of Larroque have not led to a direct therapeutic result, they have at least shown that the fears of the school of the Val-de-Grâce were exaggerated, and that, in the treatment of typhoid fever, cathartics are not so incendiary as Broussais and his pupils thought. But it must be said that violently irritant purgatives are entirely contra-indicated in this disease, and that the neutral salts ought to be used almost exclusively.

We have seen that acute erythematous enteritis is cured by a purgative salt, while follicular enteritis goes unchanged through all its phases; there are, however, forms of deep intestinal inflammation without a pre-ordained termination, such as dysentery.

There is so much evidence to prove the efficacy of purgatives in dysentery, that there cannot be the least doubt of it; but as in this case the deep inflammation is very severe, something more than superficial weak purgatives is required; the substitutive treatment must be proportioned to the intensity of the disease; and then, if the neutral salts are used, we must repeat them, as we stated in a memoir published in 1828 in the *Archives générales de médicine;* or we must use energetic cathartics, like calomel, or gamboge, or injections of nitrate of silver, which act in the same direction. By these, the dysenteric phlegmasia, however deep, is relieved at less expense than by saline purgatives.

The unquestioned efficacy of these remedies in dysentery led to its being considered bilious, in most epidemics, and hardly ever inflammatory; though sometimes it was admitted to be bilious-inflammatory. But we will say here, as we said before under gastric embarrassment and bilious fever; the purgative was considered as only an evacuant, while it should have been regarded as also an irritant or substitutive.

When the dysenteric inflammation is superficial, or when in consequence of the medical constitution of the year it excites little febrile reaction, it is called bilious, and then saline purgatives suffice. If the phlegmasia is more severe, and the reaction more energetic, the dysentery is called bilious-inflammatory; the antiphlogistics and narcotics are useful adjuvants, and the cathartics may be a little more energetic than if the general reaction is sustained and very powerful; the antiphlogistic regimen should hold the first place, and rather energetic cathartics should be at once employed, at the head of which must be placed calomel —a precious remedy, which acts at once by its substitutive topical qualities and by its antiphlogistic alterant virtues.

Our remarks upon constipation do not apply to fæcal accumulations, a common and severe affection which daily gives rise to errors in diagnosis and treatment. We must attend to the cause, which is plainly an accumulation of fæces; and although inflammatory symptoms, often very violent, are associated with it, yet the cause of irritation must be attacked. As soon as the lump of fæces which produced the painful distention is expelled, everything resumes its order, unless a phlegmonous inflammation has developed, as is quite commonly the case, in the cellular tissue of the iliac fossa and the pelvis. In the latter case, the secondary condition deserves much attention, and a second set of remedies is needed after the removal of the most pressing disturbance.

These collections are frequent in lying-in women. Constipation is very common among them, and the slightest irritation occasions very severe inflammatory symptoms. As the fæcal matters usually accumulate only in the cæcum and the sigmoid flexure, the proximity of the uterus and its appendages gives a greater importance to the inflammation, which may rapidly extend to the uterus, ovaries, peritoneum, and pelvic cellular tissue. Hence the universal precept to keep the bowels open in lying-in women, either by laxatives or injections.

But if the fæces have accumulated, by the patient's neglect or the physician's want of foresight, and violent pains suddenly appear in the right or left iliac region, we need not at once infer an iliac phlegmon, an ovaritis, or a metroperitonitis, however intense may be the local pain; but we must consider the cause, and expel it, after which we can attack other symptoms, if any remain. The use of purgatives is greatly recommended by the fact that they are useful in lying-in women, even when the uterus and peritoneum are primarily and chiefly attacked.

Beyond a doubt, the accumulation of the stercoral matters is most frequently the cause of the partial peritonitis, of phlegmons of the iliac fossa and the ovaries; but these affections may depend on any other cause, and their development is sometimes preceded for several days by diarrhœa. It is singular that, even when this is the case, purgatives are as useful as when obstinate constipation precedes.

In brief, we may say that cathartics are especially useful to lying-in women, from whatever symptoms they may be suffering. Purgatives, in the great part of the cases where we have advised their use, act directly against the local inflammation, either by a substitutive action or by removing the cause; thus they may be and ought to be ranked with antiphlogistics; in fact, they are sure antiphlogistics, in the same sense as bloodletting, since they act in the same direction and manner. If by bloodletting the physician removes from the living body the materials of nutrition and repair, and opposes the hypertrophic fluxion of inflammation, it is plain that purgatives act in the same way, first by diverting a great mass of blood, which is drawn into the portal system and temporarily removed from the circulation, and next by soliciting the evacuation of

great quantity of products of secretion, which are necessarily formed at the expense of the blood.

The flow of blood which purgatives draw to the digestive organs is not, pathologically speaking, of the same order as that which follows the application of a large sinapism, or any other irritant, to the skin. Cutaneous irritation has an entirely different effect on the system from that of the digestive mucous membrane; and, while the former gives rise to quite severe reaction, the other depresses sooner, and arouses hardly any sthenic sympathies.

When the inflammation is superficial and temporary in its nature, like erysipelas, or rheumatic affections, it is well to prefer the purgative to the pure antiphlogistics, since the former attain their end with much less loss of force than the latter, and, when we cease to use purgatives, the system remains intact and in possession of all its resources for coction and convalescence.

Plethora may be sanguine, serous, or nervous; the latter shall not occupy us here, but will be treated of under Sedatives. But sanguine and serous plethora are often confounded, especially by inattentive physicians.

When a man's eyes are prominent and injected, his face of a purple red, the veins of his neck swollen, his intelligence obscured, his respiration sluggish, his pulse hard and close, or large and developed, sanguine plethora is the word, and a vein is opened. Relief is immediate. When the same occurs again after a few days, we bleed again, astonished at the persistence of the trouble, and we continue to bleed till the blood becomes almost serous, and there is general anasarca; and when the veins contain nothing but colored water, the symptoms of the pretended plethora are still present. This is a faithful portrait of serous plethora.

In sanguine plethora there is not usually an excessive quantity of blood, but only an excess in the proportion of the reparative elements.

Obesity often accompanies serous plethora, and leanness, sanguine plethora.

When the blood, too rich in the elements of repair, stimulates beyond reason the brain, heart, glands, and elementary tissues, there is a functional indigestion, if we may be allowed this figurative expression; that is, the different tissues have not risen to the point of assimilating so rich blood, which causes disturbances without number, all of a sthenic character, with frankly and violently inflammatory reactions. This is sanguine plethora, which calls for bleeding, and watery and alkaline drinks.

But in serous plethora there is always a vascular fulness, which is owing to the fact that an excess of serum has been added to the mass of the blood. This form of plethora is common in organic disease of the heart, in most of those of the liver and kidneys, in a few pulmonary affections, in chlorosis, hypochondria, and most cachexiæ.

Sanguine plethora is caused by too nutritious or dry food, by the use of analeptic tonics, such as iron; it is never produced by an organic lesion.

In speaking of antiphlogistic treatment, we dwelt on the characteristics of sanguine plethora; a brief comparison of the two parallel states, so often and so deplorably confounded, will here suffice.

In serous plethora, we discharge a certain quantity of the injurious serum by opening a vein; but we also remove the cruor, of which the system stands in such need—a need the greater, as this form of plethora is usually one of the symptoms of cachexiæ. The serum is reproduced almost instantly, for it is the least organized element of the blood, the one likest to the inorganic elements, and to water; the original symptoms soon reappear, and cannot be combated by the same means without great danger.

Here is the opportunity for those agents which remove only the serous part of the blood, which evacuate the vessels without removing their reparative elements. The diuretics fulfil this indication best, but when they are insufficient or inefficacious, cathartics do almost the same thing. We say, almost, for the action of the two is not absolutely the same. Diuretics remove none of the materials of nutrition, and may be used a long time without the least injury to the system; while purgatives, in addition to their effect on the digestive organs, the source of all repair, cause the evacuation of a great quantity of serum, and at the same time of bile, pancreatic juice, and mucus, all of which contain elements of organic repair.

Notwithstanding this, purgatives hold a very high place in the treatment of serous plethora and the various dropsies which are allied to this condition. Those, therefore, which cause the most abundant serous discharges, that is, the drastics, have received the name of hydragogues.

Cathartics are also used as depuratives; in speaking of spoliative irritant treatment, we showed how the continual flow of pus from the surface of an issue, or along the thread of a seton, and the fluxion permanently directed to this point, were a useful means at once of diverting the irritation from important organs, and at the same time of carrying away the morbid elements through the vessels, by the constant action of an energetic emunctory.

We have seen that sudorifics act exactly in the same way; and it is the same with purgatives, which in this respect are superior to sudorifics, and even to the issue, blister, and seton, in persons whose gastric viscera are in good condition.

The abdominal fluxion caused by evacuants is quite a useful means of recalling the menses. If a woman is purged on the day after her courses cease, the menstrual flow often reappears; hence the precept, never to purge when there is reason to fear a metrorrhagia; hence the abortive properties of drastics, so culpably employed by women who hide a fault by a crime, and by physicians who make themselves accomplices to a homicide.

In order to recall the flow from piles, the same class of remedies should be used; and we know how much the abuse of purgatives predisposes to congestion of the lower part of the intestine.

CHAPTER VII.

MUSCULO MOTOR EXCITANTS, OR EXCITO-MOTORS.

Nux Vomica, Strychnia.

Paralysis.—A more or less complete knowledge of the physiological action of nux vomica led Fouquier to recommend it in paralysis; and, though he himself was less successful, perhaps, than others have been, we must still accord to him the honor of the discovery. The first application was in the treatment of hemiplegia. It is undeniable that the remedy has some value in old hemiplegias; but, as he used it also in recent cases, cerebral symptoms sometimes occurred, with an aggravation of the paralysis, and the remedy soon fell into undeserved discredit.

Bretonneau, of Tours, to whom therapeutics is so much indebted, repeated Fouquier's experiments, and soon found that while nux vomica has little value in hemiplegia, and, in general, in all paralyses arising from cerebral lesion, it may be given with great profit in paraplegia, and, in general, in paralysis which depends on disease of the cord, or of the nervous conductors only. After many trials he formulated the cases in which it ought to be tried, as follows :

Paraplegias symptomatic of concussion of the medulla, when the primary symptoms are past and paralysis alone remains; those which follow inflammation of the medulla or its membranes, when all the phenomena of local irritation have long disappeared; those which follow Pott's disease, when the osseous caries is cured, and the settling of the vertebræ completed; the various paralyses caused by lead.

Since then Tanquerel has published a thesis in which he particularly insists on the value of nux vomica, and particularly on that of strychnia (which amounts to the same thing), in lead palsies; he has reported numerous observations made under Andral and Rayer and ourselves. These cases would alone place the value of the remedy beyond a doubt.

The effects of nux vomica upon the paralyzed parts are very remarkable. The sparks, the shocks, the formications, chiefly appear in the members destitute of sensation and motion; this is even a condition of success, for when the paralyzed parts are not actively affected by nux vomica, there is little hope of improvement.

Amaurosis.—Strictly local paralyses have been successfully treated

with this remedy. We will place amaurosis in the first rank. Bretonneau attempted to relieve amaurosis, caused by saturnine emanations, by nux vomica, but with no marked benefit; since then Drs. Walson (*Journal des Progrès*, t. III., p. 234, 1830) and Liston (*Arch. gén. de méd.*, t. XXII., p. 548), and more recently Miquel, recommended strychnia for amaurosis caused simply by compression of the optic nerve. They preferred giving it endermically, and in some cases had unquestionable success. This treatment has the advantage of adding to the effect of blistering, which may claim a part in the cure of some amauroses, with the still more certain effect of the excito-motor, which in this case seems to be more directly carried by absorption to the parts in need of it. The most important of the effects of this method of administration is the perception of sparks of various number and brilliancy at the fundus of both eyes, especially that of the side to which the blister is applied. If these sparks are absent, the prospect of success is bad. The character of the sparks is also worthy of remark; they are sometimes blackish, at other times white or red. The red are the best; if too brilliant, the doses must be lessened (*Journal des connaissances médico-chirurgicales*, t. III., p. 201). In some cases we have substituted friction of the temples with tincture of nux vomica, giving at the same time the extract internally.

Of late, many amblyopias and amauroses have been treated by subcutaneous injections of a solution of nitrate of strychnia. We may cite, among others, J. Talko, of Tiflis; J. de Lacerda, of Lisbon; Magel, of Tübingen; Cohn, of Breslau; J. Chisolm, of Baltimore; Bull, Hippel, Jayakar, Irickenhaus, of Marburg; Bergh, of Stockholm; Dor, of Berne; Van Wiezel, of Amsterdam. The dose is one or two milligrammes (gr. 0·015—0·03. One injection is made daily, rarely two. In general, the action is felt a few minutes after the injection.

If improvement is to be expected, it usually begins in a few day, so that in a week we know whether it is desirable to continue. The usual time of treatment is about three weeks, but varies according to the nature of the disease.

The indications for strychnia are the following: There is no chance of benefit unless the eye is free from ophthalmoscopic appearances of lesion. The cases which have seemed to us most favorable are those of traumatic amaurosis from concussion or contusion; hysterical amaurosis, epidemic hemeralopia, amaurosis from anæmia, after severe fevers, etc.

Lead poisoning.—In the local paralyses which attack those who have been exposed to the emanations of lead, we have not found that the local application of nux vomica to the denuded derma had any better effect than its administration in the ordinary way. We have found much more benefit by giving strychnia or extract of nux vomica internally, while we applied to the skin, over the paralyzed muscles, fomentations with the alcoholic tincture. This is the method to follow when we have not electricity at command—which is much better.

Paralysis of the bladder.—Incontinence or retention of urine, depen-

dent on paralysis of the bladder, has been treated successfully by the same remedy. Lafaye, of Bordeaux, cured an old man of retention in seven weeks, by extract of nux vomica in the amount of 20—40 centigrammes per day (gr. 3—6) (*Journal de méd. pratique de Bordeaux*, t. II., p. 32). Mauricet reports (*Arch. gén. de médecine*, t. XIII., p. 403), that two brothers of lymphatic constitution, one thirteen, the other fourteen years of age, were subject to nocturnal incontinence of urine; they took morning and evening a pill of half a grain of alcoholic extract of nux vomica, and were cured in three days. The medicine was stopped in a fortnight, and the incontinence reappeared; it was resumed, and again suspended, with the same results as before; but a third trial, prolonged for a month, effected a solid cure.

Local paralysis.—About thirty years ago, at the Hôtel-Dieu, we cured, by the same method, a woman who had become paraplegic by a fall from a very high place, and whose bladder, rectum, and all the pelvic organs, had remained paralytic.

Subcutaneous method.—This method has been used in treating local paralysis. The first who employed it, M. Courty, of Montpellier (*Bulletin de thérap.*, 1863), had at first small success with old paralyses; but he was wholly successful with a few injections made in the manner to be described, in a paraplegia of only one year's standing, though various other treatments had failed. He was still more successful in three cases of recent facial paralysis, for which from three to six injections sufficed, performed in the period of from ten to fifteen days.

In these experiments, Courty used a solution of strychnia of one per cent., with which he injected every two or three days from 4 to 8 milligrammes (gr. 0·06—0·12) behind the condyle of the lower jaw.

Since then, the example of Courty has been followed by a certain number of physicians, but they have no longer used strychnia, but the nitrate or sulphate, which are more soluble. Pletzer (*Schmidt's Jahrb.*, 1865) thus cured a case of facial paralysis and two of sciatic neuralgia very rapidly. Sander obtained very good success in a tic-douloureux of the face. Saemann succeeded equally in a case of facial paralysis and one of sudden amaurosis, as Frémineau had done.

Since our last edition, some observations have been published, tending to show that strychnia, given subcutaneously, in doses varying from half a milligramme to two and a half, at once (gr. 0·0075—0·0375), may benefit local paralyses, sometimes of considerable extent.

Ch. Hunter (*British Review*, April, 1868) gives seven cases of cure, and notes in particular that, shortly after the injection, heat returned to the paralyzed parts, but that, in spite of quite rapid improvement, a considerable time was required for a cure. Leube, of Erlangen, has published a case of diphtheritic paralysis cured by these injections (*Archiv f. klin. Med.*, VI., ii. and iii., 1869).

We have injected sulphate of strychnia a certain number of times, with but moderately satisfactory results.

The solution of the sulphate in distilled water does not change by the formation of confervæ like that of morphia, atropia, and others. That which we have used for more than a year is as pure as the day it was made.

Impotence.—We were first led to this treatment of impotence by analogy, and then by the observation of the effect of the remedy on one of our patients. It was a man who had suffered for three years from complete paraplegia with chorea. The arms and legs, the bladder and rectum, were paralyzed as to movement; sensibility remained; the intelligence was perfect. From the beginning of the disease, the excitability of the genital organs had been wholly extinct. Under the action of nux vomica, movement returned almost completely, tremor ceased, and after a month of treatment erections occurred, which, at first weak, soon became as energetic as formerly and returned every night. We soon found the same effect in a roofer aged forty, whose lower limbs were much weakened, and who had not been able to have connection with his wife for seven months. In two weeks of treatment he walked more firmly, while the genital organs were in a state of excitement, which was the more remarkable as the muscular force of the limbs did not return with equal rapidity. We have seen analogous effects in a woman. We obtained equally happy results in the case of a young man of twenty-five, of athletic frame, whose relations with his wife had been scarcely more than fraternal during the eighteen months of his wedded life; we restored to him a virility which he lost again after a while, in spite of the use of nox vomica.

Since these first trials, many other cases have confirmed these results; at present, scientific reports abound in cases of the cure of complete paralysis or simple inertia of the bladder, incontinence of urine, impotence or spermatorrhœa, cured by strychnia employed in various forms.

These successes are readily explained by the remarkable action of strychnia on the muscular layers of the organs which are paretic. In a few cases the remedy, taken internally, has given rise to retention of urine, and even such a constriction of the urethra that a sound was introduced and withdrawn with difficulty.

Nocturnal incontinence of urine.—Nux vomica and belladonna, though so different in their physiological properties, nevertheless cure the same diseases, especially nocturnal incontinence. It may be that there are two different or opposite causes for this state; inertia of the bladder in some cases, and excess of irritability in others. In young boys, nocturnal incontinence is quite commonly accompanied by an habitual state of erection during sleep, which leads to the supposition that there is an analogous pathological state, that is, erethism of the muscular layer of the bladder. In favor of this view we may add, that nocturnal incontinence is generally better cured in children by belladonna than by nux vomica. But when the incontinence is both daily and nightly, preparations of nux vomica are much the better.

Chorea.—This is one of the diseases in which nux vomica has been the most successful. This was stated by Lejeune, rather vaguely. Niemann and Cazenave treated a case, which had been despaired of, with nux vomica, and were successful. We employed it in 1831 for a case of paralysis combined with chorea, less in the hope of curing the chorea than for the paralysis. It was in 1841 that we first clearly formulated the treatment of chorea by nux vomica; and our experiments were made publicly in our hospital. At about the same time, without the mutual knowledge of either party, the methodical use of strychnia was advised by Fouilhoux and Rougier in chorea. While we were collecting and publishing observations, Rougier was doing the same, except that he gave strychnia, and we, nux vomica.

Encouraged by our example, a great many physicians repeated our experiments, and the use of nux vomica in chorea is now almost universal.

We order for children a syrup of strychnia, made by dissolving 5 centigrammes of the sulphate in 100 grammes of simple syrup. 100 grammes of syrup contain almost 25 teaspoonfuls, and each spoonful therefore contains 2 milligrammes of the active principle (gr. 0·03).

This syrup is rarely kept ready made at the shops; it has to be written for, and sulphate of strychnia, not strychnia, particularly insisted upon. In spite of its bitterness, children have little repugnance to it.

The administration must be watched with the greatest care. We give on the first day two or three teaspoonfuls of the syrup, according to the age, insisting on its being given at equal intervals during the day, at morning, noon, and night, so that the effects may be watched and the aim not overshot. If the dose of three spoonfuls is well borne, it is continued at first for two days, then increased by one spoonful; then wait two days more, and thus attain the amount of six, always giving each at the proper intervals.

When this dose is reached, we substitute one dessert-spoonful (representing twice as much as the former) for one teaspoonful, and following the same rules, gradually reach 60 grammes or 6 dessert-spoonfuls per diem, containing 3 centigrammes of sulphate of strychnia (gr. 0·45). Then one after another of these is replaced by a tablespoonful, and, by the same gradual process and precaution of distributing the dose at nearly equal intervals during the day, we at last give to children of from five to ten years of age from 50 to 120 grammes of syrup, or from 25 milligrammes to 6 centigrammes (gr. 0·4—1·0) of sulphate of strychnia.

Beyond this age we begin with the dessert-spoonful, and gradually reach 200 grammes of syrup or 10 centigrammes (gr. $1\frac{1}{2}$) of the active principle, for adolescents. It is especially important to remember, always to begin with small doses; their action is watched, and before going further, the amount is kept fixed for two days. It is the more essential to watch over the treatment, as the remedy must be given in doses large enough to betray itself by physiological action. It is necessary, also, to let the persons in charge know what may happen.

In a very few days, when we begin to increase the original dose, the patient feels at certain moments in the day, twenty or thirty minutes after his dose, a little stiffness of the jaw, headache, disturbance of vision, a little vertigo, and some stiffness of the muscles of the neck; he complains of itching in the parts covered with hair and the hairy scalp; this itching extends to the bald places, and sometimes a pruriginous eruption occurs. If the dose of the medicine is increased, the stiffness becomes general, and attacks the members which are most agitated, and which are also, as is well known, the most paralyzed. In some cases there are also muscular shocks, and often (if there is hysteria) spasms, or convulsions. These shocks are produced especially when the patient is surprised, as when he receives a sudden order, and may throw him to the ground. The contractions are tetanic, painful, especially when there is an effort to resist and to remain upon the feet; but lying on the flat of the back is sufficient to quiet the storm at once.

When these effects appear we must not increase the dose any further, for strychnia, like all the preparations of nux vomica, is a remedy which, by virtue of its very peculiar long therapeutic range, and a most remarkable accumulative action, is capable of causing unforeseen accidents, even though it has been given in moderate doses which up to a given point of time produced scarcely appreciable effects.

If it is important that the physician should not be alarmed at the physiological phenomena which he should seek for, and which, unpleasant as they may be, have no gravity except when carried too far (and that never happens when the syrup is properly given), it is also important to be aware that tolerance of the remedy not only varies according to individuals, but even in the same person, so that while the doses remain the same, we never can infer to-morrow's effect from that of yesterday. While six spoonfuls produce no appreciable effect to-day, violent spasms may occur to-morrow immediately after the first dose, even when we are sure that the preparation is the same.

This variety of action makes the administration a delicate matter, demanding the most scrupulous attention, which will perhaps prevent this treatment from taking the place which it ought to hold in chorea. As a last rule, we add that the syrup ought to be given several days after the cessation of the chorea. By repeating the treatment soon after, for a much shorter time and with much smaller doses, we may prevent relapses. This is the rule we observe, but it is impossible or very difficult to put it in practice in a hospital (Trousseau, "Clinique médicale").

Ought nux vomica, then, to replace all other remedies in chorea? God forbid that we should ever advise the neglect of indications which may, and sometimes ought to govern treatment! Bleeding, if there be fever or plethora; iron, if chlorosis or anæmia is evident; antispasmodics and immersion, if hysteric symptoms predominate; sulphate of quinia and digitalis, if there are signs of articular rheumatism in the subacute

stage, must be prescribed first of all; and nux vomica will give good help as soon as the first troubles are made smooth.

Tetanus.—Nux vomica seems to have been useful in some cases of spontaneous tetanus.

Hiccough.—M. Guibout has lately communicated to the Société de médecine des hôpitaux two cases of hiccough, which were cured by the following potion:

Sulphate of strychnia.....	3 centigrammes	(gr. 0.45).
Syrup of mint.....	30 grammes	(℥ i.).
Water.....	150 "	(℥ v.).

The first case was that of a person who was troubled with a perpetual hiccough. The potion produced a complete cure in a few days. A year later M. Guibout saw the patient again, and there was no relapse. The second was that of a man who had cerebral hæmorrhage and a violent hiccough; the latter symptom was driven off in thirty-six hours by the same preparation of strychnia.

Obstinate vomiting.—In a case of amenorrhœa with obstinate vomiting, without pregnancy, M. Debauge of Lyons, relieved the vomiting by sulphate of strychnia given twice a day endermically (*Lyon médical*, 1872, No. 1).

Neuralgia.—M. Rœlants uses nux vomica with much success for facial neuralgia, both in inveterate and recent cases. He has collected the history of 29 patients, 21 of them treated by himself, and the others by Drs. Van der Hoven, Van Anckeren, Meerburg, Levie, Krierger and Jones. Of these 29, 25 were cured.

Rœlants gives nux vomica in powder, in fractional doses, gradually raised from 20 up to 60 centigrammes (gr. 3 to 9) and more, for the 24 hours. He expressly advises the greatest watchfulness and circumspection in the administration, for he has seen persons in whom small doses produced very violent effects, and had to be diminished or entirely suspended. In all cases it is right, as soon as the disease has yielded, to begin to diminish the doses.

We should at present prefer the subcutaneous method, by which Pletzer cured sciatica, the most obstinate sort of neuralgia.

Lead colic.—The value of nux vomica in the hands of Serres is probably due to its narcotic effects. It is applied to the abdomen in fomentations; and at the same time it is given internally in increasing doses, until the pain is past, and the dejections are re-established.

The action of nux vomica upon the muscular coat of the intestines in the reflex way has been turned to account in stercoral accumulation and even in real strangulation. Homolle has quoted several very interesting cases of strangulated hernia, in which the surgeon was about to perform an operation for releasing the intestine, but nux vomica, given as a last resource, relieved the stoppage and the symptoms of strangulation.

Asthma.—The same physician states that nux vomica has given him very good results, not only in gastralgia, dyspepsia, and hypochondria, but also in asthma, whether connected or not with pulmonary emphysema, and in certain suffocating catarrhs in old age. Here strychnia may act by restoring tone to the pulmonary vesicles, or by stimulating the pneumogastric nerves; and thus it would aid in the expulsion of materials which choke the ultimate bronchial ramifications. The same remedy has been of use in certain palpitations of the heart dependent on profound general debility, and in certain dropsies, which, says M. Homolle, might be considered as produced by a diminution of the general contractility of the tissue (*Union médicale*, oct., 1854).

Dyspepsia.—It was once thought that certain other properties of nux vomica, including its excessive bitterness, might be made useful; that a tonic effect might be produced, analogous to that obtained by bitters in general; and it was given in certain dyspepsias.

It is quite natural to suppose that the bitterness plays its part, for bitters are generally useful in these affections; but it is also very probable that the evident action of nux vomica upon the muscles of organic life, and consequently upon the muscular coat of the intestine, restores to the digestive tube the movements which it had lost, and which are a necessary condition for the performance of digestion. Experience has shown that this remedy (first proposed by Schmidtmann) is peculiarly adapted to old men, or to those who are grown old prematurely: it is suited to that especial state of the intestine in which digestion is very slow and rather painful, is accompanied by flatulence, swelling of the belly, and constipation, without any fever or bitter taste in the mouth or nausea; a state not to be confounded with the digestive sluggishness which precedes, accompanies, or follows most acute and chronic diseases.

In this case the dose of nux vomica should be less than in paralysis.

The remedy, however, is far from being exclusively appropriate to the latter conditions. The best established experience shows that, in young persons, nux vomica sometimes produces truly remarkable results in certain forms of obstinate dyspepsia, especially those which are accompanied by flatus and quasi-paroxysmal pains, as in the case of certain hypochondriac patients. In these circumstances we have found special value in the bitter liquor of Baumé, given in the dose of six or eight drops in a few teaspoonfuls of water, shortly before eating.

Cholera.—Nux vomica has been recently the object of excessive praise and passionate attacks; some have lauded it as the specific for cholera, while the great part have proscribed it as both useless and dangerous.

Between these extreme views there is room for an intermediate opinion. Our experience has led us to the following conclusion:

Employed during the cold stage, and in the most intense forms, nux vomica usually fails, as do all the other agents of the materia medica. If sensibility is extinguished and absorption suppressed, what good can this or that remedy do, however energetic it be?

If the form of cholera is less grave, and the conditions permit the remedy to display its effects, then the potent excitation of the ganglionic system which nux vomica produces will be able to render efficient aid in reaction, in the same way as many other tonic and stimulant remedies, and sometimes to arouse promptly the radical functions, which have been directly and deeply affected by the morbid cause.

It is even possible that in virtue of the very special action of this drug, the reaction, instead of being quick, brusque, and impetuous, as is too often the case after the employment of diffusible stimulants, may be more moderated, more progressive, and likewise better sustained; and that, in consequence, the reaction may be less liable to develop symptoms of violent cerebral congestion. We say that all this is possible, meaning to imply that all has not yet been proved by irrefragable facts, whatever the declared partisans of the treatment may say of it.

But from these results, important as they perhaps are (unfortunately this is still very doubtful), how great is the distance to that specific action, and especially to that kind of infallibility which was at first attributed to the strychnia-treatment—an illusory infallibility, which soon disappeared before failures both numerous and marked.

Whatever may be said of these unhappy and compromising exaggerations, we are quite disposed to admit that nux vomica has not been as useless in the treatment of cholera as has been claimed.

On the other hand, the services it has rendered have been too often counterbalanced by inherent inconveniences and dangers. After remaining completely inert during the cold stage, it may cause, during the reaction (doubtless owing to the accumulation of doses), symptoms of intoxication of the most fearful sort, which in some cases are terminated by death. A few unhappy cases of this sort have been published, and doubtless many others must have remained unknown.

If a remedy so hard to manage and so dangerous in itself were applied in the course of a great epidemic to a whole population, so that supervision would be nearly impossible in the majority of cases, is it not probable that more harm than good would follow?

We therefore think that we need not absolutely exclude nux vomica from the treatment of cholera, but that it would be prudent to reserve it for suitable cases, in which the physician is able to watch its administration with care, and thus lessen its dangers.

Poisoning with aconite.—Dr. Hanson, of Hartford, Conn., treated a colored child, aged five years, who had carelessly swallowed a draught of tincture of aconite; the child was algid and comatose, and could not vomit owing to the insensibility of the isthmus of the fauces. A few drops of tincture of nux vomica were given, to which the return of sensibility was ascribed, and, in consequence, the power of vomiting, and immediate recovery (*Boston Med. Journal* and *Bulletin de thérap.*, 1862).

Poisoning by chloral.—We know of no case in men which has been cured by strychnia. Numerous experiments upon animals, showing the

antagonism of these two substances, might lead us to think that strychnia is of service; but it is not at all so, though one of O. Liebreich's first experiments seemed to show it. A rabbit received a large dose of chloral, and soon afterward was injected with a strong dose of strychnia; he was aroused, and recovered without exhibiting the characteristic symptoms of strychnia. Two days later, while not under the influence of chloral, the same dose of strychnia killed him in ten minutes. But later experiments by Liebreich and others have resulted differently, and the animals have died.

M. Oré, of Bordeaux, reached the same results. When the dose of strychnine was sufficient to dispel the symptoms of chloral, it became toxic, so that all the animals died, either from the effect of chloral or of strychnia (*Acad. des sciences*, 10 juin et 27 juillet, 1872).

If small, non-fatal doses of chloral are given, small doses of strychnia may prevent sleep.

Intestinal worms.—While we have already named the leading properties of nux vomica, which makes it one of the most valuable of drugs, there are some others of less importance. Schultz gave it in powder for intestinal worms; and, in the country of Over-Yssel, it is still prescribed for tænia, in connection with drastics. Hargstrom gave it in the dose of a scruple a day to many dysenteric persons; the dose is enormous, and those who imitated his plan have been much less bold, but have reached the same results ("Dictionn. de mat. méd." de Mérat et de Lens., t. IV., p. 559). In certain obstinate chronic diarrhœas nux vomica has sometimes been of the greatest benefit.

Brucia.

The seed of nux vomica contains three special alkaloid principles—strychnia, brucia, and igasuria—which constitute the active part, and differ very little in their therapeutic properties. What we have said of the one is applicable to the others, without any sort of exception.

The very exact experiments of Andral (*Arch. gén. de méd.*, t. III., p. 294) have proved that strychnia and brucia act in the same way, except as regards power; the former being much the more efficient. If we take the alcoholic extract of nux vomica as the type of action, and represent its energy by 1, that of brucia must be represented by 2, and that of strychnia by 6.

The experiments of Bouchardat and Bricheteau, however, would seem to prove that brucia is more active than is usually thought.

Bricheteau used brucia in hemiplegia following apoplexy, and considers it preferable to strychnia in this sort of paralysis; it has the advantage, that it can be given in large doses without fear of causing dangerous symptoms. He gave it in the dose of one centigramme (gr. 0·15), and increased it every day by one centigramme, as long as no effect was

produced. Some patients can take as much as twenty centigrammes of brucia in a day.

Fraser has shown that when a small quantity of ethyl or methyl is added to strychnia, the power of the poison is not only lessened, but altered, and that, instead of convulsions, only paralyses of the termini of the motor nerves are produced. The effects of strychnia are exchanged for those of curara. The same experiments made with brucia gave identical results. Two milligrammes of the crystalline alkaloid injected subcutaneously into a rabbit caused tetanus in a period varying from one to three-quarters of an hour, and death in a time not exceeding three hours.

The experiment was afterward made with iodide of methyl-brucium, discovered by Stahlschmidt ($C_{23}\ H_{26}\ N_2\ O_4\ CH_3\ I + {}^8H\ {}^2O$), which consists of white scales feebly soluble in water—one part to 79 parts of water at 37° [100·6°F.] and 225 parts at 9° [48·1°]; its taste is like that of iodide of methyl-strychnium.

About five centigrammes of this salt were injected under the skin of a rabbit without causing convulsions, but in three hours paralysis of the limbs set in, which lasted half an hour and then disappeared. In a second experiment, twice the dose produced no effect.

The sulphate of methyl-brucium ($C_{23}\ H_{26}\ N_2\ O_4\ CH_{32}\ SO_4$) is much more soluble than the preceding. It is more active, but does not give the effects of brucia, and only causes a paralysis of the motor nerves resembling that due to curara. When the animal dies, he does not die by convulsions which cause asphyxia. On the contrary, in the experiments on salts of methyl-brucium, the reflex action is very much weakened, and at times even extinct. The animal lies powerless on the table, in a state of complete flaccidity, unable to perform any voluntary movement, and not responding to stimuli like pinching the skin.

These curious results are well adapted to put us on guard against the conclusions, often premature, of experimental toxicology, and to make us more and more circumspect in the choice of substances for experiment.

Rhus Toxicodendron.—Rhus Radicans.

Rhus radicans, also called poison sumach, is considered very poisonous, as its name signifies; but the leaves, the branches, and the juice which flows at the period of flowering, are said by Fontana ("Traité de la Vipère") to have no injurious effect when taken internally; and the most recent experiments have fully confirmed his statements.

Fontana, to whom science owes so many and curious facts, showed in his own person that the leaves of this shrub cannot be touched frequently for a length of time without so affecting the system that in a few days a vesicular, quasi erysipelatous eruption appears on the face, hands, and especially the genital organs. Van Mons ("Observ. sur les propriétés du rhus radicans," "Act. de la Soc. de méd. de Bruxelles," t. I., p. 136)

and Bulliard ("Plantes vénéneuses") go further, and state that it is sufficient to be exposed to the emanations of the plant, without touching it, in order to suffer effects analogous to those reported by Fontana.

These emanations, absent or without effect during the day, are very active at night, a fact of which Van Mons' experiments leave no doubt.

The effects of rhus radicans do not usually appear until a few days after one has been exposed to them. The experiments of Lavini (*Journal de chimie médicale*, juin, 1825) confirm this singular sort of inoculation. He applied two drops of the juice of rhus to the first phalanx of his index finger, leaving it on only two minutes; but at the end of an hour it had produced two black spots. Twenty-five days after, the following symptoms suddenly appeared: a great burning in the mouth and throat, rapidly increasing swelling of the left cheek, the upper lips and the eyelids. The night following, the forearms swelled to twice their natural bulk, with a coriaceous skin, insupportable itching, very great heat, etc.

This curious action led the homœopaths to use this substance in diseases of the skin; but Dufresnoy, of Valenciennes (*Ancien Journal de médecine*, t. LXXX., p. 136), had previously published a brochure, in which he praised the properties of the plant in dartres, and subsequently in paralyses. He gave from ½ to 4 grammes of extract (gr. 7½—60) per day.

Since then, papers have been published from time to time upon this substance in the periodicals, and many physicians of standing have confirmed the experiments of Dufresnoy. We have often used it for paralysis; but our experiments in skin diseases are, as yet, so few and inconclusive, that we will not mention them here.

The only paralyses we have seen treated by Bretonneau, of Tours, or have treated ourselves, have been those of the lower limbs, following concussion of the spine, or a lesion of that organ which did not destroy the tissue. We have collected a sufficient number of facts upon this point to place the value of rhus radicans beyond doubt, in our own minds.

The doses which we have given are 25 centigrammes on the first day at meal-time, and we increase every day by 25 centigrammes (gr. 4) until we give 4 grammes in a day (℥ i.).

No appreciable inconvenience attends the administration of this remedy. The digestive functions are not disturbed, but become more active. No nervous symptom appears, except spasm of the bladder, which occasions a frequent desire to urinate, and a sort of vesical tenesmus. This inconvenience, if it be one, is relieved by a few whole-baths.

Ergot of Rye.

Obstetrical action.—Even Murray, the most complete of all our earlier writers on materia medica, notes none of the medical virtues of ergot of rye. Popular tradition had taught a few empirics its obstetrical virtues,

but a remedy destined to become one of the most valuable was not yet understood by science.

Of all the properties of ergot, the most important and incontestable is certainly that of producing contractions in the case of uterine inertia. This was known to some matrons and empirics, but Dr. Stearns was the first to call the attention of physicians to the point in a letter addressed to Dr. Akerly, printed in the *Medical Magazine* of New York. Shortly after, Oliver Prescott wrote in the *Medical and Physical Journal* (XXII., p. 90) a very detailed monograph on the use of ergot in uterine inertia, leucorrhœa, and uterine flowing. In France, at this period, and even long before, Desgranges, of Lyons, taught by matrons, proved, in many instances, the obstetric virtues of the drug (*Nouveau Journal de médecine*, t. I., p. 54). Shortly after, Chaussier and Mme. Lachapelle published a series of observations, so contradictory to all that had been stated regarding the benefits of ergot of rye in uterine inertia, that the best authors were led to doubt the results of former trials. New experiments were made, and MM. Goupil (*Journal des Progrès*, t. III., p. 168) and Villeneuve ("Mémoire historique sur l'emploi du seigle ergoté") each published a very long memoir, in which they gave, by a scrupulous analysis of the writings of previous authors and a statement of their own experiments, a full and entire confirmation of the labors of the New York physicians.

At present, in spite of the obstinacy of a few physicians, who deny to ergot the possession of properties almost as evident as those of cinchona, the value of this remedy is generally admitted in the following circumstances:

Inertia of the uterus during labor, delayed delivery, clots in the womb, hæmorrhage from the womb.

Inertia of the womb during labor.—In the summary of therapeutic studies upon ergot which Bayle published, it is stated that, among 1,176 cases of slow or arrested parturition due to inertia of the uterus, 1,051 were more or less promptly terminated after the administration of the remedy; in 111, ergot failed; in 14, the success was moderate (Bayle, "Bibliothèque thérapeutique," t. III., p. 534). The uterine contractions produced by ergot begin with extraordinary promptness; they seldom appear earlier than ten, or later than thirty minutes after the dose is given.

In 18 cases, Prescott (l. c.) saw this action occur:

1	time	in	8	minutes.
7	times	in	10	"
3	"	"	11	"
3	"	"	15	"
4	"	"	20	"

The effects last from half an hour to an hour and a half. Prescott (l. c.), from the analysis of 59 cases, fixes the average at about an hour. It

begins to grow less in half an hour, but resumes a considerable intensity if a fresh dose is given, even if all the symptoms caused by the first dose had ceased for some time. The extreme intensity of these contractions cannot be conceived unless one has seen them. They do not exhibit those intervals of rest which occur in ordinary labor, but hasten and follow each other with extraordinary violence, so that sometimes the womb seems to contract incessantly for an hour together.

Prescott, Stearns, Desgranges, Villeneuve, say that ergot should not be given unless the labor is quite languid, when the pain stops at the moment the head has passed the upper strait. Almost all agree that dilatation of the cervix is a *conditio sine qua non* of the use of ergot; but Desgranges (*Nouv. Journ. de méd.*, t. I., p. 54, 1818), Haslam (*Medico-Chirurgical Review*, 1827), and a few others, quote facts which plainly show that ergot has been perfectly successful in cases where the cervix was not dilated. In this case, we think that the cervix ought to be rubbed with extract of stramonium or belladonna, half an hour or an hour before ergot is used.

Experience has only confirmed these statements, and we find contemporary accoucheurs nearly all demanding, as indications for ergot, that the inertia shall be due to no mechanical obstacle to the exit of the child. The pelvis must be normal, the cervix wholly dilated or dilatable, the membranes broken, the genital passages large enough to let the child pass, and the presentation must be such that the labor can end spontaneously. It is then necessary to make sure that neither the pelvis, the mouth of the cervix, nor the bladder, etc., present obstacles against which the efforts of the woman may be made in vain (Bailly, "Nouveau Dictionnaire de méd. et de chir.," Art. "Ergot").

We agree with Tarnier that the remedy should not be used except in case of absolute necessity, and that the effect upon the fœtal circulation should be watched by frequent auscultations. If the heart-beats become slow, the application of the forceps arrests the danger (Tarnier, *Rapport à l'académie de médecine*, 26 nov., 1872).

We will here inquire whether the use of ergot in inertia of the womb is always exempt from danger to the mother and child. Its enemies have supported their views by some unfortunate cases which have occurred. But we ought to consider, first of all, that the remedy is usually employed only in laborious labors, when the length of the labor has exhausted the forces of the mother and fatigued the fœtus, when a vicious conformation of the pelvis or the fœtus forms an obstacle to accouchement, and when the mother's illness is a cause of weakening of the uterine contractility. Is it surprising that, under such unfavorable circumstances, there are more accidents than in ordinary cases? It is very hard for us to decide from the facts which have been given, but it seems reasonable to think that the precipitation of the labor, the permanent and violent pressure of the uterus upon the fœtus, and of the fœtus reacting against the uterus, may sometimes injure both mother and child. It is for the phy-

sician to judge if these circumstances are such as to counterbalance the harm which might result from expectation or from certain surgical manœuvres.

In our opinion the greatest danger arises from the excessive violence of the expulsive efforts which ergot causes. Immense efforts are made, and the lungs and brain remain in a state of congestion which may be dangerous.

We should also think ergot contraindicated in puerperal convulsions, unless it were thought that feeble efforts ought to suffice to expel the child; in this case, in spite of the authority of Waterhouse, Michell, Roche, Brinkle, and Godquin (see Bayle, "Bibl. thér.," loc. cit.),we should recommend the use of forceps in preference to ergot.

We will here give a statement of Dr. Blariau's note (*Gaz. médicale*, 1839) regarding certain accidents due to the use of this substance in accouchement. The author, while recognizing the incontestable value of ergot, of which he is a great partisan, calls attention to the evil effects of this substance, not upon the mother, but on the child. He states it as a fact, upon his own observation, that the use of ergot kills one child in five, owing to the incessant compression of the umbilical cord which the continued uterine contractions produce. This injurious result is entirely attributed by him to the non-intermittency of the contractions; which compress the fœtal body continuously, together with the cord.

M. Blariau extracts from the statistics of the city of Ghent the number of children stillborn from 1826 to 1835, and comparing this with the number stillborn in 1836, he found that in a year and a half the number had doubled, which he attributed solely to the frequent use of ergot.

The observation of the injurious effect of ergot upon the child is certainly not new; but Blariau's result will seem exaggerated to many physicians.

By what process can ergot injure the child? by a toxic or a mechanical act? All accoucheurs have supposed that the danger was due to the compression of its organs by the energetic and permanent contraction of the womb. No one has thought of attributing it to a kind of poison due to the passage of the principles of ergot into its blood. It is very probable that this passage does take place; we may refer to what is observed in the case of many other substances, which have been proved to exist in the blood of the fœtus. But it is not probable that this constitutes the great danger to the life of the fœtus.

Abortion.—When this occurs in the first four months of pregnancy, the uterine fibres are deficient in development and in ability to expel the product, while the compact and resisting nature of the cervix increases the difficulty. All this time the blood is flowing, and it is often necessary to take means to save it. It is then useful to give ergot, whose action upon uterine contractility is very evident as early as the third month; and it is generally admitted that this increased activity of contraction aids in the separation of the ovum and its expulsion. In this case there

is, then, a real indication for ergot, if the abortion has progressed so far that we cannot hope to stop it. But accoucheurs of our day advise waiting until the neck is softened, and the lower part of the ovum so far engaged that the uterine contraction shall not entirely enclose it. This is a very good restriction, and should not be neglected except in case of severe hæmorrhage.

Moderate contraction of the pelvis.—M. Bailly, in his excellent article "Ergot" in the "New Dictionary of Medicine and Surgery," writes that ergot may be used in case of contracted pelvis, if we are sure by strict measurement that the antero-posterior diameter is not less than 9 centimetres (3·54 inches), but it is indispensable, in using the remedy, that the presentation shall be by the head; and, if the head has not passed at the end of an hour, the forceps or lever must be used.

Breech-presentation.—When the child's breech has reached the plane of the pelvis, the woman had better take one or two grammes (gr. 15—30) of ergot, that the contractions may become more energetic and continued, and thus aid the exit of the upper half of the body, and support the manœuvres which must often be practised in bringing this kind of labor to an end (Bailly, l. c.).

Puerperal hæmorrhages.—The hæmorrhages which follow delivery are frightfully abundant and rapid. Whatever the activity of ergot may be, it requires at least ten minutes to operate, and if the accoucheur had no other resource the woman would inevitably succumb. Very fortunately, this inertia can be foreseen to a certain extent, and, as ergot involves no risk, it will be well to give it whenever there is any reason to fear the complication.

In the first place, the accoucheur or the woman may be aware of a personal tendency to puerperal hæmorrhages. In such case, in spite of the favorable progress of accouchement, it will be well to give one or two grammes immediately after the expulsion of the child. When a woman states her liability to hæmorrhages, or when twins are born, or when she is exhausted by labor, however regular, ergot must be given directly after accouchement.

The same is the case whenever the forceps or version is required in terminating the labor. This was the ordinary practice of P. Dubois.

We will add a remark made by M. Blot, that all women affected by anasarca, with or even without albuminuria, are greatly exposed to puerperal hæmorrhage.

Post-puerperal hæmorrhage.—In case of tardy hæmorrhage coming several days after, or one or two days after confinement, ergot may also be of very great use. This remark is especially applicable to country practice, where physicians are often obliged to leave a patient shortly after confinement and go great distances. But whenever the patient has intelligent attendance, and the uterine contraction rapidly forms the "reassuring globe of the obstetrician," as the old physicians called it, this precaution need not be taken in advance.

Tardy delivery.—When the afterbirth comes late, and particularly when its presence causes hæmorrhage, when the hand placed on the hypogastrium does not feel the womb contracting above the pubes, ergot is very useful. This follows from facts collected by Bordot, Davies, Bolardini, Duchâteau, Morgan (see "La Bibliothèque thérapeutique" of Bayle), Benton (*Archiv. gén. de méd.*, t. XXIII. p. 577), Maurage (id., t. XVIII., p. 557).

The action of ergot is often more certain when the placenta is already partly engaged in the cervix.

Clots in the uterus.—When the contractions after delivery are insufficient, large clots often form. It will be best to first introduce the hand and remove them, but if this manœuvre is too painful, or delivery took place one or several days previously, it will be better to give ergot in divided doses and place a poultice on the hypogastrium.

Puerperal diseases.—In a discussion which was held at the Académie de médecine in 1858, M. Jules Guérin maintained that uterine inertia after delivery, even when only moderate, left the placentar attachment exposed to air. Guérin considered this condition the cause of puerperal diseases, and thought that ergot, by producing contraction, occluded the matrix and placed the placental wound in the favorable condition of a subcutaneous wound. This practice, followed at the hospital Cochin, by M. de Saint-Germain, with the object of avoiding consecutive hæmorrhage, seems to have been useful (Bureau, "Thèse de Paris," 1870, 7 mai).

Non-puerperal uterine hæmorrhages.—After delivery, inertia of the womb is naturally supposed to be a cause of hæmorrhage by leaving the sinuses open, and ergot of rye, contracting the uterine fibres, is believed to bring the walls of the vessel together, and assist the expulsion of clots that may be retained in the viscus. Success fully justified this belief; but it is not quite established that ergot acts equally well in non-puerperal hæmorrhage.

Prescott * positively says that ergot has no action on the uterus unless the fibres of the organ are dilated:

That the unimpregnated organ will not be affected by ergot:

That ergot ought not to be used in hæmorrhage depending on increased arterial action, since in this case the volume of the uterus is nearly at its minimum.

Though these statements rest on no fact, most authors, modelling their views upon Prescott's, have professed the same opinions, or have not spoken at all of the use of ergot in non-puerperal uterine hæmorrhage, or have mentioned it only to condemn it. Mandeville,† at the end of a case of menorrhagia checked by ergot, says, "Perhaps we might derive

* Dissertation on the natural history and medical effects of secale cornutum or ergot, by Oliver Prescott (*Medical and Physical Journal*).

† *Gazette médicale*, 1827, p. 124.

advantage from the use of it in passive menorrhagia? I think not; for in the latter case the cause seems to be situated in the exhalent system, while ergot seems to act solely upon the muscular system.

Villeneuve* says that "ergot seems to have no pronounced action on the uterus except when the organ, containing the product of conception, is about to expel it."

Goupil† reports that several authors, whom he does not quote, have professed to obtain good results in menorrhagia, but have given no detailed facts; while M. Andrieux, after using all the common remedies in a case of this sort, tried ergot, but without advantage.

Several writers, however, have maintained the anti-menorrhagic virtues of ergot. Chapman‡ says that he has seen two cases of dysmenorrhœa in which ergot gave great relief; he adds, "It is more useful in uterine hæmorrhage; I have never used it, but we cannot refuse to believe that it is useful."

Peronnier§ affirms the anti-menorrhagic power of ergot.

In a Latin work of the seventeenth century‖ we read that ergot (clavus secalinus) has been found of use in menorrhagias.

These, however, are but simple indications. Some later authors go further, and quote facts.

Cabini, Pignacca, Bazzoni, Italian physicians, in papers contained in Omodei's journal,¶ report several cases of menorrhagia cured by ergot; but these are not only excessively short and deficient in detail, but are mixed up with some on epistaxis, hæmatemesis, pneumorrhagia, leucorrhœa, which were likewise cured by ergot—an association not adapted to inspire confidence.

The same is the case with Sparjani's facts. In an excellent memoir contained in Omodei's journal** he reports seven very detailed cases of menorrhagia cured by ergot.

In 1832, in concert with Maisonneuve, we published in the *Bulletin de thérapeutique* the result of our own experience, which was then very satisfactory and has been since confirmed by more numerous facts.

Our first cases were twenty-two women. We omit the pathological points, and will here study only that which relates to therapeutics. We will examine the action of ergot, reviewing the various phenomena it produces in the different organs; then we will try to establish some general propositions regarding the toxical and remedial action and the mode of administration.

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* "Mémoire historique sur l'emploi du seigle ergoté pour accélérer ou déterminer l'accouchement ou la délivrance dans le cas d'inertia de la matrice," par A.-C.-L. Villeneuve, p. 73.

† *Journal des Progrès*, 1837, t. III., p. 183.

‡ Chapman, "Elements of Therapeutics," vol. I., p. 482.

§ Perronier, "Thèse de Montpellier for 1825."

‖ "Sylvia Hernicia."

¶ *Annali universali di Medicina*, 1831.

** Ibid., 1830.

For importance and constancy, those affecting the uterus stand first. They may be reduced to two: suppression of hæmorrhage and colic.

1. Suppression of hæmorrhage.

The bleeding has never resisted the action of ergot of rye, whatever was the condition of the uterus. We would not profess to infer that this action is infallible, though our experience had been ten times as wide, but at least we may conclude that this action is evident and indisputable.

If the general result has been identical, the partial result has not. Numerous variations have occurred, in the rapidity, the order, and even in the existence of the effects produced by each dose; and, as we shall see, it is extremely hard to determine the causes of this variation.

In considering the mode of action of ergot in uterine inertia, in recalling the opinion of Prescott and Villeneuve which we reported above, it might have been thought that the therapeutic effects would have been sensible in proportion as the state of the womb approached that of gestation; that after abortion, for example, or in women who have had several children, and whose womb therefore retains somewhat more of the muscular character, hæmorrhages would have yielded more rapidly.

Experience has not confirmed this assumption. In fact, on the one hand, among seven women, whose womb had never contained the product of conception, we saw the flow checked at the end of a quarter of an hour, and in six, seven, eight, twelve, sixteen, twenty-four hours; while in women who had aborted or had had children, suppression occurred in fifteen minutes, half an hour, and in four, six, eight, sixteen, eighteen, twenty, twenty-four and thirty-six hours. The proportion is by no means unfavorable to unimpregnated uteri, but rather the contrary. But the difference is too slight to be considered, otherwise than to conclude that ergot always acts with nearly the same rapidity, whether the fibres of the womb have been distended by previous pregnancies, old or recent, or have never been distended.

In five cases, where the flow was symptomatic of cancer of the womb, we have seen the discharge stop in less than thirty-six hours. These facts are remarkable. We may draw from them the conclusion, that the aptitude of the uterus to receive the influence of ergot does not depend in a very marked degree upon the state of the fibres of the organ.

The duration of the disease also seems to have little influence on the rapidity of cure. In several cases we have seen hæmorrhage, which had lasted a month or six weeks, overcome in six or seven hours, or even in a quarter of an hour, while in other similar cases it was not checked in less than twenty or thirty-six hours. On the other hand, hæmorrhage that had lasted less than a fortnight has been checked, sometimes in a quarter or half an hour; sometimes not till twenty or twenty-four hours.

The same remarks would apply to the matter of age.

In some cases the bleeding, after being completely suspended, reappears, but with characteristics entirely different from those it first had. It is usually not a pure discharge of blood, but a sero-sanguinolent dis-

charge analogous to the lochia, which it sometimes resembles in smell; further, it is never a genuine metrorrhagia, but only a dribbling of blood, less abundant than that which forms the menses. No special condition of the womb, no circumstance relative to duration, age, or temperament, seems to have exercised any influence on the production of this slight trouble; it has usually been due to some imprudence on the part of the patient, some error in the administration of the drug, or some accidental circumstance. We have also remarked, though we cannot explain it, that when the relapse has occurred, it has selected the morning in preference, especially the time from four to six o'clock.

In almost all cases, from the first taking of ergot, sensible modifications have been observed in the nature or amount of the flow; 60 centigrammes (gr. 12) have several times suppressed it completely. But in some cases we have given 2 or 3 grammes (gr. 30—45) without any appreciable effect until the fourth, fifth, or sixth dose, and once the bleeding even increased, in spite of taking 4 grammes (℥ i.). This fact, though exceptional, is important, and proves, 1. That ergot should not be considered inefficient simply because 60, 120, or 180 centigrammes produce no effect (gr. 9—27); 2. That in urgent cases we must not rely blindly on a given dose, but watch well for the action in order to double the dose promptly if the first does not act.

2. Uterine colics.—The suppression of hæmorrhage is never the single isolated effect of ergot; we have always seen it preceded or accompanied by more or less violent colics. These colics are constant, and seem essentially connected with a diminution of the flow of blood, and may even explain its mechanism. But it is remarkable that while we have never seen the hæmorrhage stop or even become modified without previous colics, the most distinct arrest of bleeding has not always followed the most violent colics. But in general, intense colics are ordinarily the precursors of a considerable diminution or modification of uterine hæmorrhage. From this coincidence one might infer that the mode of action of ergot is the same in menorrhagia and in inertia of the womb, or the consequent metrorrhagia. In both cases the remedy may act by causing contraction of the fibres of the womb. In short we see that, in expulsion of the product of conception, whatever be the period of pregnancy, colics and uterine contractions are so related to one another that the existence of the one is an infallible token of the other. In the language of accoucheurs the two words are even regarded as synonyms; and why should they not be?

At a first glance, indeed, it seems hard to conceive of contractions in a compact tissue like that of the virgin uterus; but we will observe: 1. That this organ, when simply congested, is in a remarkable state of dilatation; 2. That this dilatation must be still more marked when the congestion is so marked as to produce a hæmorrhage; 3. That in this case, to the physiological cause of the dilatation there is often added a mechanical cause, such as retention and accumulation of blood in the uterine cavity. Now, even though but slightly dilated, it is easy to suppose the organ to

contract. The mechanism is like that of an abortion at the third or fourth week.

At this date, in fact, the changes which the tissue of the womb undergoes are very obscure, and may very well be compared to those which the organ presents after four or six weeks of active congestion. There are some facts that seem to be hard to acommodate to this explanation; we refer to the cure of cancerous metrorrhagia. In this case, can it be said that the cause of the suspension of hæmorrhage is the contraction of the uterine fibres, a part of which are already invaded by the cancerous change? If, however, we consider that the neck is usually the only part attacked, and that the greater part of the arteries which furnish blood to the uterus pass through the body of that organ before they reach the neck, we can understand that contraction of the remaining sound fibres may suspend hæmorrhage.

But uterine colic, independently of its relation to the suppression of hæmorrhage, presents interesting peculiarities of its own. It is almost always the first apparent symptom of the action of ergot; it recurs almost constantly after each fresh dose; and the time between the dose and the symptom is always the same. Our observations show that they always appear in ten or fifteen minutes; in this we are perfectly in accord with Prescott. As to their duration, they vary greatly. We have seen them continuous, lasting half an hour, an hour, or two hours, and intermittent, lasting only a few minutes at a time.

Now, if we consider on the one hand the rapidity of the production of these colics, and on the other, their brevity, we shall conclude that ergot has a powerful but transient effect on the uterus. All accoucheurs make this remark; they find that after three or four hours the obstetrical effect is exhausted. This has been considered one of the most conclusive points in favor of ergot; for how could grave poisonous effects be ascribed to a remedy acting so quickly, and so easily calculable? We shall see, when speaking of cerebral symptoms, that this conclusion is not a rigorous one; but the fact will afford important considerations relative to the mode of administration of ergot in menorrhagia.

The colics are evidently uterine in character. All women who had had pregnancies compared them to the colics which precede accouchement; those whose uterus was virgin compared them to the colics which accompany laborious menstruation. There was but one exception; the case was the more remarkable, as in all probability an abortion took place during these colics. But even in this circumstance, if the colics have not presented all the marks of uterine pains, they have been still more unlike intestinal colics. We have in no case observed diarrhœa, borborygmi, or other symptoms of irritation of the large intestine.

From what precedes we believe we may infer:

That ergot exercises a potent but transient influence on the womb.

That this action affects chiefly the fibres of this organ, and produces contractions in them.

That the contractions, constantly accompanied by pains, rapidly put a stop to metrorrhagias, to whatever cause due.

That the state of the womb has no influence on their production.

That they are observed even when a part of the fibres of the neck of that organ is attacked by cancer.

That ergot acts like the narcotics on the central nervous organ.

That the resulting phenomena are slow, but quite durable.

That they are never dangerous when we limit ourselves to arresting the metrorrhagia.

That the amount given can be made several grammes in four or five days without harm.

That, in case of metrorrhagia, it is well to divide the dose and give it at equal intervals.

Finally, that we must not fear to begin with rather large doses—say, 4 grammes (3 i.) in twenty-four hours.

Uterine congestions.—If the womb is seen contracting under the influence of ergot soon after parturition, it is reasonable to employ, with Sparjani, the same remedy for the uterine congestions which are usually the commencement of chronic phlegmasias of the organ, since the arrest of metrorrhagia is effected in the same way in the case of an empty womb. Sparjani used ergot in four very evident cases of uterine congestion, and even of commencing metritis; the three first cases had resisted the usual remedies, but were cured immediately; the fourth was only partly relieved (*Annali universali di Medicina da Omoddei*, marzo, 1830).

Action of Ergot on other Organs than the Uterus.

Various hæmorrhages.—Hæmoptysis.—The almost constant success of ergot in metrorrhagia led Sparjani to think that other hæmorrhages would obey the same treatment. He tried it in epistaxis, hæmoptysis, hæmatemesis, hæmaturia, etc; Pignacca and Cabini (loc. cit.) repeated his experiments. Four cases of epistaxis are reported, two by Sparjani, two by Cabini. Two only seem convincing. We have analyzed eight cases of hæmoptysis, five by Sparjani, two by Pignacca, one by Cabini, and only one seemed to us really conclusive. Finally, a case of hæmatemesis was quoted by Cabini, and one of hæmaturia by Sparjani, but both seemed to us valueless. We have ourselves tried ergot to arrest hæmorrhages other than those of the womb; we have sometimes failed, and where we have succeeded, have not been able to ascribe the success to the remedy. It is really hard to judge of the effect of a remedy upon hæmorrhage, which is essentially a temporary and variable accident.

Leucorrhœa.—Bazzoni (l. c.) reports three obstinate cases, which yielded with such rapidity to the use of ergot, that it is impossible not to recognize its influence. But leucorrhœa is due to so many various causes, and is so often dependent on an excoriation of the os tincæ or some

other inflammation of the cervix or vagina, that it is impossible to suppose that these external lesions and the uterine congestions, the causes of fluor albus, can be cured in the same way.

When the uterus is distended by a polyp or a mole, the action of ergot may still be useful to hasten its expulsion. Several facts reported by Davies, Macgill, and Hagerstown (Bayle, loc. cit., p. 547), would seem to give some authority for this treatment.

Nocturnal incontinence of urine.—Millet, of Tours, having to treat anæmic young girls for incontinence of urine, associated ergot with iron after the ordinary remedies had failed, and with very remarkable results.

We have seen ergot produce the same effect on a young boy affected with diabetes, polyuria and nocturnal incontinence.

In conclusion, ergot has lately been given in several cases with advantage, either alone or in combination with opium, for polydipsia.

How does ergot act? by modifying the nervous system, which reacts on certain sets of muscles? This seems very likely. Barbier, of Amiens, has accordingly given the drug in cases where preparations of nux vomica are successful, that is, in paraplegia. He treated with ergot two paraplegic persons, and cured one; both felt in their legs and thighs shocks like those produced by strychnia.

Excito-motor Treatment in General.

The mode of excitation which we are here studying, and the agents which produce it, have no resemblance to the other excitants, which chiefly act upon the vascular system and nutrition. These agents act upon the centres and the nervous conductors which preside over the contractions of the muscles of animal and organic life. Hence we have given the name of excito-motors (excitateurs), a term which perfectly indicates their mode of action.

Excito-motor action is obtained:

1. By the calculable physical agents, whose action is immediate, transient, and does not require the harmonic integrity of the organs. Thus electricity, galvanism, the magnet, electro-puncture, motion, solicit directly and immediately the nerves and the fibres of a part, although the part be separated from the rest of the body and deprived of the common or general life, retaining only the individual or isolated life.

2. The others, such as nux vomica, and ergot, act previously on the nervous centres, and the muscular contractions are produced only through this modification.

3. Others still, as massage and flagellation, have a mixed action, to which we will return later.

These different agents of one treatment must not be ordered indiscriminately; and in order to explain the indications, it is necessary to

state here certain views of paralysis and the different ways in which it can be produced.

The most common cause of paralysis is a deep lesion of the nervous centres, which causes a change of the medullary fibres. In this case, there no longer exists a communication between the peripheral nervous fibres and the central parts of the cerebro-spinal axis; the impressions are no longer transmitted, the volitions no longer reported. Whenever an irreparable solution of continuity exists in the medullary fibres of the centres of innervation, paralysis is complete and usually incurable.

The result is nearly the same, whether the solution of continuity be due to an effusion of blood, inflammatory softening, or the action of a wounding body.

If the same lesions occur in the nervous conductors, the paralysis is necessarily observed in the part to which the nerve is distributed. A compression, to whatever cause and mechanical conditions it is due, equally produces paralysis.

This form of paralysis is certainly the most incurable of all—yet it is not absolutely so.

We daily see men recover movement and sensibility which had been wholly lost through effusion of blood in the brain, or destruction of the vertebræ causing incurable gibbosity.

The lesion assuredly continues to exist, and treatment will do nothing to reunite the several medullary fibres; but there is a supplementary nervous circulation, like the supplementary vascular circulation after ligature of the vessels, and this is the mode of which we ought to know the laws.

Whenever a rupture of nervous fibres occurs by a spontaneous process, it implies the establishment of a fluxion at the injured spot, which extends to a various distance. This fluxion necessarily produces a severe disturbance in the functions of the part. If the rupture has been caused by external violence, it must be followed by a morbid fluxion at the affected point. The fluxion, whether followed or preceded by the morbid lesion, is very brief in duration, and as soon as it has disappeared, the invaded tissues are apt to resume the functions they had temporarily lost. We say "apt to resume their functions," and we employ the expression intentionally.

Here, then, there was a double cause for paralysis; first, rupture of medullary fibres, and, second, fluxion which invaded the non-ruptured fibres. A possible improvement, if not a full cure, is then intelligible. We shall see whether we must leave to nature alone the care of treatment, or whether art should intervene.

But there is something more to be considered in this form of paralysis. A bundle of rather coarse medullary fibres transmits to a given part of the body the orders of the will and the movements which express them. It usually happens that the whole bundle is not destroyed by the effusion of blood, although the paralysis may be complete. To what is this

owing? To the fluxionary state of which we spoke above, and which we have tried to estimate. But, supposing for a moment that it did not exist, there would still be found another and a more potent. Supposing that one thousand fibres afford innervation to a muscle, and that by any lesion nine-tenths lose their functions permanently, the remaining hundred will at first be almost wholly insufficient to transmit impressions and volitions; the sensibility will be almost completely extinguished, and the greatest efforts will scarcely cause a few fibres to contract. But by degrees these remaining fibres acquire a supplementary activity, if we may use the term, and soon they replace tolerably well those which are disused. We can see, as Tiedemann said, that the divided parts of a nerve or of a nervous centre are regenerated by means of a material evidently nervous in its character, which becomes a medium of transmission as certain as the normal tissue; besides, the nervous energy of the remaining parts is increased, and supplements the action of the divided parts, as the circulation of the blood is re-established by dilatation of the collateral branches.

Now, whether palsy be caused by complete section of the chief nerve of a limb, or by rupture of the great part of the central fibres of the brain or medulla, a sufficient number of nervous parts remain in a sound state, to justify the hope of re-establishing sensibility and movement more or less completely.

The excito-motors are the agents which the therapeutist must have most recourse to in stimulating the functions of these sound portions.

To each organic element and organ or apparatus, is assigned a normal sum of function; but if they are obliged to do more, they by degrees acquire a greater functional capacity, and soon execute ten times what they could do before they were subjected to this exaggerated exercise. The stomach of the gourmand becomes active in proportion as the function is exercised; the eye becomes more penetrating when applied to the study of microscopic objects; the touch and smell gain incredible perfection by sustained exercise; gymnastics ten-folds the muscular force. Here the organs become anatomically and functionally perfect; the volume of the organic elements increases in proportion to the activity of the functions that are given them to execute. The nerves and fibres spread out in the nervous distributions are included in the rule we have given.

Is it in the physician's power to give to the remaining healthy parts the requisite functional capacity, that they may make up for the divided parts?

Of all conditions, the most fitted to bestow this functional capacity is, as we have said, the exercise of the organ which performs the function. Here is just the difficulty. How can we transmit to the nervous threads situated between the periphery and the central lesion a modification by which the sound portions will be forced to assume unusual efforts? This is evidently to be effected by the excito-motor agents.

When a paralysis has been caused by concussion of the brain or cord,

a congestion or inflammation, or any other modification which has lasted for some time, the parts previously influenced by the diseased portion of one of the centres or of the nervous conductor remain paralyzed, even when the innervating organ has returned to such an anatomical state that it can fulfil its functions. Here the momentary cessation of the influence which excites the brain or cord has put a stop to the functional aptitude of the peripheral nerves or the cord itself.

If now the impressions have for a longer time ceased to be transmitted by the nervous conductors, the latter lose their functional aptitude. Thus blindness produced by cataract sometimes leaves amaurosis, which persists even when the crystalline lens has been removed or couched. So the abuse of continence produces impotence or frigidity.

These forms of paralysis are met by excito-motors, with almost constant success. Nux vomica, electricity, massage, flagellation, ought to be used successively and in combination.

In this class of paralyses we must include those produced by the poisonous emanations of lead or mercury. Here the paralysis may persist long after its cause is eliminated, and experience has shown what excito-motors could do in this case.

We have seen paralysis caused by want of internal stimuli (the influence of the brain and cord) or external stimuli (external impressions); now, on the contrary, we shall see paralysis following abuse of a function, as when venereal impotence follows excessive indulgence, or muscular impotence follows excessive fatigue, and senile impotence follows a too prolonged exercise of the organs.

The two first forms—and they are true paralyses—are usually cured by the unaided efforts of nature, as soon as the exhausted excitability is restored by rest and food. But let us here, also, recognize the value of excito-motors, of massage by malaxation or percussion, of flagellation and handling, the resources of wearied libertines who do not choose to await the return of power by resting. But when rest and food do not suffice, the patient becomes an old man, and excito-motors have an evident but only temporary action, which, in still young people, may sometimes restore the lost function for a long period, provided the efforts of the physician are not neutralized by excessive expenditure of nerve-force.

To complete the sketch, we will speak of paralysis attributable to aberration of nervous influence.

In hysterical women, in persons whom excessive bloodletting places in a state of severe spasm, it is not rare to see local paralyses suddenly occur, sometimes limited to one branch, and sometimes to smaller subdivisions. A great many cases of this sort have been reported. Here also, local excitants, and first of all faradic electricity and massage, must play the chief part in the cure. In the partial chills and anæsthesias which are quite often seen in hysterical women, electrization by friction or by the wire brush is more specially indicated.

We have hitherto studied paralysis only in the voluntary nerves and

the muscles which they animate; the paralysis of the intimate organic movements of our parts, or atony, is attended to in the chapter on excitant treatment; this form, in fact, is suited by the excitants; but the nervous ganglia of the trisplanchnic, the branches that emanate from them, the muscular fibres in which they distribute their movement, may be the seat of modifications which, while not identical with those of the nervous system of animal life, yet have a great analogy with the latter. Here, we must admit, the excitants have not so immediate and so evidently useful an action as in the circumstances we have given above; yet the bladder and uterus form an exception to this rule. In fact, nux vomica in paralyses of the bladder and œsophagus, ergot of rye in inertia of the womb, have at least as much power as other excito-motors have upon the animal system of muscles. But in paralysis of the stomach and intestines, which is very hard to diagnosticate, and is not easily recognized except by the rapid production of gas which distends the intestine to excess, gymnastics and massage are quite useful.

The choice among excito-motors depends on the special action of each, and the seat of the nervous lesion.

What has been said is nearly sufficient to show the special indications for each excito-motor.

We have seen how strychnia is given rather in paralysis due to a lesion of the nervous centres; electricity, in that dependent on disease of the conductors or nervous termini; flagellation, in paralysis of the genitals; ergot of rye, if it is necessary to stimulate the uterus.

Let us observe, however, that those which are used internally and are absorbed and carry their influence to the entire system, may under certain circumstances be poorly borne, and sometimes arouse in healthy organs a stimulation which is vigorous in proportion to the strength of the doses demanded. This inconvenience, usually slight, may become serious, and then we must use those which, like electricity and massage, can be directed at will to one part alone.

CHAPTER VIII.

NARCOTICS.

Opium.

Diseases of the nervous centres and conductors; insomnia; insanity.—The hypnotic properties of opium have led to its use in insomnia, and it is one of the surest means of procuring sleep; but the sleep is usually heavy, disturbed by disagreeable dreams, and sudden wakings; and further, the use of opium soon becomes a fresh cause of insomnia, as the system becomes unable to do without it. Much larger doses are then required, whence arise important disturbances in the functions of animal and organic life, which are easily inferred from the physiological effects of opium.

For insomnia depending on no painful or febrile disease, opium seems to us a dangerous remedy, and we far prefer the antispasmodics and the temperants. Narcein is now given in preference.

Many had employed opium in treating insanity, and had found it of the greatest value in cases complicated with painful symptoms, or mainly characterized by sadness and depression. But the idea of a general and continued treatment by opium was suggested by the discovery of the subcutaneous method of administration. Erlenmeyer and Roller tried it at the asylum at Illenau, and Aug. Voisin, physician to the Salpêtrière, established it upon a large scale. He found that those insane who quickly manifested the physiological phenomena of opium were afterward considerably improved, while those who were wholly tolerant of the remedy were not benefited. The forms which seemed most happily modified were the following: lypemania, with or without hallucination, ecstasy, stupor, mystic religious delirium, maniacal agitation, melancholic anxiety, and folie circulaire.

The treatment was injurious in the congestive and inflammatory forms (*B. de thérapeutique*, 1874).

Pain.—Opium usually relieves pain, whatever be its cause; not that the evil itself is always calmed, but that the brain becomes less capable of perceiving the painful impression. Yet the effect is a mixed one; if applied topically, it deadens the sensibility of the nerves of the part without influencing the brain, when it is entirely local; but when carried into the circulation, it acts upon a part of the brain by numbing its sensibility, and upon the painful regions to which it is carried by the blood.

Pain, and even the apprehension of pain, may, in certain persons, give rise to nervous troubles, especially to a tremor which has some analogy with that of drunkards. Very simple and slight operations, such as catheterism, may cause symptoms of this sort. In such cases the efficacy of opium is incontestable; it should be given some hours before the operation, and in moderate doses, sufficient to produce a little inclination to sleep. If the effect is so happy in preventing the simple nervous movement of which we speak, might it not likewise prevent the febrile access which so often accompanies the prolonged presence of catheters in the bladder?

Traumatic delirium.—After severe and deep wounds, or capital operations, the patient is often seized immediately with tremor and delirium. These alarming symptoms are sometimes checked by opium, but the remedy should be given in doses proportioned to the severity of the symptom and the susceptibility of the patient. From 5 to 10 centigrammes of opium (gr. $\frac{3}{4}$—$1\frac{1}{2}$) must be given at once, or 1 or 2 centigrammes (gr. 0·15—0·3) of narcein, and repeated, in much increased quantity if needed, every half hour until sleep is procured.

Cancers.—M. Tanchon's topical remedy for ulcerated or non-ulcerated tumors of the breast is the following:

Digest for 24 hours, at a moderate temperature, 24 or 25 degrees (75—77° F.), a certain amount of crude opium in powder or pieces, with a sufficient quantity of water to form a thick broth. Cover the ulcerated surface two or three millimetres ($\frac{1}{8}$—$\frac{1}{12}$ inch) thick with this preparation once or twice a day, according to the obstinacy of the pain, placing over it a piece of fine water-proof paper or oil-silk to prevent evaporation. Subcutaneous injections are now preferred.

The majority of neuroses have been treated with opium—hysteria, chorea, delirium tremens, tetanus, hydrophobia, epilepsy, convulsions.

Hysteria.—Associated with antispasmodics, opium is plainly useful in hysteria; a mixture containing opium, asafœtida, and ether, appears to us suitable in most hysterical symptoms. When there are acute pains, such as the hysterical clavus, or cramps, etc., opium should be given in larger proportion, and local opiates will be of great value. Bichat recommended in hysteria vaginal injections of opiate preparations.

Among the physicians of our time who have most praised opium, we will cite M. Gendrin, who has shown that, in order to subdue the disease, when it takes the form of very frequent and violent attacks, much larger doses are necessary than are commonly used. It is observed that, in affections characterized by convulsions or extreme nervous excitement, the system shows the most remarkable tolerance for narcotics, and therefore demands doses proportionate to the refractory nature of the neurosis and the intensity of the symptoms.

Chorea.—This disease does not always yield readily to cold affusion or immersion, or the ordinary remedies. In some very obstinate cases we tried, in despair, high doses of opium; and the results were sometimes

so extraordinary and satisfactory that we applied the plan in a great many others. But when the chorea is very severe, opium must be given in large doses, of from 5 centigrammes to 1 gramme (gr. $\frac{3}{4}$—15) per day; at the Hôtel-Dieu we carried the dose of sulphate of morphia to $\frac{3}{4}$ of a gramme (gr. 12) in 24 hours, in the case of a woman. We give $\frac{1}{10}$ of a gramme (gr. $\frac{2}{3}$ nearly) of opium every hour, until the convulsive movements are considerably calmed and intoxication begins ; then we maintain the same state of sedation for five or six or eight days. We then stop, give a few baths, and let the patient rest ; and a few days later we recommence. It is rarely the case that the chorea is not so much changed at the end of a fortnight, that nature speedily effects a cure. This vigorous treatment ranks by the side of that in which nux vomica is employed ; we have used it, however, only in very severe cases (see the article on Nux Vomica).

Alcoholic chorea.—In alcoholic chorea with or without delirium, so incorrectly termed delirium tremens, and in alcoholic delirium without tremor, the value of opium has long been proved ; it is through this that we were led to use large doses of opium for chorea. Simmons was the first to dare to give large doses of opium in alcoholic chorea; Saunders followed, who published new facts that threw those of Simmons into oblivion ; but Wittcke handled the remedy with the most energy, and was imitated by Sulton, Delaroche, Guersant, Duméril, Dupuytren, Rayer, Szerlecki, Forget, Stockes, and ourselves.

In this case very large doses were given: 5—15 centigrammes (gr. $\frac{3}{4}$—$2\frac{1}{4}$) or more every hour, until the patient fell into a deep sleep.

The good effect of opium in delirium tremens has long seemed to be settled ; but a few years ago, a large number of experiments were made at Philadelphia, which seem to invalidate this view. Treatment by simple expectation with cold water for a drink has been compared with the internal administration of large doses of opium, and the results have been very different from what were anticipated. In those treated by opium, the disease lasted long and was often fatal, while in those who took cold water, the cure was more rapid, and the disease was much more rarely fatal.

These unexpected results have been obtained by other observers ; and we ourselves are at present inclined to prefer digitalis in this complaint.

Mercurial tremor.—We have seen some very severe mercurial choreas very rapidly cured at the Hôtel-Dieu in Paris by this method. The treatment sometimes occasioned delirium, which lasted several days.

Tetanus.—This sêvere and usually fatal disease has always been treated with opium, but a really useful treatment was not applied until quite recently, in which truly frightful doses were given. Thus, Monro has seen 7 grammes (gr. 105) of opium given in one day ; Chalmers more than 30 grammes (about ℥ i.) of laudanum in the same space of time. Murray speaks of a man cured after taking, for several days in succession, more than 600 grammes (℥ xx.) of laudanum, which incredible dose produced,

at first, neither sleep, nor resolution of spasm. Gloster speaks of a case cured after taking 100 grammes (3 xxv.) of opium ; Littleton cured two children, of ten years, by giving to one 30 grammes of laudanum (℥ i.) in one day, and to the other 50 grammes (3 xiii.) of extract of opium in 12 hours.

It is extraordinary that, after such facts and such numerous testimony, physicians of our time use with such timidity a remedy which is without action, unless given in enormous doses, in this fatal disease. Desormeaux, however (*Bull. de. Thérapeutique*, 1862), and Pury, of Neufchatel (ibid., 1864), have cured cases by enormous doses of opium.

A physician of Montreal, in Canada, claims to have produced most happy results, by the combination of opium and cold affusion. When a patient is seized with tetanus, cold water is poured over him until a sort of syncope occurs; then he is wrapped in very dry hot blankets, and receives a draught composed of hot wine and opium in a very large dose. This treatment is recommenced when the spasm returns, and so on until the cure is complete.

Several authors have advised that opium be placed upon the wound which is the source of tetanus. M. Lembert and others have produced beneficial results by denuding the skin in the vicinity and covering it with a very large dose of a salt of morphia.

Epilepsy.—This is only immediately affected by opium; for example, when the convulsions follow so rapidly as to threaten life directly. Opium sometimes modifies an existing tendency to an unusual frequency of convulsion, but when the storm is over, it does not prevent the attacks from repeating themselves. It is evident that in eclampsia, a very sudden and rapidly transient disease, opium may be of use.

Epidemic meningitis.—In that very grave affection which is very often accompanied at a certain period with deep anatomical lesions, and which has received the name (as we think, very improperly) of cerebro-spinal meningitis, Dr. Boudin has used opium in increasing doses, and states that he has obtained more rapid and complete cures than by any other treatment. Opium seems to have been useful in the epidemic of cerebro-spinal meningitis which ravaged Germany during the war of 1866.

Neuralgias.—The old methods of internal administration were not so successful in rheumatism and neuralgia as that of applications to the skin of the painful region, and not nearly so successful as the use of the salts of morphia upon the denuded skin, or by subcutaneous injection.

The authors who have written upon neuralgia, especially facial, recommend the internal use and the external application of opium; but since Lembert and Lesieur discovered the endermic method, which was previously only guessed, several physicians have published in periodical reviews accounts of neuralgia and rheumatism cured by the application of

salts of morphia to the denuded derma. In the year 1831 we began a very numerous series of experiments upon this point at the Hôtel-Dieu, and will here give the result of our labors and of those of our predecessors.

We commonly use ammoniacal blisters to remove the epidermis, but in some cases, especially sciatica, we sometimes prefer cantharides. There are very important precautions to be observed in applying and dressing these blisters, which are described under Ammonia and Cantharides, in Vol. I.

The first blister is placed as near as possible to the point of origin of the painful nerve; and from 1 to 15 centigrammes of muriate or sulphate of morphia (gr. $\frac{1}{4}$—$2\frac{1}{4}$), according to individual susceptibility, is placed on the denuded surface.

We have very rarely seen a case of superficial neuralgia where the pain was not quieted in a quarter of an hour. This stupefying and sedative action generally lasts from twelve to twenty-four hours. In order to prevent the return of pain, the morphia must be applied afresh before its local and general effects are entirely exhausted; and it is a capital rule to dress the blister at least twice a day. But it is equally important to continue the application for some days after the disease seems to be cured; a precaution especially needed in sciatica.

Often, when the neuralgia occupies the dental branches, and even when it affects the nerves of the temple and neck, we may secure absorption by rubbing the gums and the inner side of the cheeks on the affected side with extract of opium softened with water, or a rather concentrated solution of sulphate of morphia. The absorption then takes place energetically, and, though the patient carefully avoid swallowing the liquid, he nevertheless feels a little narcotism, and we obtain very powerful therapeutic effects.

There is another very convenient little procedure, which we recommend to the attention of physicians, consisting in the use of a medicated paper to be laid on the painful region, after removal of the skin. For this purpose a rather thick, unsized paper is chosen, of fixed dimensions—say, 10 square centimetres. This paper may be divided into 10 parts of a centimetre each ($\frac{4}{10}$ inch square), and it is to be alternately dipped in a solution of morphia or atropia, and dried, until it has taken up the whole of the solution. If the latter contained 10 centigrammes of morphia, each square centimetre will contain 1 centigramme; or if a solution of 5 milligrammes of neutral sulphate of atropia, each square centimetre will represent $\frac{1}{2}$ of a milligramme. This system has been perfected abroad. The Danes first, and then the English, have substituted gelatine, which dissolves in water or animal fluids, for our paper, in the preparation of dry collyria, subcutaneous injections, etc.

The external application of morphia is doubtless sufficient in a great many cases to cure neuralgia, but we must also often give cinchona, or the poisonous solanaceæ, which wonderfully assist the action of opium.

Thus we are accustomed at the close of treatment to prescribe the following pills, which we have termed anti-neuralgic:

Extract of stramonium.....	50 centigrammes	(gr. 7½).
Watery extract of opium.....	50 "	(gr. 7½).
Oxide of zinc.....	8 grammes	(ʒ ii.).

M. F. 40 pills.

Of these pills from 1 to 8 may be given in the 24 hours. They must be so given that the patient begins to perceive a decided disturbance of vision; and continued in that way at least a fortnight after the pain has entirely ceased.

The subcutaneous injections have been used with most success in neuralgia, and have in great part replaced the endermic applications, owing to the much greater promptitude of their action and the precision of the dosage.

Epileptiform neuralgia.—Tic douloureux.—This affection is usually seated in the face, and exceptionally in other parts; we have only twice observed it elsewhere, viz., in the intestine. We have never seen a case cured. But in some cases the pains yield by degrees, and at last disappear for two, three, or four months; then, when the unhappy patients think themselves cured, the disease returns with fresh fury, and lasts from two months to a year.

Most of the resources of medicine and surgery have been exhausted upon this affection. Section of the nerves sometimes gives temporary relief, but the pain soon returns. We have seen patients covered with scars made in cutting the branches of the trigeminal, and still suffering as at first.

Of all the agents which we have used (and they have been very numerous, and used with extreme perseverance), opium has failed the least often. It must be given in large doses; large enough to quiet the pain, regardless of the size of the dose; and increased, if necessary, as long as they do not cause trouble. We once gave 50 centigrammes (gr. 7½) of the aqueous extract, almost at the outset, and progressively and rapidly raised the dose to 15 grammes (nearly ʒ iv.) in the twenty-four hours. A few days gave relief.

In the case of an old lady of Antwerp, who had suffered from epileptiform neuralgia for more than ten years, we began with fifteen centigrammes (gr. 24) of morphine internally, and in less than two weeks we reached four grammes of the sulphate in twenty-four hours (ʒ i.). This lady, being in moderate circumstances, had to buy opium by the kilogramme (2 lbs.); she herself made balls of 15 grains, and took, according to necessities, from five to twenty of them per day.

It is quite remarkable that such enormous doses did not much disturb the digestion; there was no somnolence, and during the night sleep was as usual. For more than six years, we have seen this lady from time to

time, and have noted the following effects: she sometimes remained one, two, or three months free from attacks; then she suspended the use of opium, after gradually diminishing the quantity in proportion as the pains diminished; then the epileptiform neuralgia returned all at once with new violence; then she took on the first day 15 or 20 grammes of crude opium, which she kept up until the pain was calmed; as soon as the attacks were diminished in force and frequency, she also lessened the amount of opium, since she could no longer endure the amount without suffering nausea and a great deal of malaise. A few days sufficed to bring the patient into a very endurable state, but little pains from time to time warned her that she was not cured. The opium was continued, and at last she became free from pain for a variable length of time ("Clinique de l'Hôtel-Dieu," 3e éd., p. 100 et seq.).

Rheumatism.—Local non-inflammatory rheumatism, however painful it may be, is easily cured by the application of morphia to the denuded skin. Two or three dressings usually suffice. Opium in a large dose, taken internally, often has the same effect, but with less certainty. In the general articular rheumatism which has neither swelling of the joints nor fever, the internal use of large doses seems better to us, and it is rare that this form is not improved after a few days of treatment.

We have sometimes seen acute articular rheumatism cured with much ease by local applications of the salts of morphia; but here it is necessary to make two dressings a day with very great care, to multiply the blisters, on account of the multiplicity of joints affected, and to second the remedy by purgatives, given during the disease and after the symptoms have wholly disappeared. For a full statement of this method we refer to the memoir we published in 1832 in the *Archives générales de médecine*, in concert with Dr. Bonnet, of Lyons, so prematurely removed from science.

Dr. Corrigan prefers the internal use of large doses of opium in acute articular rheumatism. He seldom gives less than 50 or 60 centigrammes in a day (gr. $7\frac{1}{2}$—$9\frac{1}{4}$). At the same time he orders embrocations of hot spirit of turpentine, camphorated brandy, or a simple decoction of poppy-heads, to be made to the painful joints. To the opium he adds sulphate of quinia when the fever ceases almost instantly, and when the pains have an erratic character (*Gazette méd.*, t. viii., mars, 1840).

In chronic rheumatism we have found Willis's cataplasm of much use; it is prepared by taking (according to the size of the joint) $1\frac{1}{2}$ or 2 kilogrammes (lb 3, 4) of bread; this is cut, crust and soft part, into bits, and soaked in water for fifteen minutes; then it is squeezed hard in a twisted cloth, and, thus prepared, is placed in the water-bath, where it must remain three hours. We thus obtain a partly dried paste, which is softened by adding gradually a third of a quart of camphorated alcohol. This cake is kneaded ten minutes, and should have the consistence of a plum-pudding; this is essential, for if too soft, it melts, and if too hard, it dries, and may excoriate the skin.

Thus prepared, it is spread on a linen compress, in the form of an

elongated rectangle, thicker at the centre than at the edges, and large enough to wrap the joint completely. Then its surface is spread with a liquid mixture composed as follows:

Camphor	7 grammes	(gr. 105).
Extract of belladonna	5 "	(gr. 75).
Extract of opium	5 "	

It is now ready, and is to be applied directly to the joint, and the whole covered with oil-silk, to prevent evaporation. The poultice is retained by making very firm pressure with a band of flannel 10 metres long, and over this another of linen of the same length. The limb must be kept at rest, and the poultice is kept on till the ninth or twelfth day, when it is found as fresh and moist as when first put on.

Diseases of the organs of sense.—Laudanum forms a part of almost all the collyria for acute diseases of the eyes. But we must be careful about giving opium locally or internally when there is an inflammation of the iris, and must prefer the poisonous solanaceæ to the papaveraceæ. We have seen that opium always increases the contractility of the iris, and we shall see that the solanaceæ relax it. But when iritis is not threatening, washing of the ulcerations of the cornea with laudanum by the aid of a brush will have the double advantage of assisting the cicatrization of the ulcer, and later, the absorption of the plastic lymph, which, interposed between the layers of the cornea, constitutes the macula.

Eruptive fevers.—Opium has been considered one of the most useful remedies in eruptive diseases of the skin. Sydenham considered it a specific, in confluent variolæ, almost as certain as cinchona in intermittents. Morton, Boerhaave, Van Swieten, were almost as confident; De Haen gave it in all the forms of small-pox; but it was chiefly in languid and anomalous eruptions that Sydenham recommended it.

The same treatment is applicable to measles, especially when, in the period of invasion, there is a violent cough and severe diarrhœa. But diarrhœa almost always occurs at the moment of eruption, lasts one or two days, and is wholly favorable. Opium ought not to be used then, unless the intestinal flux is too abundant, and lasts beyond 36 or 48 hours.

It is not the same with scarlatina, a disease in which the eruption almost always requires to be restrained rather than assisted, and the most formidable nervous symptoms appear at the outset. Opium would here be dangerous.

Diseases of the respiratory apparatus.—Opium has been recommended in acute diseases of the chest, and the method of Sarcone acquired great celebrity in the last century. It is as follows: Bleed freely twice at least in the space of three hours; immediately afterward, a third of a grain of opium every two or every three hours. The fever usually falls before the fourth dose. But if the fever and the stitch in

the side remain equally violent, bleeding is again employed, with leeches and cups to the side, and at last opium. Thus Sarcone pretends to cut short the disease. Huxham and De Haen adopted an analogous method, bleeding vigorously at the beginning, but they only gave opium when the fever was moderated.

It is impossible to make use at present of the facts of these authors, because, on the one hand they have described the disease very badly, and also because they confounded inflammation of the pleura and that of the pulmonary parenchyma under the name of pleurisy. The distinction is the more important, as acute pleurisy is usually free from danger.

In acute pleurisy we have often relieved the pain of the side by local applications of morphia to the denuded derma, which, in a great many cases, has sufficed to drive away the pain and fever. The exudation was absorbed, slowly or rapidly, without our being able to determine any influence which opium might have upon reabsorption.

Laennec used to associate opium with tartar emetic in the treatment of acute pneumonia. We can understand to a certain extent that this association should be made in order to secure toleration for the tartar emetic; but when once the tolerance is established, we should quickly give up opium, which, in small doses, excites the circulation, and counterbalances the depressive action of tartar emetic.

When, however, the pneumonia is ataxic in character, opium in quite large doses may dispel the severest symptoms; in which special cases its action resembles that of musk, which is so well admitted.

In acute catarrh, and the obstinate coughs which depend on a tickling sensation in the larynx, the preparations of opium are among the most useful remedies. They may be used inwardly, or applied as washes (made with laudanum) to the whole of the chest.

This is the way in which opium is so useful in pulmonary consumption, often greatly relieving a disease incurable by art, and solacing the last moments, as in the case of cancer.

There is a dangerous symptom, often associated with pulmonary tubercle, which may be relieved by large doses of opium; we refer to hæmoptysis. Two patients of this class were treated by Béhier, of the Hospital Beaujon; rhatany had been used unsuccessfully, and then perchloride of iron internally, when M. Béhier thought of opium. He began with from 25 to 50 centigrammes (gr. 4—8) in the 24 hours; the hæmoptysis was quickly stopped, and a very marked improvement in the disease took place.

Béhier remarks upon the double effect of opium: in these two cases there was neither narcotism nor contraction of the pupil, though the dose had been made at once 50 centigrammes in 24 hours.

Whytt recommended opium in attacks of nervous asthma: it is often successful, whether compounded with the poisonous solanaceæ or the antispasmodics.

Whooping-cough.—When belladonna is given to children with

whooping-cough, the attacks become less frequent, and it becomes easier to give nourishing food; and even when it does not have this effect, the attacks become less intense and vomiting is arrested. In some exceptional cases, in spite of the use of the remedy, tolerance of food is not established. Then we combine small quantities of opiates with the atropic preparations. Sometimes it is given in a syrup: Extract of belladonna, 20 centigrammes (gr. 3), dissolved in syrups of opium and orange-flowers, āā 30 grammes (℥ i.); take from 1 to 8 teaspoonfuls in the 24 hours. But if we give the belladonna alone, we give one drop, or even half a drop of Sydenham's laudanum as soon as the child begins to vomit, and immediately before giving food.

Diseases of the organs of circulation.—Acute rheumatic pericarditis is advantageously treated by the local application of salts of morphia to the denuded skin. We have repeatedly followed this method, which has seemed to us to relieve the pain and inflammatory congestion.

Diseases of the digestive organs.—Opium is one of the best remedies for the symptom vomiting. But we should remember that opium, as soon as it causes any nervous accidents, is itself a very potent cause of vomiting, and in certain persons a very small dose will produce it.

In some violent and obstinate gastralgias, a very minute dose (1, 2 or at most 3 drops of Sydenham's laudanum) is beneficial, given a quarter of an hour before eating. This suffices to prevent the pain, and makes digestion easy, which was previously almost impossible.

There is a form of dyspepsia associated with bulimia, or, more exactly speaking, a sense of emptiness felt in the stomach shortly after eating. This form is also characterized by diarrhœa supervening almost immediately after the food is taken. Those affected say that they digest extremely quickly, that their food does not weigh on the stomach, that their stomach is excellent, and the bowels disordered. Opium is here particularly useful; it alone does much more good than all the other agents of the materia medica; but in order to derive due benefit from it, it must be given with the greatest circumspection. Sydenham's laudanum is the most convenient preparation, because the easiest to measure. We begin with the dose of one drop, increasing subsequently if necessary. The patient should take it before eating, not after; this is indispensable in order to secure the effect. This small quantity, swallowed before the labor of digestion begins, puts to sleep in a proper degree and regulates the muscular excitability, the excess of which was the cause of the undesirable symptoms. Large doses, on the contrary arresting at once the muscular movements and the act of secretion of the gastric juice, increase the disturbance of digestion instead of calming it.

For a considerable number of dyspeptics opium is the most efficient stimulus to the appetite and regulator of digestion; in many cases codeia has seemed to deserve the preference to other opiates.

In intermittent neuralgias of the stomach, which we think very different from what is commonly termed gastralgia, a draught of opium, or

the application of a salt of morphia to the denuded skin of the epigastrium, quiets the pain very efficiently, and often prevents the return of it. It is the same with rheumatic colics, if the name ought to be given to those sharp and sudden pains of the abdomen which sometimes succeed the disappearance of rheumatism from a part where it was fixed. Opium is the best remedy for colic pain, without regard to its cause.

It is doubtless this fact that led to the use of large doses of opium in the treatment of lead colic. The method of Huxham, De Haen, and Stoll, was to place on the belly strong opiated applications, and to give opium internally in large doses until the pain had passed away: some laxative was given afterward. Stoll, the warmest defender of this treatment, also says that it was often not necessary to give laxatives, opium of itself sufficing to resolve the spasm and re-establish the stools.

Opium in large doses has been lately recommended in acute peritonitis. Dr. Graves, of Dublin, obtained the most happy results from opiates in two cases of extremely intense peritonitis following paracentesis (*Gaz. méd.*, 14 mars, 1835). In another case, due to rupture of an abscess of the liver into the abdomen, he gave very large doses of opium and applied blisters which he dressed with morphia, and found the symptoms of the phlegmasia disappear completely in a few days without bloodletting. He had still better success in a case which was due to a drastic purgative (ibid., 1835, No. 11). As to peritonitis from perforation of the intestine, we think it very hard to believe in the cures which Drs. Pétrequin, of Lyons, and Stokes, of Dublin (ibid., 14 mars, 1835), thought they had performed in several equally grave cases; it is probable that they had made some error in diagnosis, and that the cases were of pseudo-perforation, of which Thirial and some other physicians cited a certain number of cases a few years ago.

In strangulated hernia, opium has been less useful. Moutard-Martin, however, claims benefit from its use in cases of intestinal occlusion coming on rapidly. He gave from 10 to 30 centigrammes of extract in a linctus of which a spoonful was given every hour (Dr. Tariote, "Thèse de Paris," 1874, No. 391).

Opium when used externally, always produces constipation; when given internally, especially in large doses, it constipates at first; but after a few days it often causes diarrhœa in those who did not previously have it.

In treatment of acute diarrhœa, injections, fomentations and draughts containing opium usually put an end to the disease; but in chronic diarrhœa, opium only quiets temporarily, and it is necessary to recur promptly to other means, from time to time resuming opium; and in this special case, the external administration will be more useful than the internal use of extract of opium.

Opium has another effect, which we must mention. Certain diarrhœas, especially in children, are due to the too sudden passage of alimentary matter from one part of the intestine to another. If from special excita-

bility of the muscular coat, or from any other reason, the chyme which should be perfected in the stomach reaches the duodenum before it has passed through a complete physiological elaboration; if the mass which should receive a necessary addition from the liver and pancreas in the duodenum passes thence without this addition; if the mass leaves the small intestine without acquiring or losing certain definite properties, the parts of the intestine which are naturally adapted to contact of normal matters are irritated by contact with this undigested substance, and a sort of lientery is the result. Opium may be taken in small doses at the time of eating, in order to moderate the muscular irritability of the alimentary canal, delay the excessively rapid progress of the food, and thus cause the proper substance to encounter the portion of intestine with which it has natural relations. This is the same indication as that which is presented in bulimic dyspepsia, of which we spoke above.

From the efficacy of opium in colics and diarrhœa has been inferred its value in acute dysentery. Sydenham did the most to bring the opium treatment into credit; after him Sennert, Brunner, Wepffer, and Ramazzini added their authority to that of the illustrious practitioner of London; while, on the contrary, Degner, Pringle, Young, and Zimmermann declared that opium was pernicious in that disease. Both sides sustained their opinions by more or less ingenious theories, and by facts; but when we read the history of the epidemics of dysentery observed by Stoll, we quickly see that these discrepancies between such skilled and conscientious men arose from their having observed epidemics of different sorts.

Diseases of the genito-urinary apparatus.—Though nephritic colic is caused in most cases by the presence of a calculus in the calices, the pelvis or the urethra, opium may nevertheless be used with advantage, first to relieve pain, and next to subdue the spasm of the passages where the calculus is lodged; opiate enemata are also of great use in case of stone in the bladder or acute catarrh or rheumatism of the bladder.

Our remarks concerning the value of opium in nephritic colics may also be applied to colics of the sort termed hepatic, whether due to a simple neuralgia of the hepatic plexuses, or symptomatic of the presence of some calculus passing through the biliary passages to the intestine.

In gonorrhœa with chordee, in acute blennorrhagia in women, emollient injections containing aqueous extract of opium or Rousseau's laudanum quiet the excessive pain and hasten the termination of the inflammatory period. It is the same with inflammations of the urethra or vagina without syphilitic characteristics.

In uterine pains, whether precursors of abortion or due to an acute or chronic phlegmasia of the uterus, a displacement or a neuralgia of the organ, strongly opiated injections, and injections of the same kind, often produce marked improvement. Professor Paul Dubois uses this remedy with much advantage to prevent abortion, or to modify and reduce to a normal type the pathological contractions of the uterus during confinement. He chiefly uses injections with a large amount of laudanum,

which he renews frequently until the desired effect is obtained (*Institut médical*, 31 juillet, 1839).

The same treatment is very useful in amenorrhœa disconnected with chlorosis; and the influence which we have seen that opium has over the uterine functions authorizes us to give it whenever the suppression of the menses is accompanied by a congestive condition of the uterus.

Various diseases.—Opium was recommended by Cullen, Gland, and Hufeland, in typhoid diseases, and formally objected to by Bretonneau, Chomel, and a great many other distinguished practitioners. We have sometimes used it in dothinenteritis, but never with favorable results; but in perforation of the intestine, in this disease, it may be useful by calming the pains of peritonitis and restraining the intestinal contractions; and during convalescence, when the nervous symptoms have subsided and only an obstinate diarrhœa remains, the addition of opium to subnitrate of bismuth or cinchona may make the convalescence more rapid and frank.

In the plague, opium and its preparations, as theriaca, mithridate, philonium, diascordium, have been recommended as at once preservative and curative. Experience must decide this point, which is very obscure.

In intermittent fever, the value of opium has been admitted by more good observers than can be named, though cinchona is doubtless always preferable. Before the discovery of cinchona, opium was regarded as one of the best febrifuges: Paracelsus, Horstius, Ettmüller, Wedelius, gave it a little before the paroxysm. Berryat, who revived this practice in the last century, gave 6 or 8 drops of Sydenham's laudanum an hour or two before the access, to children of 3 to 5 years, 10 or 12 drops at the age of ten or twelve years, and 15 to 30 drops to adults. Lind, Houlston, and Odier, of Geneva, on the contrary, direct that the remedy shall only be given half an hour after the hot period begins.

Gausland is strongly opposed to this method; he admits that opium makes the paroxysms shorter and less painful, but says that the fever becomes much more obstinate.

We have endeavored to employ the influence which opium exercises over the secretions, to increase the cutaneous secretion and to suppress the others. In a case of dropsy symptomatic of lesion of the liver, we twice tried to produce active diaphoresis, and at the same time to lessen the serous exhalation from the cellular tissue and the splanchnic cavities. We attained both ends, but the abdominal exudation was lessened only a few days, and the extreme abundance of the perspiration did not seem to us to be a valuable substitute for the nearly total suppression of the urine which the large doses of opium caused.

The mucous secretions of all kinds are almost wholly suppressed by large doses of opium. Pulmonary phlegmorrhagia and chronic vesical catarrh are rapidly modified, and by continuing the medicine several days the mucous membrane gradually loses the habit of the discharge.

In a case of diabetes mellitus, Professor Forget, of Strasburg, gave

daily 2 grammes (3 ss.) of opium without any inconvenience; it was the only remedy that lessened the amount of urine. Narcein might now be tried for the same purpose.

It is probably through the same mode of action that the remedy is of real use in hæmorrhages. Whytt especially praises it in metrorrhagia following abortion or childbirth, in which case he associates it with sulphuric acid. We can scarcely understand this effect, as we have found for the most part that it provoked the monthly discharge. Nevertheless, we have given opium with profit in several cases of hæmoptysis; and we have already said that M. Béhier has confirmed these excellent results in cases of hæmoptysis in pulmonary phthisis.

In mercurial salivation, Hunter recommended strongly opiated washes. I think it might be well also to give opium internally.

Opium is frequently associated with other remedies, either in order to add its own effect as an adjuvant, or else to aid the system to tolerate the leading remedy. Thus, in combining it with mercury, or certain antispasmodics, we employ all the therapeutic virtues of the associated drugs; but when a patient cannot bear sulphate of quinia without vomiting, a little opium, given at the same time, serves as a kind of passport to the quinia, which is the real therapeutic agent. We will here recall the reciprocal antagonism of opium and the poisonous solanaceæ, which, when associated, neutralize, or at least mitigate one another's effects.

Opium is one of the remedies that are most frequently abused; yet its use is not always without uncomfortable effects. In the violent colics which accompany an indigestion, in diarrhœa, or any other super-secretion which has a critical action, as relieving the patient, opium may be a very dangerous remedy.

As regards the abuse of the drug, there is the serious circumstance that they are forced to use it in increasing doses, and that, incessantly tempted by the sensation of comfort, they at last keep themselves in a state of constant intoxication, and soon fall into a physical and moral marasmus.

We wish also to mention the extraordinary effect of small doses upon infants at the breast. We have often produced a distinct narcotic effect with a quarter of a drop of Sydenham's laudanum, which is equivalent to half a milligramme, that is, a hundredth of a grain of opium. It is necessary to be extremely careful in giving this class of preparations to little children.

There are two celebrated preparations, called theriaca and diascordium, which owe a part of their singular virtues to the opium they contain. Doubtless the virtues of this bizarre combination of divers substances have been greatly exaggerated, but, without overstepping the limits of truth, we are forced to admit that they effect some cures which would not be so certainly attained by opium.

Theriaca is especially recommended in fevers of a bad character, in confluent small-pox, measles, when the eruption disappears, and danger-

ous symptoms of the head or chest follows; or when, at the beginning of the eruption, a violent diarrhœa weakens the patient and prevents him from throwing off the morbific principle. Theriaca is also preferred to opium in treating gastralgia and enteralgia, especially those connected with chlorosis; when united with ferruginous remedies, it causes them to be better borne, and completes a cure which iron alone would not have been able to effect. In this case theriaca is given in connection with iron in the dose of 1 or 2 grammes (gr. 15—30) per diem, or alone, in a bolus of 1 gramme once or twice a day, especially in the morning fasting, and at bed-time. When the patient objects too much to the internal use of theriaca, or it disturbs his digestion, it is applied to the pit of the stomach or the abdomen in the form of a plaster.

Diascordium is particularly recommended in diarrhœa, especially when the inflammatory symptoms are a little relieved. In chronic diarrhœa it is of great value; in this case it is given in the dose of 1 or 2 grammes in the 24 hours. As the patient becomes accustomed to it, the dose should be increased. It is easy to see how diascordium, with the large amount of substances rich in tannin which it contains, acts as an astringent, besides having the power to relieve the local pains.

Poisoning by belladonna.—Giacomini ("Traité philosophique et expérimental de matière médicale et thérapeutique," translated by Mojon and Rognetta, 1839, p. 537) states the following:

"Experience showed to the ancients that which a good pathological philosophy proves to us, to wit: that the toxic effects of belladonna are destroyed by hypersthenisant substances. Prosper Alpin and Nobel remarked that opium combined with belladonna enfeebled the action of the latter. Bonnet treated this form of poisoning by alexipharmics and stimulants; Camerarius used the same means; stimulants and theriaca were prescribed by Faber, wine by Schenk, bezoars, aromatics, and volatile oils by Valentini. Lippi has cured several cases with Sydenham's laudanum. Laurand saved a child who had swallowed about 1 gramme of extract of belladonna by means of an ethereal draught; while of five persons who had taken of the same, and who experienced more or less serious effects, the one who had also drunk white wine was quickly relieved."

Shortly after this, Corrigan and Graves observed that when there was delirium with contraction of the pupil, belladonna succeeded better, while, if the pupil was dilated, opium was preferable.

In 1843, Angelo Poma used opium as an antidote to belladonna.

In 1858, Cazin reported two observations by Lindsey, and said that he himself had cured two patients, poisoned by belladonna leaves, with opium.

In 1859, Benjamin Bell and Béhier stated definitely the antagonism between opium and belladonna. Béhier added further statements when investigating the hypodermic method.

We possess to-day a certain number of very exact observations upon

the cure by opium of patients poisoned by belladonna; these are reported by Benjamin Bell, Béhier, Lee, Macnamara, Seaton, Erlenmeyer, Onsum, Bathurst, Woodman, and Fronmüller. (See Constantin Paul, "De l'antagonisme en pathologie et en thérapeutique," and Schmidt's *Jahrbücher*, 1865, t. II., p. 282.)

In these cases, it is remarkable that persons poisoned by belladonna have been able to take enormous doses of opium, without showing the symptoms of intoxication from opium. We can quote, for instance, the case of a child of six years, treated by Lee, which, poisoned with 10 grammes (gr. 150) of extract of belladonna, was able to take 120 drops of laudanum in three hours without narcotism, and was cured the same day.

It follows that opium is the best antidote for belladonna, and may be confidently given in a large dose.

Prolongation of chloroform-anæsthesia by opium.—In 1864, Claude Bernard made the valuable observation that opium, given after chloroform, was able to recall the phenomena of anæsthesia, and prolong them in a remarkable manner. He had produced anæsthesia in a dog by chloroform, and had allowed him to regain his consciousness, when it occurred to him to inject subcutaneously 5 centigrammes of muriate of morphia (gr. $\frac{3}{4}$). The animal soon became stupefied, but the most remarkable thing was that the chloroformic insensibility returned at the same time, though no fresh dose was given.

In the same week in which these experiments were made the same operation was performed in Germany. Professor Nussbaum, having to operate on a patient with carcinoma of the subclavicular region, made a subcutaneous injection of 5 centigrammes of acetate of morphia during the anæsthesia produced by chloroform. The patient, without waking, slept tranquilly for twelve hours, during which time he bore the prick of a pin, incisions, and the actual cautery, without the least reaction. The trial was repeated three times, with the same success, upon three other subjects of operation (*Bulletin de thérapeutique*, 1864, t. I., p. 40). The Versailles Society of Medicine repeated the experiment upon animals, and established the correctness of Professor Nussbaum's statements (ibid., p. 233).

The experiment requires certain conditions in order to succeed. If too long a time passes after sensibility is recovered, before the morphine is administered, there is no longer enough chloroform in the blood to anæsthetize the morphinized nerves, though they are weakened by the narcotic action.

On the other hand, if the previous use of chloroform has not been sufficiently prolonged, there is little of it accumulated in the blood, and the morphine likewise fails to bring back its effects.

In order to succeed, the patient must have been previously subjected to a prolonged inhalation, as was done in the case of Nussbaum's patient, and of the animals on which Claude Bernard experimented.

Since this, Claude Bernard has made more important discoveries, or, at least, some which are of much more direct value in medicine. Instead of beginning with chloroform, he began with morphine. He injected into the cellular tissue of a dog 5 centigrammes (gr. $\frac{3}{4}$) of the muriate; the animal soon became stupefied, but retained considerable excitability, as is always the case in such circumstances. In this state a minute dose of chloroform extinguished the sensibility of the animal, and he fell into the most complete state of relaxation. This experiment was repeated many times, and enabled M. Claude Bernard to perform the most delicate operations, giving rise to the hope that surgery would soon utilize this precious action.

In this case, morphine, by stupefying the sensorium commune, and allowing the excitability of the nerves to predominate, singularly aided the action of chloroform (*Revue des cours scientifiques*, and *Bulletin de thérapeutique*, 1869).

This discovery was soon applied in medicine. Dr. Guibert, of Saint-Brieuc, applied it in surgery and accouchement. In surgery, he employed it chiefly for minor operations, which did not require full anæsthesia. He made, an hour before the operation, a subcutaneous injection of 1 or 2 centigrammes of muriate of morphia, after which a few light inhalations of chloroform produced, without loss of consciousness, analgesia sufficient for the performance of the operation without pain. We were witnesses of the fact.

In childbirth, he produced true obstetrical anæsthesia. At the moment when the pain was almost insupportable, he injects 1 or 2 centigrammes of muriate of morphia (gr. 0·15—0·3), after which a few inhalations produce a decided diminution of the pains (Académie des sciences, 1872).

M. Labbé, surgeon at La Pitié, has applied this in major surgery, and has succeeded in considerably reducing the quantity of chloroform given in protracted operations, amputations, excision of bones, ovariotomy, etc. (Académie des sciences, 26 février, 1872).

Co-operatives and auxiliaries.—The only substances that act in the same way as morphia are codeia and narcein. The substances used as auxiliaries are: 1, diffusible stimulants, especially alcohol; 2, the antispasmodics, and heat; 3, those which stupefy sensibility, namely, the alkaloids of the solanaceæ and the ranunculaceæ.

Antagonists.—These are the acids, the astringents, the drugs which close the small vessels, as cold, belladonna (Bell, Béhier), sulphate of quinia (Gubler), and bromide of potassium.

Incompatibles.—Tannin is an antidote for morphia.

Belladonna.

Neuralgia.—Belladonna has often been used internally for neuralgia, given in the form of powder, infusion, decoction, extract or tincture: it is evidently successful. In neuralgia we usually have pills made of one centigramme (gr. 0·15) of the extract, of which one is to be taken every hour until vertigo appears. The pain is then usually lessened, and it is right to lessen the frequency of the doses, or delirium might soon set in, which, though not alarming, should be avoided, unless there is no other way to relieve the pain. We continue thus for several days, until the patient ceases to have neuralgic symptoms. We have chiefly used the remedy in treating neuralgia of the face; in sciatica we have not had nearly so good success. We must add that, even in facial neuralgia, belladonna alone has not always effected a complete cure, and that, in order to prevent a relapse, large doses of sulphate of quinia or iron have had to be given. But, in transient neuralgia, it is needless to employ the latter sort.

When the affected nerve is superficial, applications of belladonna to the skin deprived of epidermis are incontestably of use. We have repeatedly seen supraorbital neuralgias cured in half an hour by the application of extract of belladonna over the superciliary arch; and when the disease was periodic, each attack was easily prevented by a previous use of the same remedy. But if, in spite of the absence of pain, the patient still feels the malaise which usually accompanies the paroxysm, quinia puts an end to the whole. The same remedy succeeds fairly well in quieting temporal neuralgia; it often fails when the pain occupies the inferior maxillary nerve or the infraorbital, doubtless owing to the greater depth at which these nerves are situated. We have never been able to quiet sciatica by this remedy.

We usually order the following solution:

Neutral sulphate of atropia.....	0·25 parts,
Distilled water.....	100·00 "

with which compresses are wetted, and placed on the seat of pain, and then covered with a piece of oil-silk to retain the moisture, the whole being kept in place by a ribbon or handkerchief. This application is repeated several times in the twenty-four hours and continued each time for at least one hour. The action is more or less powerful, according to the individual; the proportion of atropia must be increased or diminished accordingly. When disturbance of sight and dryness of the throat are carried too far, the dose must be diminished, or the application less frequently repeated; but when the symptoms of absorption are indistinct, and the pain is not quieted, the dose should be raised, and the application made almost continuous. When the neuralgia is confined to a very

limited point, a much stronger solution must be used: 1½ per cent. in water slightly alcoholized. The solution is then applied with the finger, a drop at a time. A slight friction is made two or three times an hour, which often has a very powerful effect. When neuralgia occupies the hairy scalp, when, for example, it affects the occipital nerve, the roots of the hair and the skin of the scalp must be wetted quite thoroughly, and absorption will take place very readily. Solutions of atropia are quite useful as local applications in neuralgia of the superficial cervical plexus; they are by no means so useful in intercostal or brachial neuralgia, and they lose most of their power in neuralgia of the lumbar plexus, of the sciatic nerve, and of the abdominal viscera. If the application to the skin is not sufficient, subcutaneous injection must be employed.

The inefficiency of belladonna when applied to the skin for the relief of deep neuralgia appeared to us to depend on the difficulty of absorption; we therefore tried an application of the extract directly to the denuded derma. The trial was most successful, and several recent sciaticas treated by this method were cured in a few days. When this neuralgia was several months old, the pain did not wholly disappear; and we then made an incision in the skin, between the greater trochanter and the ischion, which penetrated to the fatty cellular tissue, and into this sort of issue we introduced, in the lieu of peas, boli or trochisci of varying size, made by the following formula:

Extract of belladonna	2	grammes	(3 ss.)
Extract of opium	2	"	
Powdered guaiac finely sifted	4	"	(3 i.)
Mucilage of tragacanth			q. s.

Make a pilular mass; divide into 20 pills, and dry by the stove.

Each ball contains 10 centigrammes (gr. iss.) of extract of opium and the same of belladonna. The guaiac and the tragacanth have no other use than to make the mass very hard, but without preventing the pills from being softened and giving up a portion of their poisonous principles.

We place in the cut at least two, sometimes three, and retain them by a piece of diachylon plaster, over which we lay a little plate of very flexible lead, or several pieces of tin-foil. It is well to place in the hole, along with the medicine, a real pea, very hard, which swells considerably during the day and keeps the hole open. The absorption of the active principles, as thus applied, is quite active, and the narcotic effect is easily graduated, by increasing or diminishing the size of the bolus; or we may reduce the proportion of opium and belladonna.

We usually dress but once in the twenty-four hours, though relief is quicker if it is done morning and evening, using a smaller bolus each time. In order to derive all the advantage from this remedy which we have a right to expect, we should keep the system constantly under the

influence of it. It is kept up as long as the pains last; when they disappear, only one pill is introduced along with the real pea, and when the disease has been entirely relieved for eight or ten days, we dress with ordinary peas like a simple issue. After many trials, we find that this mode of treatment is the one with which we have succeeded the best in sciatic neuralgia.

The dose of extract, which can be put on the surface of blisters, should not exceed 30 centigrammes; and a smaller amount should be used at first; otherwise, delirium and other symptoms of intoxication by the poisonous solanaceæ will occur.

Practitioners should be informed that the application of extract of belladonna to the denuded derma causes very acute pain. To prevent this, we cover a piece of fine linen with extract, applying the clean side to the skin, and put a piece of adhesive plaster over it. The extract dissolves slowly without giving pain.

Lead colic.—The efficiency of hyoscyamus in lead-colic, well established by Stoll, and the identity of the action of this plant and belladonna, led Dr. Malherbe, of Nantes, to try belladonna; the facts were published in 1850, in the *Journal de médecine et de chirurgie*, edited by Malgaigne, proving the efficiency of this heroic remedy. Belladonna may in this case be given in much larger doses than in diseases which are not painful. Under its influence most patients feel relieved from the first to the third day, and are cured from the sixth to the eleventh. At first 5 centigrammes of extract are combined with 10 of the powdered root (gr. $\frac{3}{4}$—$1\frac{1}{2}$); if no toxic or therapeutic effects are produced, this is increased; if the contrary, it is diminished. We give conjointly, every day, one or two enemata of 2—5 centigrammes of extract, and rub an ointment of belladonna to the abdomen. Subcutaneous injections have since been successful.

The nervous colic of warm countries, so frequent among sailors in the tropics, upon which Dr. Fonssagrives has published a very interesting paper in the *Archives générales de médecine* (oct., 1852), has been treated by him with belladonna, with a success that cannot be too much praised. This treatment does not exclude the use of purgatives, which are not to be given until the pains are quieted.

Pains.—In painful diseases, of whatever nature, it is often very important to relieve the pain; and as soon as this symptom has disappeared, the others are easily conquered. In fissure of the anus or hæmorrhoidal crevices, an ointment made of 4 grammes (ʒ i.) of extract of belladonna with twice as much lard or cerate is the best topical remedy. If wicking or suppositories covered with this remedy are to be introduced into the rectum, the dose must be greatly reduced, in order to avoid the risk of severe cerebral symptoms.

In acute arthritis, in gout, when seated in a joint with little soft tissue about it, we have relieved the severest pain by a poultice composed of bread crumb q.s.; water, q.s.; when the poultice is cooked, add from 40

to 100 grammes (ʒ x.—xxv.) of camphorated alcohol, and spread on the surface a layer of porridge made of 10 grammes of extract of belladonna, 5 grammes of opium and 10 grammes of powdered camphor (ʒ iiss.—gr. 75— ʒ iiss.). The poultice must be so thick as to retain the form of the vessel it was cooked in, when placed on the table; this is indispensable. It is wrapped in flannel and oil-silk, and may remain applied eight or ten days without changing. We have thus cured in a short time very severe inflammations of the knee which had caused a complete flexion of the leg upon the thigh.

Simple poultices made with the decoction of 30 grammes (℥ i.) of belladonna in a quart of water, and flaxseed-meal, are useful in relieving the pain of superficial abscesses, certain cutaneous affections, ulcerated cancers, inflammation of the testis, blennorrhagic inflammation of the bulbus urethræ. In the last, pure extract rubbed along the canal is better.

We are accustomed, in otalgia, to inject a decoction of belladonna into the ear, and afterward apply a piece of cotton soaked in baume tranquille; the latter is simply a digestion of plants of the "virosæ" in oil. In toothache, relief is given rapidly by placing in the carious tooth 2 centigrammes and a half (gr. 0·37) of the extract. Washing with tincture of belladonna is very useful in relieving the pain that follows the application of mustard.

The neuralgic pains of the uterus are greatly relieved by small plugs of cotton containing a pill of 5 or 10 centigrammes (gr. ¾—1½) of extract of belladonna, pushed to the end of the vagina; the thread around the little tampon remains in the vulva; it is introduced in the evening and taken out in the morning.

When the pain is very local, there is an advantage in subcutaneous injection. This method is particularly useful in uterine neuralgia, unless the woman is subject to exaggerated "nervosisme," when belladonna is ill borne.

Rheumatism.— Gout.—In gout and articular rheumatism, such cruelly painful diseases, extract of belladonna or stramonium is given internally with success; the dose is 1 centigramme (gr. 0·15) of extract every hour: delirium usually appears on the second day, but the treatment is continued, and is kept up, whatever be the violence of the cerebral symptoms, until the pain and swelling are wholly gone. Dr. Lebreton, who has often used this bold treatment, has often told us that acute rheumatism yielded in one week, and that he had never seen the least harm from the cerebral symptoms. On his authority we tried the plan; Münch and Ziegler had already recommended it (Murray, "Appar. med.," t. I., p. 649). In our hospital and practice, we have given belladonna in powder or extract to patients with acute articular rheumatism. The first day, we give from 25 to 40 centigrammes of extract in eight pills, in the 24 hours. This amount is increased every day, until a little delirium occurs; we then continue with the same dose three or four days and then gradually dimin-

ish. At the same time we give (and this precaution is most important) a dose of calomel and jalap or some other purge once a day, to keep the bowels always relaxed.

In a few days the improvement is very marked, and usually the acute rheumatism is cured in twelve or fifteen days of treatment. Sometimes we have seen the remedy fail altogether; but we have seen other patients who were wholly cured on the third, fourth, or fifth day.

When the pain is gone, purgatives must be continued for some time, as a more certain preventive of relapse.

Our remarks regarding belladonna in the treatment of rheumatism are equally applicable to stramonium, which should be given in smaller doses.

Epilepsy.—When we consider the extreme difficulty of curing epilepsy, we are little disposed to receive statements of cure due to belladonna. But this skepticism should not pass certain limits; we must not refuse the testimony of good authorities. Greding (see Murray, Apparat. med., t. I., p. 646) gave belladonna several times in powder and extract to patients suffering from epilepsy, simple or complicated with mania; he did not produce a cure, but gave much relief. Leuret at Bicêtre, and Ricard, have published twenty-two cases confirming Greding (*Gaz. méd.*, 1838, No. 12). But the two Münch's have seen some complete cures in cases where sudden fright or menstrual suppression brought on epilepsy, and the disease therefore seemed connected with a less severe cerebral lesion.

Bretonneau, in our time, has used belladonna with the most perseverance and success. Like Greding, he used it often in epilepsy: quite often checking the trouble, and in a few cases curing it completely.

Having now used Bretonneau's method for thirty years, we find it the least inefficacious that we have ever tried or seen tried. We have obtained a certain number of solid cures; in many cases we have found an improvement which left nothing to desire; but in the majority, belladonna has completely failed.

Belladonna, therefore, is far from being the specific for epilepsy; but it is more useful than the salts of silver, copper, and zinc, which does not prevent our sometimes having recourse to these substances when it fails.

But we cannot sufficiently enforce the patience and perseverance which both physician and patient require in order to succeed. A year is hardly sufficient to make known the influence of belladonna; but if there is any improvement the next year, we must persist for two, three, or four more, in order to master the nervous system.

Pills are made, containing one centigramme of extract of belladonna and the same amount of powder. The first month we give one in the morning, if the attacks occur chiefly by day, or in the evening, if chiefly by night. Each month we give one pill more, and, whatever the dose, we always give it at the same moment. We thus reach the dose of from five to twenty pills, with no other limit than the patient's tolerance and the effect upon the disease. If belladonna is ill borne, the dose is increased

only once in two, three, or four months; and likewise, if the disease has been much modified.

For some years we have used atropia in preference to belladonna. We order a 1 per cent. solution of the neutral sulphate of atropia in white brandy; one drop of the solution contains half a milligramme (gr. 0·007) of the salt. We give at first only one drop, then increase the dose by a drop from month to month, as we did in giving the pills.

Convulsions.—We have very often found belladonna of advantage in treating convulsive disorders, especially the eclampsia of children and lying-in women; we do not much rely on it at the beginning, but when the attacks recur several times a day and several days in succession, belladonna in small doses sometimes gives unexpected results. The unilateral or partial epileptic convulsions, even when symptomatic of a grave, organic lesion, are those in which we have obtained the best results.

Tetanus.—Lenoir published some years ago four cases of cure of traumatic tetanus obtained by bleeding, followed by vapor baths and large doses of belladonna. He began by vigorous bleeding, and directly afterward he gave, every morning and evening, a vapor bath lasting at least two hours. At the same time he gave, during the day, enough belladonna to cause a little stupefaction. He prolonged the treatment until the spasms had entirely disappeared, and a few days later.

Paralyses.—Bretonneau was led by success in treating convulsive diseases, sometimes accompanied by paralysis, to use the remedy in treating certain paralyses, uncomplicated by spasm. In several cases of paraplegia he obtained cures as unexpected as inexplicable, and we have witnessed some results which we were far from expecting. But in hemiplegia, unless there were at the same time convulsive spasms, he obtained, in general, no result.

Nocturnal incontinence of urine in children.—This sad infirmity, the direct cause of which is usually so hard to appreciate, was treated with extraordinary success by Bretonneau, and later by ourselves and others.

It suffices to give, in the evening, an hour before bedtime, from 1 to 4 centigrammes of powder and extract of belladonna; it is rarely the case that there is not a decided improvement after a week of treatment; this is kept up till the incontinence has ceased. We then stop, for a week, and resume it for two weeks, cease again, and resume it for a week each month for some months in succession. This length of treatment is usually superfluous; but, in order to make certain to prevent relapses, it is better to sin by excess than by lack of precaution; and children may the easier be subjected to this seemingly energetic course, as they can have no repugnance to the nearly insipid powder and extract, which may be mixed with sugar. In certain rebellious cases, the dose of extract and powder must be raised to 15 or 20 centigrammes at once, at bedtime, friction being, at the same time, made upon the hypogastrium with a mixture of extract of belladonna and water.

As to the mode of action of belladonna in nightly incontinence of urine in children and adolescents, we see, first, that belladonna, in large doses, lessens the contractility of the muscular fibres of the bladder, a property which has been particularly shown by Dr. Commaille's experiments on himself.

When the incontinence has lasted a long time, and occurs in an adolescent, the treatment is by no means so simple. It is sometimes necessary to insist on the remedy for a year or two, increasing the dose each month as in the case of epilepsy, and to continue long after the trouble has wholly ceased. We have too often seen incontinence return when the cure seemed to have been perfect for one, two, or four months. Often, also, when belladonna has checked the trouble during the first months of its use, it is proper to suspend it and replace it for a while by the preparations of nux vomica.

If we reflect that (as Bretonneau and we ourselves have observed) the patients generally pass water by day in a very strong stream, while perfectly capable of retaining it, we may understand how by night, when the vesical sphincter relaxes, and the bladder retains an extraordinary tonicity, the urine escapes involuntarily, and then belladonna is useful by lessening this exaggerated tonicity of the muscular layer of the bladder.

Let us further remark that belladonna, so efficient in the treatment of *nocturnal* incontinence, is useless, and often harmful, in incontinence which is both daily and nightly; it is observed that in patients of the latter class, the stream is usually slack, contrary to what is seen in the other class. In these, the preparations of nux vomica are more particularly required.

We are authorized to conclude from these facts, that nightly incontinence in children is relieved by belladonna, chiefly, through its sedative action on the neck of the bladder and the prostate part of the urethra.

Belladonna has an anaphrodisiac power which, pointed out by several, has been very positively confirmed by Heustis. In a patient who took the drug for a severe whooping-cough, the erections were suspended, during the entire period of its administration, as long as the dose produced a slight stupefaction. Three doses of one centigramme (gr. 0·15) invariably produced this effect. In other persons, with gonorrhœa and chordee, the result was invariably the same. Heustis used the same treatment for a person subject to frequent nocturnal pollutions, with complete success, though belladonna gave rise to no appreciable physiological symptom (*Archives*, mars, 1859).

Gastralgia.—Enteralgia.— Constipation.—The preparations of belladonna are much used in treating gastralgia and enteralgia. It is especially valuable in relieving those shooting pains, and incessant calls, which are observed in some forms of dyspepsia. Bretonneau has done the most in clearly formulating the indication for this remedy in this affection. He forbids belladonna whenever there is a tendency to diarrhœa, and pre-

fers opium; but when there is constipation (as is more usually the case), he gives a very little belladonna, either at meals or at bedtime.

He often treats constipation in the same way, especially in hypochondriacs and nervous women.

It is remarkable that certain persons, whose bowels are never moved except by the most energetic purgatives, obtain a daily stool by the smallest dose of belladonna. One, two, four pills, each containing one centigramme of extract and the same of powder, are usually enough. Sometimes a teaspoonful of castor oil or magnesia, taken at night on top of the belladonna, completes the effect, which would fail otherwise.

When the patient is able, by going daily at the same hour to stool, to obtain an evacuation, the oil is suspended, and the dose of belladonna gradually lessened and at last dropped.

Many can only obtain a stool after smoking a pipe or cigar; do tobacco and belladonna both act against constipation by their common solanaceous principle?

Insanity.—The species of relationship that exists between hydrophobia and insanity, says Murray, has led to the trial of belladonna in the latter disease. Repeated trials have been made, and several authors have proclaimed numerous successes; analogy, which so often is a useful guide in treatment, gives a hint by the fact that belladonna, in a large dose, causes a temporary insanity.

In our time, certain experimenters state that they have found it of use, especially in monomania with fixed hallucination. Moreau, of Tours, has used stramonium in the same way.

Diseases of the eyes.—All the solanaceæ have the obvious property of dilating the pupil. This has been made of use by surgeons in operating for cataract by couching or extraction, and also in preventing painful stricture of the iris in certain ophthalmias. After forming an artificial pupil, the cut edges have been kept from uniting, and Himly has proposed to use belladonna to discover whether the iris is adherent, and to prevent adhesion, suspending from time to time the administration in order to produce alternate contraction and dilatation (Mérat et De Lens, "Dict. de mat. méd.," t. I., p. 492). The end is attained variously; some rub the extract on the brow of the affected eye, some lay upon the eye a poultice made with a decoction of belladonna, some prefer to drop into the eye the extract or juice of the plant dissolved in water, but at present a solution of $\frac{1}{4}$ per cent. is generally used, of which a drop is placed between the lids. The latter method is perhaps the surest, and it is as rapid as the others. Belladonna and stramonium used in this manner are considered by most ophthalmologists of great value in the treatment of iritis.

A. Bérard and Tonnellé, of Tours, have used it very advantageously in cataract. They apply it not only before, but after the operation, which not only enlarges the field of vision, but prevents inflammation and adhesion of the iris, so common and so dangerous a sequel of extraction or couching of the crystalline.

This use of belladonna has been most remarkably useful in certain affections of the iris, which tend to obliterate the pupil, after operations for cataract. In membranous iritis, the adhesions in the form of rays reaching from the edge of the pupil to the centre of the lens, are gradually stretched by the action of the drug, in a degree which varies according to their consistency and antiquity. The small circumference of the iris becomes unequal and angular; little re-entering curves are formed, like so many partial pupils. The extremities of these curves, retained by membranous adhesions, then, and sometimes for a very long time, present angular projections, which by degrees become smaller and disappear, by a sort of wasting or by separation. The débris is not rarely seen floating in the centre of the pupil until completely destroyed by absorption. We have seen the points of insertion of these membranes in the crystalline capsule, already quite opaque, become by degrees transparent, and sight completely re-established.

In other, severer cases, where the pupil is almost wholly obliterated by membranous products, Tonnellé has by degrees restored the opening, and given sight.

In this case there is sometimes a small, partial dilatation of the pupil at a point in the small circumference of the iris, whence results a sort of secondary pupil which progressively enlarges; sometimes the membranous web seems to grow thin by degrees towards the centre, it wears away, then tears, or is dissipated and dissolved like a cloud.

This is more usually the case with the false membranes which follow the operation for cataract, and it is thus that Tonnellé obtains the most complete success. Led by observation to see that the secondary cataract, which often destroys the good results of the most skilful operations, is only the result of membranous iritis, and the product of the false membranes peculiar to this affection, he used belladonna according to the above method for this disease, almost always with perfect success, when in time. This remedy should be used from the fourth day, the period when the membranes usually form.

The operator ought to have a rule to examine the patient carefully on the fourth day. It is not necessary to expose the eyes to a bright light, which might be injurious; a half-light is enough. If the patient sees, it is needless to go further; but if he does not see clearly, especially after extraction, and there is no inflammatory swelling of the eye, it is nearly certain that there is a secondary cataract, and there is no harm in ascertaining the fact by a prompt examination with all possible precaution.

The longer the trouble has lasted, the harder to destroy the membrane. Tonnellé, however, has destroyed it on the eighth, sometimes on the twelfth day.

The membrane is often detached on one side only; this need not cause anxiety. If belladonna is continued in sufficient doses, absorption destroys by degrees those which remain, and they are reduced to a small border which surrounds the whole or a part of the edge of the pupil.

When belladonna, used as above, does not destroy the membrane which is produced in iritis or cataract, it has the immense advantage of preventing closure of the pupil, which would by degrees draw together until it formed a grayish point, when there would be but the slightest chance of an artificial pupil.

Tonnellé then used the needle and belladonna, in mutual support.

When there remain some rays of membrane, a narrow needle slightly curved on its flat surface, and with cutting edges, is introduced through the cornea into the anterior chamber; its point is turned to the iris and crystalline, and the adhesions are rapidly cut. This little operation sometimes has to be repeated twice or thrice; it gives no pain, and, if properly done, no inconvenience. Belladonna ought to be continued immediately afterward, to prevent new adhesions; success is only certain upon these conditions.

In secondary cataract, when the membranes have not too much consistency, and are refractory to belladonna, the same procedure must be employed, and the membranous products freely detached: this is a case where belladonna is especially required, for it is indispensable, as preventing a new adhesion, which without it would be sure to form. By means of belladonna the fragment is kept floating free until destroyed by absorption.

In this way the so-called secondary cataract, one of the most frequent causes of all the failures of the operation for cataract by extraction, is almost always conquered.

In the worst and most obstinate cases, it has sometimes been necessary to make two or three introductions of the needle, and to use belladonna six or eight weeks. Its prolonged use has never been observed to lessen the sensibility of the eye in any respect.

It is readily understood that certain cases of cataract, cured without operation, may have been simply membranous products of iritis.

The preparations of belladonna are used continuously for all wounds of the iris. The effect of such wounds being to contract the pupil and obliterate it, these preparations are employed as soon as the inflammation is sufficiently controlled by cold water. Even if we fail to prevent membranous adhesions, we keep the pupil in such a state of dilatation that the destruction of the membranes by means of the needle presents no difficulty. The drug is also used when cataract is destroyed by being broken up, preventing adhesion between the débris of the capsule and the iris, and greatly hastening the resorption of the débris by giving them free contact with the aqueous humor. Observation shows that the use of belladonna in this case is so valuable as alone to insure success.

As a preparation for the operation for cataract, it should be reserved for cases of couching, and absolutely proscribed in extraction. Artificial dilatation of the pupil is useless as aiding the escape of the lens, and exposes the iris during the operation to the edge of the instrument, and after the operation to vicious adhesions to the cornea.

In the ophthalmia of children, so often accompanied by iritis, the simultaneous use of divided doses of calomel and of frictions of belladonna around the orbit is extremely valuable. Belladonna should be continued as long as the eye remains sensitive to the action of light.

Constriction of the sphincters.—If belladonna thus relaxes the muscle of the iris, it ought to do the same to other muscles. Analogy leads us to use it in constriction of the anus, urethra, and cervix uteri. Chaussier invented the latter application: in primiparæ, and women in whom the cervix did not dilate after long and violent uterine contractions, he covered the os uteri with soft extract of belladonna mixed with cerate. This practice was followed by Mandt (*Rust's Magazine*, vol. XIX., p. 350) and a great many other physicians: Spath has reported several cases, proving the extreme value of this method (*Gaz. méd.*, 1838, No. 2). Ergot should sometimes be given simultaneously, to increase the energy of the uterine contractions, while belladonna lessens the rigidity of the neck.

The union of belladonna with a fatty body is best effected by dissolving it in water, and working the latter up with cerate, in the way used to make Galen's cerate. The proportion of extract varies from a quarter to an eighth of the whole mass.

Constriction of the urethra.—Ileus.—Hernia.—Dr. Holbrook used enemata of an infusion of a few centigrammes of belladonna leaves, and injections of the same sort, as well as fomentations on the perineum, to relieve spasmodic or inflammatory constriction of the canal of the urethra (*Bulletin des sciences méd.*, t. I., p. 36), and Will, dispensary surgeon in London, proposed for the same purpose to pass bougies covered with a little of the extract (*Journal des progrès*, t. I., p. 97). Enemata of belladonna and poultices spread with extract have been used advantageously to relax the fibres of the abdominal aponeuroses in strangulated hernia. Rollon de Sainte-Foix published in the *Bulletin de thérapeutique* (t. X., 1836) the account of a strangulated hernia of difficult reduction, which was easily reduced after the application of extract of belladonna to the tumor. In the *Gazette médicale* (1838, No. 8) we also read of four cases of intestinal strangulation cured by enemata composed of the infusion of 4 grammes (℥ j.) of belladonna root and 30 grammes of camomile flowers (℥ j.).

Uterine pains.—Dysmenorrhœa.—Retention of the menstrual discharge.—When the uterine pains are neuralgic, as is quite common among chlorotic women, or depend on inflammatory fluxion, or a displacement, vaginal injections with a strong decoction of belladonna (15—60 grammes, ℥ iv.—xv. to three pints), repeated two or three times a day, are in general very useful; the same end is reached by injecting a little water into the rectum, to which are added 10 or 20 drops of tincture of belladonna. We use another process, especially when the uterine pains are accompanied by leucorrhœa and superficial ulcerations of the os tincæ: we make with cotton wadding a ball in which we enclose a pill of 5 or 10

centigrammes (gr. $\frac{3}{4}$—$1\frac{1}{2}$) of extract of belladonna and 30 or 40 centigrammes (gr. 6—8) of powdered tannin; the ball is tied with a double thread at least 10 or 15 centimetres (4—6 in.) long, and the little tampon is carried by the finger to the cervix uteri. Women learn to do this easily without help; it is repeated every evening after an injection intended to cleanse the vagina and os uteri thoroughly. The next day, on waking, the ball is easily removed by the thread. The dressing is very simple, has the double advantage of curing phlegmasias of the cervix which are often treated by violent measures, and of relieving the uterine pains. The speculum is quite superfluous.

Another kind of uterine pain is evidently due to retention of the menstrual flow: it is successfully treated with applications of belladonna. Women have the signs of menstruation, namely, headache, swelling of the breasts, want of appetite, sometimes diarrhœa, etc., etc. With these symptoms there is associated a considerable heaviness of the hypogastrium; then acute pains in paroxysms like those of parturition. Soon blood begins to flow in clots; the pain then diminishes, and the blood is replaced by a puriform fluid, which sometimes smells like the lochia. If the uterus be palpated *intra vaginam* while the pains are worst, it is found very voluminous, and the os closed. A week later, it is found of normal size. Bretonneau, who carefully followed this pathological evolution, and pointed out the errors of diagnosis which might arise, thought that the rigidity of the cervix prevented the menstrual flow, that the blood accumulated in the cavity of the womb, painfully distending the viscus, and that the most useful treatment was to place extract of belladonna upon the cervix, and give a few grains of acetate of ammonia.

The tampon of belladonna, without tannin, applied by night only, is of great value here; but it is simpler to carry a little ball of 5 or 10 centigrammes (gr. $\frac{3}{4}$—$1\frac{1}{2}$) of extract on the finger-tip to the cervix.

The above form of dysmenorrhœa is more common at a fully adult age than at the beginning of adolescence. But it is admitted by the best observers that dysmenorrhœa, so common at the age of puberty, is often due to the same causes as those of puberty, to wit, a uterine fluxion and retention of blood in the uterine cavity, which is suddenly distended and contracts with energy to free itself from the foreign body.

For young girls, only vaginal or anal injections of belladonna are suitable: the finger or speculum ought for obvious reasons never to be used.

The local application of belladonna is often of use in diminishing or suppressing the secretion of milk. It is preferable to iodide of potassium, especially when, for particular reasons, only one mamma needs to be acted upon. The plan has been praised by Goldun and Rewmann, and tried with great success by Frend. Aran noted the anti-lacteal properties of belladonna, giving it internally, but not locally.

Vomiting of pregnancy.—Bretonneau, struck with the occasional extreme difficulty of checking the vomiting of pregnant women, was led by theory to employ belladonna. He thought the vomiting due to a spas-

modic resistance of the uterus, which refused to let itself be distended by the product of conception. This resistance, painful in some cases, became through sympathy the cause of vomiting. The idea may be objected to, and its author attached very little importance to it; but it led him to make friction with belladonna on the skin of the hypogastric region, which was successful beyond his hopes. We have followed his example, and have often gained good results.

Bretonneau used a mixture containing extract of belladonna softened and rendered half liquid by a little water. He much preferred this preparation to a mixture of extract and fat. The patient rubs some in twice or thrice a day at the hypogastric region, taking care to wet her finger when the mixture dries. The rubbing lasts eight or ten minutes. When finished, the parts are covered with a wet compress, and a piece of oiled-silk over all. In most cases the vomiting ceases in a few days, or is greatly lessened.

In certain severer cases, unhappily not rare, belladonna is as powerless as all other remedies, and the unhappy remedy of forced abortion is the only one that is left.

Cazeaux had a case for which he had vainly tried belladonna by Bretonneau's method, and was about to practise abortion to save the woman's life, when he thought that the effect might be surer if he applied a large amount of extract of belladonna to the neck and its cavity; and this little operation, repeated once a day a few times, produced a rapid and unexpected cure.

Salivation.—The dryness which belladonna easily produces indicates a rapid and considerable diminution of the salivary, buccal and pharyngeal secretions. Ebstein, of Breslau, applied this property to the relief of excessive salivation. Sulphate of atropia, given internally in the dose of one or two milligrammes (gr. 0·015—0·03) diminished the secretion in several patients. The improvement was more marked when a milligramme and a half was given by subcutaneous injection, but the cure was not complete (*Berliner klin. Wochens.*, 1873, No. 25).

Whooping-cough.—Analogy led Buchhave (Murray, "App. med.," t. I., p. 648) to give belladonna in whooping-cough. It was thought that there was a spasm of the bronchi, glottis, and respiratory muscles. Whether this opinion was correct or not, it is certain that, as soon as the convulsive period begins, belladonna is very useful. Bretonneau gave the powder invariably in a single dose, morning or evening; beginning with one centigramme (gr. 0·15) of extract and increasing by the same amount every other day until the cough was very much improved. If the disease remained stationary after some days, he increased again, but never so as to cause toxic action. If the disease diminished under a given dose, he gradually lessened it, not leaving off entirely until the whooping-cough had been reduced to a simple catarrh. We have often seen the remarkable efficacy of this remedy; but we give also some emetics when belladonna does not act rapidly enough. Others take the powder of belladonna, 20

centigrammes (gr. 4); watery extract of opium, the same; extract of valerian, 2 grammes (gr. 30); mixed and divided into 16 pills, one to four per diem. For children that refuse pills, we order the following syrup: Extract of belladonna, 20 centigrammes (gr. 4), dissolved in syrup of opium and of orange flowers, of each an ounce; from 1 to 8 teaspoonfuls to be taken in the twenty-four hours. This method seems to us much less efficient than that of Bretonneau.

Since atropine has been added to the list of remedies, we substitute it for belladonna. We order for very young children a mixture containing 1 centigramme (gr. 0·15) of neutral sulphate of atropia to 200 grammes (℥ vi.) of distilled water; 5 grammes, that is, a teaspoonful, of the solution correspond to ¼ of a milligramme (gr. 0·004) of the salt. This is given at first in the dose of a teaspoonful, and then in larger doses, taking pains to give them together (if they are increased) in one time, in the morning, fasting, and not during the day.

But while belladonna given in whooping-cough or in various catarrhs with nervous symptoms often procures the sedation desired, it very often causes insomnia which must be remedied by opium or valerian; and it is for this reason chiefly that we sometimes order these two medicines together with belladonna.

Asthma.—In "essential" asthma, i. e., that unaccompanied by any ap-appreciable organic change of the heart or lungs, except sometimes pulmonary emphysema, and which is sometimes entirely intermittent, some advantage is obtained by giving belladonna internally; but these good results cannot be compared with those derived from smoking the dried leaf mixed with tobacco or alone. We have twice seen intermittent dyspnœas, which had lasted long, and returned every night with discouraging obstinacy, completely yield to the smoking of belladonna or stramonium. We have often produced an improvement, though not a perfect cure, which no other remedy had obtained.

Bretonneau, who knew the management of remedies better than all his contemporaries, was much pleased with the internal use of belladonna in nervous asthma. During the attack he relied rather on the cigarettes of belladonna or stramonium; but he chiefly employed belladonna internally to prevent the return of the disease.

He ordered a single dose, as in the case of whooping-cough, containing from 1 to 10 centigrammes (gr. 0·15—1·5) of powdered belladonna root, united with one-half less of the extract of the same plant. This was taken for several months, or even years, successively, with intervals which were longer in proportion as the effects were satisfactory. He attached little importance to large doses, provided the system remained permanently under the influence of the drug, which is shown by a slight feeling of dryness of the throat, by habitual dilatation of the pupils, and by stools usually larger and easier.

For a long time, the cigarettes prepared by a certain Espic, of Bordeaux, had a great reputation in the treatment of essential asthma and

pulmonary catarrhs complicated with nervous symptoms. They are thus prepared:

℞. Selected leaves of	belladonna.....	30	centigr.	(gr. 4·6).
" "	hyoscyamus	15	"	(gr. 2·3).
" "	stramonium.....	16	"	(gr. 2·5).
" "	phellandrium aquaticum	5	"	(gr. ¾).
Aqueous extract of opium.....		13	milligr.	(gr. 0·2).
Cherry-laurel water.....				q.s.

The leaves, carefully dried and stripped of their nervures, are carefully chopped and mixed. The opium is dissolved in a proper quantity of cherry-laurel water, and the solution distributed equally throughout the mass.

The paper for the cigarettes is previously washed in a maceration of the above plants in water distilled from cherry-laurel, and properly dried.

Two to four cigarettes are to be smoked daily.

Dr. Guyot-Dannecy, of Bordeaux (*Journal de Bordeaux*, septembre, 1864), states that in burning the belladonna paper a part is imperfectly consumed, and gives off irritating vapors to the respiratory organs. He proposes to substitute for the paper fresh leaves of belladonna, plunged for twenty-four hours in a 10 per cent. solution of saltpetre. These preparations are consumed entirely.

Hæmoptysis.—Schroeder, in hæmoptysis, has advised breathing the smoke of belladonna leaves burned on charcoal. He states that pulmonary hæmorrhage is always stopped almost immediately after this is done.

Scarlatina—Belladonna is said to have the remarkable power of preserving from scarlatina. Hufeland has done the most to accredit this idea, which belongs to Hahnemann; he says that persons who are taking belladonna while exposed to the contagion do not contract the disease. The German journals swarm with facts which seem to confirm this singular idea. Imposing as are the authorities which claim this virtue for belladonna, we can only remain in doubt, as we are not certain whether the physicians whose views we almost wholly reject, properly appreciated all the effects of epidemic influences. Belladonna, given for this purpose, is taken in the dose of one centigramme (gr. 0·15), several times a day, in powder or extract.

Poisoning by opium.—Antagonism of belladonna.—In 1570, Prosper Alpin observed that if opium and belladonna were combined, the latter seemed less active; and numerous cases of poisoning by belladonna were known to have been cured by theriaca. Giacomini formulated precisely the opposition between certain properties of opium and belladonna. About the same time, Graves and Corrigan observed that belladonna was very successful in delirium accompanied by constriction of the pupil, while opium gave the best results when the pupil was dilated. In 1854, Dr. Anderson read to the Physiological Society of Edinburgh a paper in

which he distinctly stated the physiological antagonism of opium and belladonna. He supported the theory by two very remarkable facts: in the first case, a person who had been poisoned by a large dose of muriate of morphia was cured by 24 grammes of tincture of belladonna. The second patient was a woman who had tried to kill herself with 20 grammes (3 v.) of laudanum. The stomach-pump, electricity, and other means, had been used without success, when Anderson decided to use tincture of belladonna. An ounce was given at a dose, then 2 drachms half an hour later, and at the end of five hours all the symptoms of opium intoxication had disappeared.

Since then several physicians have done likewise.

Dr. Mancy, of Cincinnati, published the result of such a case in which belladonna alone had been used; and in 1859 a memoir appeared from Benjamin Bell in the *Union médicale*, in which two cases of morphine intoxication were successfully treated by hypodermic injections of atropia. Since this, similar facts have been published in France by Béhier, Blondeau, Lubelsky, Dodeuil, and ourselves (See *Bulletin de thérap.*, 1866, and C. Paul, "Thèse d'agrégation: De l'antagonisme en pathologie et en thérapeutique").

In this method of treatment one thing is remarkable: very large doses of belladonna may be given to patients without producing its characteristic intoxication, while the symptoms of narcotism diminish. We have quoted an example which we think very convincing in the *Bulletin de thérapeutique* (t. LXVII., p. 320).

Further evidence is given by the labors of the Dublin committee (Report of the Committee of the British Medical Association to investigate the action of medicines, by John Hughes Bennett: *British Med. Journal*, Oct. 3, Dec. 19, 1874).

One capital point in the problem must not be overlooked. In order to show the antagonism, the two opposed forces must not be excessive, and capable of destroying the system. When a man is standing and is pushed from behind, he remains standing if another equal push is applied in front; but if we tried the problem by placing the man between two locomotives going in opposite directions, we should not find an equilibrium, but an entire destruction of the man, and perhaps of the machines also. The antagonism will come out most clearly with moderate forces. This is what most experimenters have failed to understand; after placing themselves where it is impossible to see a fact, they deny it.

But the inference has been by no means generally accepted, and the antagonism between opium and belladonna has not been regarded as proved by a certain number of physicians. This is due to the complexity of the elements of the problem.

1. Is it true that belladonna puts an end to the narcotism, and, conversely, that opium arrests those of intoxication by belladonna? We think this first question, at least the first half of it, must be answered in the affirmative, as irrefutably proved by the facts cited. It may be added

that the quantity of opium required to combat the intoxication of belladonna ought, according to M. Bóhier, to be greater than that of belladonna.

2. Does the system remain indifferent to the action of a mixture of the two?

If the quantities are not excessive, the answer is an affirmative. But if they are excessive, antagonism does not exist. Claude Bernard and Vella, in studying the antagonism of curara and strychnia, established the distinction plainly; and it is by not observing it that Camus, using much larger doses, came to deny the antagonism.

Claude Bernard thus explains the antagonism between curara and strychnia:

"Curara is a substance which acts specially on the secretions, increasing their activity, often in considerable proportions. In poisoning by strychnia, curara ought to act by aiding the elimination of strychnia by the super-activity which it gives to all the secretions, particularly that of urine; for when a poison has entered the blood, there is hardly any way but elimination to combat its effects. A person poisoned by strychnia can only be saved when the dose taken, though fatal, is not excessive; for if, after the eliminative action of curara, enough strychnia remains to kill, the poisoning will go on as if nothing had been done."

The problem of antagonism has been stated in a wholly different way, by inquiring whether two substances have such an opposite effect on each element of the system that, if given together in certain equivalent proportions, they will not alter the equilibrium of the system, as in a good balance two equal weights will not change the poise. The last question can only be settled by experiments on animals. In the case of belladonna, it is certain that some species of animals are less impressionable than others. The rabbit, according to Bouchardat, can eat leaves of belladonna with impunity, and pass atropine in its urine, so that it has been proposed to manufacture atropia by feeding rabbits on this food. Giacomini says that goats have the same immunity. The capybara and the rat, according to Meuriot, are similarly constituted.

As regards such cerebral phenomena as those produced by opium and belladonna, the lower animals give little information. We must appeal to the dog, the cat, the horse (Trasbot), and man, to solve this problem.

The experiments of Benj. Bell upon the rabbit, those of Camus (of Saint-Quentin) (*Gaz. hebd.*, 1865), upon the rabbit and sparrow, those of Dr. Bois (of Aurillac) (*Gaz. des hôp.*, 17 juin, 1865), are insufficient. We hoped that the thesis of Meuriot would have some details, but the action of belladonna is compared with that of bromide of potassium only.

Synergic substances.—The other poisonous solanaceæ, stramonium, hyoscyamus and tobacco, have an almost identical effect, and possess the same mydriatic power. If belladonna is used as an antispasmodic, it may be associated with opium, hydrocyanic acid, and lobelia. If atropia

is used as a sedative, it may be aided by bromide of potassium, quinia, ergot, and arsenic.

Antagonistic substances.—We have shown what antagonism implies. Limiting it to the case of the pupil, we will mention as antagonists, opium and, especially, the Calabar bean.

Antidotes.—Tannin and substances containing it annul the action of atropia.

Stramonium.

The analogy, not to say identity of action, between stramonium and belladonna, has led to a trial of the former where the latter failed.

Storck ("Libellus quo Demonstratur Stramonium," etc., Vindobonæ, 1762) is considered the first that tried to utilize the active properties of stramonium. He treated five patients, two insane, one choreic, and two epileptic; the first patient was a young girl of twelve, insane for two years. Storck began with 2½ centigrammes (gr. 0·37) of stramonium morning and evening. Improvement began in the third week; the dose was continued two months, increasing by 1½ centigrammes. During the treatment the patient gradually recovered her reason. The second case is equally curious; it was that of a woman aged some forty years, who had had vertigo for two years; by degrees her reason was affected, and she became subject to attacks of mania. Storck began at 5 centigrammes (gr. ¾), and gradually rose to 15 (gr. 2¼). In four days there was considerable improvement. A month had hardly passed before the understanding was perfect. The stramonium was abandoned; but shortly afterward the patient died, and a large number of hydatids were found in the brain. The condition of a young choreic girl was aggravated during the administration of stramonium, and two epilepsies were only transiently affected.

Those who, like Storck, gave stramonium in the above neuroses, did not always observe with the same good faith and critical power: thus Odhelius, physician to the Stockholm hospital, claimed to have treated fourteen epileptics, of whom he had cured eight and relieved five, while one was not benefited. But Greding ("Mém. de l'Acad. de Stockholm") observes with justice that Odhelius's patients left the hospital too soon; it was impossible to state anything regarding the cure of a disease of which the paroxysms return at such irregular intervals.

However, the incontestable success of Bretonneau, Debreyne, and many others, in treating epilepsy with belladonna, the action of which is very like that of stramonium, should make practitioners less distrustful of the statements of Storck and Odhelius.

A considerable number of facts seem to confirm the value of stramonium in mania. Schneider (see Bayle, *Biblioth. thérap.*, t. II.) cured, slowly it is true, with tincture of stramonium, a lady of fifty years who suffered from demonomaniacal melancholy, and another woman who be-

came mad after confinement. Bernard (*Bulletin des sciences méd.*, t. XI., p. 343) gives the case of a woman affected with chronic mania which came on after accouchement, who, having by mistake taken stramonium seeds, suffered the effects of poisoning and was cured of her mania. Amelung, a warm partisan of stramonium, recommends the tincture in acute mania, but only when the violent agitation and the signs of cerebral plethora are calmed. He quotes four cases of mania cured by this means (*Journal d'Hufeland*, novembre, 1828).

Moreau, of Tours, has stated more clearly than had been previously done the mode of using datura in treating insanity. He applies it chiefly to cases of monomania with hallucination, resting upon the fact that datura causes hallucinations, and that mania with hallucinations ought to be cured by the drug in the same way that most irritants are used locally to cure irritation. He published in the *Gazette médicale* (octobre, 1840) a paper of great interest, in which the therapeutic hypothesis which he had wished to verify is justified by clinical observation.

We do not believe that others have had more success than Storck in treating chorea with stramonium; but a much more terrible neurosis, tetanus, was once treated successfully by James Begbie ("Transact. of the Medico-chirurg. Society of Edinburgh," vol. I., p. 285), as, later, Lenoir so well succeeded in curing traumatic tetanus with belladonna (vide supra, Belladonna).

Asthma.—Datura stramonium has not always succeeded in the hands of those who have tried it for such neuroses as mania, epilepsy and chorea; but the incontestable value of the medicine in asthma and the neuralgias places it among those drugs on which therapeutics can best rely.

The habit of smoking a kind of datura (metel. fastuosa) to cure asthma is popular in the East Indies, if we may believe Sims (*Edinburgh Med. and Surg. Journal*, vol. VIII., 1812). Dr. Anderson, physician at Madras, who praised it much, sent some to an English general, who brought it to Europe in 1802 and gave some to Dr. Sims, who gave it to a young phthisical patient and an asthmatic physician to smoke, to their great relief.

The datura stramonium, the only form used in Europe, has identical virtues. The same author says that a physician had often been waked suddenly about two in the morning by an attack of suffocation which seemed as if it would kill him, and which lasted from 36 to 72 hours; the access was suppressed at once, and then always prevented by smoking datura stramonium like tobacco (ibid.). English reports in the same journal (vol. VII., 1811) that he was subject to extremely violent attacks of asthma, which nothing relieved, but was cured immediately by smoking stramonium. It was used in the same way and with the same success by Christie, physician-in-chief of the Ceylon hospitals, who quotes the case of Ebert, who had suffered two years with nocturnal asthma; the attack was cured or prevented when the patient smoked datura fastuosa (ibid., vol. VII., 1811).

The facts observed and published by Krimer (*Journal complém. du Dict. des sciences méd.*, t. V., p. 375), confirm those we have reported. He gives five cases of asthmatics cured by smoking d. stramonium. Meyer (*Hufeland's Journal*, April, 1827) recommends the same, having found it useful in spasmodic asthma. We have seen the illustrious Laennec and Cayol using the same remedy with advantage in like cases. Mirande has published new facts (*Bulletin de thérap.*, t. XIII., 5e livraison).

In support of these facts we may add the results of our own experience; we feel perfectly justified in proclaiming the truly remarkable efficacy of the drug as used and smoked in asthma. By this word we do not mean a permanent difficulty of breathing, connected with an organic and immovable difficulty of the organs of circulation and respiration, but only a dyspnœa, often extreme, and essentially intermittent or remittent; a dyspnœa which is explained by no appreciable material cardiac or pulmonic lesion; entirely nervous, but able, sometimes, to appear as an accessory and non-essential symptom in the various organic symptoms of the chest.

The two first patients treated by us with this remedy had identical symptoms, and both were temporarily cured.

Their asthma was frankly intermittent; the access began suddenly every evening at ten or eleven, and lasted till four or five in the morning; it was so intense that the patients had to stand up, and to hold on by the furniture in order to breathe. When the attacks were over the breathing became calm, and the patients could attend to their duties, walk, run, mount stairs, without more loss of breath than the most healthy persons, accustomed to the most violent exercise. This state lasted a week, a month, or more; then there was a time of calm; then the attacks recommenced. One patient had been unable to lie abed for seven months, the other for four. We gave them datura stramonium to smoke, and the attack was literally cured on the instant, so that from the first night they could lie down and sleep without oppression. For more than twenty years these patients have had relapses of their trouble at times, but they smoke datura at the first warning, and are speedily relieved. This is the particular form in which datura succeeds best; but it is far from always curing, even in this case; if we have often succeeded, we have often failed; but sometimes, in spasmodic non-intermittent asthma, which in general yields to datura less well, we have seen the remedy calm the symptoms as quickly as in nocturnal asthma. The influence of datura on persons affected with essential asthma has something almost miraculous in the first months and years of its use, but if the disease is grave, and returns often, by degrees datura loses its power, and at last becomes wholly inert. It is still used with profit to relieve the cough and dyspnœa of phthisis, of patients suffering from catarrh and diseases of the heart, when they suffer from time to time the oppression which must be referred to a nervous modification rather than to their demonstrable organic lesions.

We usually have datura leaves mixed with equal parts of sage-leaves, and smoked in a pipe or with little paper cigarettes. The dose of the dry leaves is 75 centigrammes to 1 gramme (gr. 12—15) to each pipe: one or more are smoked in a day, according to need. If a man is accustomed to smoke tobacco, the datura is mixed with it. The leaves can be burned on coals and diffuse their smoke in the room.

Stramonium forms a part of most anti-asthmatic cigarettes or tubes; we have given the most usual formula under belladonna.

The inhalation of vapor of warm water charged with stramonium is proper, but by no means so active; it cannot be used when the suffocation is extreme, for it increases for the time the dyspnœa.

As to the internal administration, in dyspnœa, we have never been successful except when we have followed the method given by Bretonneau for belladonna (see above); and Skipters ("Transactions of the Medical and Physical Society of Calcutta," vol. I., 1827), a physician in the East Indies, relates that he cured two persons of an extremely violent spasmodic asthma, by making them drink of an infusion of an ounce of the bark of the root of datura fastuosa in a pound and a half of water reduced to a pound; he gave two ounces of the decoction at once, which seems to us an excessive dose.

Whooping-cough.—Among the spasmodic affections of the respiratory organs, whooping-cough surely has the first place; and datura has been found equally successful with belladonna. The same is true of the nervous coughs which may or may not be accompanied by organic lesions of the larynx or lungs. In these various circumstances, datura is given internally in the form of extract, tincture or infusion, or in smoke, as for asthma, or in vapor fumigations inhaled by a special apparatus.

Neuralgias.—The use of datura stramonium in neuralgias is one of the best and best-established treatments. Lentin reports (*Journal de Hufeland*, t. IX.) that he treated fourteen persons for tic douloureux without a single radical cure, and that the only remedy that he found of use was the tincture of stramonium given internally, in the dose of 4 or 5 drops every 3 or 4 hours. The observations of James Begbie show the same ("Transactions of the Medico-chirurgical Society of Edinburgh," vol. I., p. 285): he gave extract of stramonium in the dose of 1½ centigrammes, sometimes 10 centigrammes, in four hours. Wendestadt de Henfeld reports confirmatory cases (*Bulletin de thér.*, 1837, 8e livr.). Marcet, physician at Guy's Hospital, in London, cured a woman aged thirty, who had suffered from very severe sciatica for several months, with 7 centigrammes of extract of stramonium per diem (gr. 1); and another woman, of forty-eight, who had suffered two years from the same disease, was cured by the same remedy. He relieved and cured several tics douloureux of the face, and rheumatismal osteocopic pains ("Medico-chirurgical Transactions of London," t. VII., 1816). Kirchoff used the tincture for frictions on the course of the painful nerve; these were performed from 12 to 15 times a day. They should be kept up some time after the disease is cured. He gives

four remarkable cases which attest the efficacy of the treatment. The most recent of these cases had lasted nine months (*Archives générales de médecine*, t. XIV., 1827, p. 373).

We have very often used stramonium in neuralgia, particularly of the face, hairy scalp, and neck, and it is one of the remedies we most depend on. We use it less internally than externally, applying it to the painful point in plasters composed of 2 grammes of alcoholic extract (ʒ ss.) sometimes with 25 or 30 centigrammes of muriate of morphia (gr. 4—4½); or in thick compresses, soaked with a decoction from ten per cent. of material; or by friction with the tincture in Kirchoff's way; sometimes we prefer an ointment of equal parts of cerate and alcoholic extract. The application should be long continued, even when all pain is over. We should say that we never found these remedies useful in deep neuralgia, as those of the brachial plexus or sciatic nerve. We have completely failed in some cases of neuralgia of the face in a great many years. In a word, we are convinced that while the remedy easily conquers superficial and not inveterate neuralgia, it is necessary, in the more profound and older cases, to apply morphia to the denuded derma, or use other modes of treatment. We have repeatedly tried to apply to the denuded skin the alcoholic extract of stramonium in place of morphia; by this remedy we have obtained very satisfactory results, especially in deep neuralgia; but the contact of the extract with the chorion is quite painful, and we have sometimes had to give up this useful remedy.

Subcutaneous injections of daturia may be used like those of atropia (see article on Belladonna).

Rheumatism.—The efficacy of stramonium in rheumatism is incontestable. Marcet, of London (v. supra), relieved a very severe lumbago by the internal use of stramonium, and others, following him, including Alex. Lebreton, of Paris, have tried to cure interarticular rheumatism by the same means, and even the most acute articular rheumatism. Lebreton gives 1½ centigrammes of extract of stramonium seeds every three hours till delirium comes on; this having occurred, the dose is lessened so as to let the delirium remain at the same height for two, three, or four days; and then he stops at once. By this heroic treatment, which we have found free from all danger, he cures in a few days synovial rheumatism, febrile and generalized. We have repeated these curious experiments, and have had success. Datura does not in this case differ from belladonna, which we have given so advantageously in larger doses. In rheumatism, it is proper to combine drastic purgatives with the larger doses of the poisonous solanaceæ.

In interarticular and chronic articular rheumatism, and chronic sciatica, we have found much profit from pills made of 5 milligrammes (gr. 0·075) of extract of stramoniun and opium. We give of these pills from 2 to 10 daily, until vision is considerably disturbed, and we continue to use them for two or four weeks, even after the pain has wholly disappeared.

Pain.—Whatever the cause or nature of pain, it may be relieved by the internal and external use of stramonium in potions or poultices, etc.; we will repeat that stramonium can do all that belladonna can, only that its powers are more active. We shall refer to what we have said of belladonna; but we again repeat that stramonium, which grows abundantly everywhere, should be preferred to the latter in general use.

Diseases of the eyes.—Daturia, like atropia and hyoscyamia, has the power of dilating the pupil. According to Lemattre, its intensity of action is less than that of atropia, but greater than that of hyoscyamia. Jobert (de Lamballe) believed that daturia was the more active, and advised it in preference to atropia for this purpose; the only point, however, is one of dose; but what may hereafter give to daturia the advantage is the fact that it seems not to be a local irritant like atropia.

Tobacco.

Tobacco was formerly much more used in medicine than now; we are convinced that it has no special properties of enough importance to occupy a large place in the materia medica, if we retain the other poisonous solanaceæ. Our readers will probably agree with us in this.

Diseases of the nervous centres and conductors.—Boerhaave directed the application of fresh tobacco leaves to the forehead and temples for neuralgia; the same remedy, or better, the decoction or extract, is useful in calming the pains of gout or rheumatism when superficial. In toothache, washes of the decoction, frictions of the gums with the extract of the plant, are very useful—more so than the pipe and quid, which have also been recommended.

As to affections of the nervous centres, they are not so well controlled by tobacco, though success in the treatment of paralysis, etc., has been mentioned.

Tobacco was recommended in the seventeenth century, as may be read in Zwinger's work (1696), as efficient in paralysis; but Fischer (*Hufeland's Journal*, 1838) called the attention of physicians to this remedy. He reported several observations which seemed to him to prove that tobacco, in small doses, used with perseverance, had a stimulant action on the brain, cerebellum and spinal medulla, and was successful in incontinence of urine due to paralysis of the sphincter of the bladder, as in paralysis of the lower limbs.

We do not think that the remedy can be advised in soporous diseases without risking an increase of cerebral disorder. But according to Thomas (confirmed by Anderson) tetanus has yielded to tobacco. Thomas advised only enemata of smoke. Anderson applied fresh leaves to the muscles that were most convulsed, also laying fomentations with the decoction of the plant upon the wound; he also gave enemata of the same decoction and of smoke.

Haughton, Tyrrell, of Dublin, and Harrison, of Liverpool, have very lately succeeded by applying an infusion of leaves to the wound or by giving nicotine in very small doses—$\frac{1}{30}$ of a drop at a time (*Bulletin de thérap.*, 1865, t. II., p. 331, and 1867, 30 novembre).

In certain headaches, especially those which seem connected with a state of extreme dryness of the pituitary membrane, the use of snuff-tobacco has been recommended, and its use may be daily seen; while in many other persons the deplorable habit of continually taking snuff keeps the mucous membrane in a state of hyperæmia, and causes headache.

Sensory organs.—It is sufficiently evident that those who suffer from a chronic affection of the nostrils, and continue to use powdered tobacco, expose themselves to many accidents. In our hospitals we sometimes see rodent dartres of the nose and face, due to no other cause. On the other hand, tobacco may be of use in increasing the nasal secretions, softening them, and aiding respiration through the nose. Some persons always have a nasal voice when not using tobacco.

The lachrymation which is caused by hardening of the mucus of the lower part of the nasal canal may also be treated with advantage by snuff; this explains the saying, that tobacco clears the sight. The same may be considered useful in certain chronic ophthalmias as a revulsive. The evil is close to the good, for in people whom the powder of tobacco irritates too much, diseases of the nasal fossæ may supervene, which, communicating with the lachrymal ways, at last produce tumors or fistulæ.

Catarrhs of the Eustachian tube and of the tympanum are sometimes benefited by tobacco smoke. The patient fills his mouth and pharynx with a large quantity of smoke, and then closing the nose and mouth, and making a great effort of expiration, repeatedly forces the smoke into the interior of the ear.

Affections of the skin.—It is a vulgar custom in the country, to treat the itch of domestic animals, their various pediculous affections, and chronic skin troubles, with washes made of a decoction of tobacco, or by ointments of which tobacco in powder forms a large part. This is evidently useful, and the people, applying to themselves a practice sanctioned by success with lower animals, often treat itch and certain dartres in their own persons. They destroy in the same way, and with equal ease, lice and crabs. But when a strong decoction is applied to the whole body, or a strong ointment, severe symptoms of poisoning may result from absorption. These symptoms chiefly occur when the derma is denuded, as in tinea, and itch with pustules. In Stoll, in the *Journal de Vandermonde*, in the history of the Société royale de médecine, there are accounts which ought to make us prudent in regard to the use of tobacco applied to the surface of the skin.

Diseases of the respiratory apparatus.—In nervous asthma, the smoking of tobacco is often as useful as that of stramonium. The extract of the plant has been recommended in tussis ferina, in whooping-cough;

but stramonium and belladonna are evidently preferable in all these cases.

Szerlecki showed by a large number of experiments the efficacy of tobacco in active hæmoptysis. Bauer observed the best effects from the use of tincture of nicotiana in the treatment of this disease. Tobacco may be very useful in hæmoptysis through its sedative effect on the circulation (Schubart's experiments), and by derivation to the gastric nervous plexuses (analogous to the action of ipecacuanha in small doses).

Asphyxia.—The smoke of tobacco in enema has been recommended in the treatment of asphyxia, especially that caused by drowning. Toward the end of the last century the studies of Pia, échevin of Paris, and the bitter discussions which arose from them, gave to enemata of tobacco an extreme importance in the treatment of the drowned. It was in vain that Portal gave excellent reasons to prove not only the uselessness, but the danger of these injections; he was not listened to, and the enemata are even now used to resuscitate the drowned. We entirely agree with Portal, and think that before praising a remedy which is certainly dangerous, some comparative experiments ought to be made, which has not been done.

From Stisser, who published at the end of the seventeeth century a book describing a great many kinds of apparatus for introducing tobacco-smoke into the rectum, to our own time, a multitude of ingenious machines have been tried and abandoned. The simplest is certainly that of Gaubius, consisting of a kitchen bellows, the pipe of which is protected by leather in order to shield the intestine, and with a tunnel adapted to the valve. The smoke is received in the tunnel, introduced into the bellows by opening them, and then gently forced into the intestine.

Diseases of the digestive organs.—When tobacco-smoke injections were so popular, they were also used for several very dangerous intestinal disorders, as ileus, strangulated hernia, lead colic, tympanites and dysentery.

Sydenham spoke well of injections of tobacco-smoke in ileus, and Martens and Schoeffer added their testimony to the imposing authority of Sydenham. The remedy has survived to the present time, but will seem very inadequate to any one who knows the mechanical and often irremovable causes which usually give rise to the symptoms which collectively are termed ileus. But if ileus is caused by a nipping of the intestine, or a spasmodic contraction of a part of the digestive tube, the smoke or decoction of tobacco, given in enema, may sometimes have the same advantages as in strangulated hernia.

Schoeffer, as far as we know, was the first to recommend enemata of tobacco-smoke in strangulated hernia. The authors of the last century are all agreed that tobacco is useful in this case. Pott, instead of the smoke, gave as enema the infusion of a drachm to a pint of water. Dehaen preferred the smoke. Sonville in the *Journal de Vandermonde* speaks of the happy effects which he obtained in two cases of strangu-

lated hernia, the first time by an injection of the decoction of 30 grammes (℥ j.) of tobacco in a kilogramme (quart) of water; the second by an infusion drunk like tea. We must protest against the enormous doses mentioned by Sonville; the infusion of an ounce of tobacco, if retained in the intestine, would certainly cause death.

All practitioners then gave tobacco chiefly as a purge, to hasten the peristaltic action of the intestine and thus remove the obstacle from the strangulated portion of the digestive tube; but evidently tobacco acts like belladonna and stramonium, which are now the only ones used in these cases, and with much more benefit; they sometimes arrest the spasm in the muscles or the fibrous rings of the intestine.

Injections of the decoction, draughts of the infusion, applications of the boiled leaves to the abdomen, are classed among the most suitable remedies for destroying intestinal worms.

It is an almost vulgar practice among physicians, to give injections of tobacco in obstinate constipation—a treatment which we have never seen produce results which we could not have produced much more quickly and surely by other means. The only thing that can be said with certainty is, that many men relieve constipation by smoking in the morning fasting; the stool usually comes before they have finished their pipe or cigar.

Diseases of the genito-urinary apparatus.—Fowler, at the end of the last century, greatly praised the tincture of tobacco for the treatment of calculous dysuria; and this somewhat doubtful testimony is strengthened by that of Henri Larle, and Shaw. The two latter cured retention of urine and spasm of the urethra by injections of the smoke or the decoction of tobacco, and in the same cases Larle used suppositories largely composed of extract of tobacco. More recent papers have proved that stramonium and belladonna, when used for the same troubles, act with much more certainty.

Dropsy.—In the seventeenth century tobacco was recommended for dropsy, especially ascites. Magnenus affirms that a decoction of tobacco acted so powerfully upon one of his patients, that he was forced to suspend the use of it. Fowler subsequently advised the following infusion as a sovereign remedy in dropsy:

℞. Dry tobacco leaves..... 30 grammes (℥ j.).
Boiling water..... 1 pint.

Macerate for an hour in a closed vessel and by the water bath; then express ℥ iv. of the infusion and add ℥ ij. of rectified alcohol. This tincture is taken twice a day in the dose of 40 drops.

Fowler raised the dose successively to 200 drops, increasing by 5 or 10; he reports 22 different cases, the most of which were treated with tobacco.

Garnett, Augustin, J. N. Schmitt, used tobacco successfully in gen-

eral dropsy. Its internal use in hydrothorax has also been praised, but we are far from recommending the practice.

Gout.—In acute gout, some empirics prescribe as follows, rather for preventing, than for relieving attacks:

One week in each month the patient takes a [daily] foot-bath containing the infusion of an ounce of powdered tobacco. Then, having well wiped the feet, he exposes them for ten minutes to the smoke of smoking-tobacco, burned on a brazier. When the feet are very dry, they are covered with a very dry woollen stocking, into which the smoke of tobacco is also introduced. We have seen this treatment successful, and by imitating it have relieved some of our own patients.

Poisoning with strychnia.—The success obtained by the use of tobacco in tetanus, led Dr. Chevers to use it in a case of strychnia-poisoning; that of a young girl of eleven, who had taken 15 centigrammes (gr. $2\frac{1}{4}$) before a meal, for suicidal purposes. Half an hour after swallowing it, severe tetanic convulsions appeared. The usual remedies were given without success; tartar emetic, animal charcoal mixed with melted lard. Then an infusion of tobacco was made with 3 grammes to the litre ($\frac{3}{10}$ per cent.), which was given in small doses, 8 grammes (ʒ ij.), until vomiting occurred, three hours later. From that moment the convulsions ceased; the vomiting reappeared several times in the night and left a sensation of burning at the epigastrium next morning. Five days after the accident, convalescence commenced, and resulted in recovery. Dr. O'Reilly, having to attend a man who had swallowed 30 centigrammes (gr. $4\frac{1}{2}$) of strychnia, gave first an emetic, then 30 grammes (ʒ ij.) of infusion of tobacco in divided doses (*Bulletin de thérapeutique*, 1867, 15 janvier). Unfortunately, the experiments made by Camille Leblanc to prove this action gave no result. Dogs poisoned by strychnia died absolutely as if they had taken no antidote (Société de thérapeutique, 1873).

Hyoscyamus.

The identity of the phenomena produced by hyoscyamus, belladonna, and stramonium, upon man, led to the thought that their therapeutic action would be the same; and experience fully confirms this. We would only say in a general way, that hyoscyamus is used in the same cases as belladonna and stramonium, but in much larger doses, were it not that most physicians, ignorant of the similitude of the action of the poisonous solanaceæ, ascribed to hyoscyamus some properties of which we will by and by speak in detail. This evidence shows still more positively, however, the similitude.

The use of hyoscyamus was hardly known to the ancients. Dioscorides gave it internally to relieve pain (lib. VI., cap. 69). Celsus made of it a collyrium, and injected the juice into the ears when there was a purulent otorrhœa (lib. VI., cap. 6). But nothing of importance is found

in books published before the middle of the eighteenth century. Storck made many experiments, which have given the plant a high rank in the materia medica (Storck, lib. "De Stramonio, Hyoscyamo," etc., p. 28 et seq.). This author certainly exaggerates the valuable properties of this drug, as of all that he experimented with. Thus, he quotes numerous cases of success in hypochondria, mania, hysteria, epilepsy, and various convulsions, and Colin ("Obs.," t. II., p. 148) adds his very questionable authority to that of Storck; while Greding (Ludwig, "Advers. Med. Pract.," vol. I. part 1, p. 71 et seq.), who seems to have undertaken to prove the falsity of all that Storck has published, tries to prove by contradictory experiments the falsity of the results announced by the Viennese physician, and to despoil hyoscyamus of all useful properties. Later studies have disproved most of Storck's wonderful results, but they have also shown that hyoscyamus has unquestionable value in certain cases.

Witt ("On Nerv. Disorders," p. 363) used the extract as a sedative in nervous disorders in doses from 2½ to 20 centigrammes (gr. 0·37—3). Stoll preferred it to opium in the treatment of lead colic, because, while quieting the pains, it relaxed the bowels. Woltje (Murray, "App. med.," t. I., p. 666) praises it highly in the same disease. Rosenstein (vide Murray, ibid.) used it advantageously to relieve nervous coughs, after the example of Storck, who recommended it in the same case. It has often been given in whooping-cough in our times, and with as much benefit as belladonna and stramonium.

The value of hyoscyamus in neuralgia is incontestable. Breiting (*Hufeland's Journal*, 1807), Méglin, Chailli, Burdin (*Journal de méd. de Leroux*, t. XIV.), especially praised it in this case; they gave it chiefly by the mouth; and the celebrated pills of Méglin, composed of equal parts of oxide of zinc, extract of hyoscyamus, and extract of wild valerian, are of daily use in neuralgia. Burdin (loc. cit.) shows that they act only by the extract of hyoscyamus they contain, and in this we agree with him. These pills are given one at a time, thrice a day, progressively increasing to twenty, thirty, and even forty per day. They must be carried to the point of causing slight vertigo and a distinct disturbance of vision, and continued at least a fortnight or a month after the pain is entirely gone. Méglin has exaggerated the usefulness of this treatment. We have very often used it unsuccessfully, and it has seemed to us only useful in preventing the return of a neuralgia which is already dissipated or almost destroyed by other remedies. When the neuralgia is superficial, the local application of 4—8 grammes (℥ j.—ij.) of extract of hyoscyamus acts much more promptly than its internal administration.

It is the same with rheumatalgia and superficial pains, whether hyoscyamus be employed in injections as for internal pains, or in poultices, as for painful inflammation of the joints, skin, breast, etc.

In phlegmasia of the iris following the operation for cataract, Schmidt obtained good effects from the external and internal use of hyoscyamus (*Bibliothèque méd.*, t. XXII., p. 105). It is easy to see that in this case

the plant acts, like all the poisonous solanaceæ, as much by calming the pain as by dilating the pupil; and it will be the best remedy for adhesions of the iris and occlusion of the pupil, which sometimes follow the operation for cataract, or grave phlegmasiæ of the eyeball. It is equally useful in relaxing the iris before the operation for cataract.

As Plater praised it in excessive hæmorrhoidal discharges ("Praxis med.," p. 635), and Storck saw it once successful in hæmoptysis, some have recommended it in general for hæmorrhages; but it would be imprudent to rely on it (for it is very faithless) while the materia medica offers several other remedies that may be more trusted.

Local applications of hyoscyamus have great advantages in relieving pain, as we have said above. Chanel used it some years ago as Magliari did belladonna, to aid in reducing hernia and paraphimosis (*Journal des connaissances méd.-chirurg.* t. II., p. 86).

Our remarks are applicable to white and black hyoscyamus equally, the properties of which are nearly identical.

The good effects of hyoscyamus, exaggerated by Storck and some others, and confirmed by observers of good faith, have been denied by Ratier, who seems to have had no other end than that of overturning all that had been done in materia medica (*Arch. gén de méd.*, t. I., p. 297). But his experiments made upon patients who often did not take the prescribed remedies, and in diseases in which good judgment rejects the use of hyoscyamus, prove nothing against the results of severe and conscientious trials.

Tremor.—Oulmont gave hyoscyamia for mercurial tremor, and the result seemed favorable in four out of six cases. He also tried it for two patients suffering from senile tremor, and found the tremor lessening in a few days, and becoming almost endurable (*Gazette des hôpitaux*, 11 jan., 1873).

Hysterical chorea.—Oulmont has lately (August 30, 1875) published in the *Bulletin de thérapeutique* two cases of chorea, greatly improved or cured by hyoscyamia. The account is very interesting, and struck us greatly. But the facts should be stated exactly. It was not the chorea of children, but hysterical chorea affecting women. The first patient, hysterical, with convulsive attacks, had already had two attacks of mental disease; the chorea had come on just after her pregnancy, and had lasted only a few days. The other had suffered eighteen months, and the chorea had first appeared eight or ten days after a first labor. We do not wish by these remarks to detract in any way from M. Oulmont's success, but only to lay down the clinical conditions. We have had success in the same circumstances.

A girl of 28 years, suffering from hysterical chorea, had also every day several very well marked attacks of hysterical convulsions. We used without success hydrotherapeutics, tartar emetic, bromide of potassium, chloral, etc., when Oulmont's statements appeared; then we gave from 2 to 5 milligrammes (gr. 0·03—0·07) of hyoscyamia per diem, and

the patient was much improved within a day or two. In a week she was almost wholly cured, and had only a few movements from time to time. We kept her three weeks longer under treatment, to make sure of her cure, and at last discharged her in a most satisfactory state. We have given hyoscyamia to other hysterical women, but without success. The same was true in a case of mercurial tremor, and various other nervous affections.

Dulcamara.

Linnæus and Carrère used it with advantage in chronic rheumatism; Cullen recognized its worth, but admitted its success in very few cases. Starke, Bergius, and Carrère say that it relieves violent gouty pains. Dehaen has seen it succeed in asthma, and calm the oppression which accompanies certain pulmonary troubles. In *Hufeland's Journal* there are four cases of its successful application in whooping-cough. Werlhoff and Boerhaave consider it as very valuable in pulmonary phthisis. It is probable that this plant, like the other solanaceæ, relieves certain nervous and spasmodic troubles occurring during tuberculous decay of the lungs, but it is more probable that Boerhaave cured chronic catarrhs, and not phthisis, as he claims.

A large number of observers have agreed that dulcamara is particularly useful in the treatment of diseases properly attributed to a special vice of the humors. The testimony of Carrère, Bertrand, La Gresie, Starke, Poupart, Swediaur, give reason for believing in its value in the treatment of dartres, scrofula, constitutional syphilis, and all the affections which come when cutaneous troubles are suppressed and the system seems to suffer internally. Crichton published a very important paper on the efficacy of the remedy in treating lepra, and Gardner recommends it especially in diseases of the skin accompanied by acute irritation, as prurigo, psoriasis and lichen. Bretonneau, of Tours, whose testimony is very important, considered dulcamara as one of the most useful agents in treating all the above chronic diseases, and a most trustworthy depurative. In brief, dulcamara, as a toxic substance, is much inferior to the other solanaceæ, especially stramonium, belladonna, and hyoscyamus; but its chief use is that of a depurative.

The stalks alone are employed in medicine, though all parts of the plant have almost identical properties.

It is important to observe Bretonneau's precepts, beginning with the smallest dose and gradually increasing it until a slight disturbance of sight is produced, with vertigo and nausea; this dose is to be continued a long time, and even after the disease has wholly disappeared.

Solanum.

Solanum nigrum has long been considered a narcotic plant; and its berries are regarded as very poisonous, and as having injured children

who have eaten them for gooseberries. Dunal, of Montpellier, thinks that in this case it is not the berries of solanum nigrum, but the fruits of belladonna, that have caused the injury.

Guillemin ("Dictionnaire des drogues") also says that the fruits and leaves of solanum nigrum by no means possess all the narcotic properties which have been ascribed to them. But Desfosses found solanin in the juice, which alone should render us suspicious. There is also a paper by Bourgogne, physician at Condé, published in the *Journal de chimie médicale*, 1827, relating to the deleterious effects of this plant on wool-bearing animals.

Pihan-Dufeuilhay quotes several cases tending to show the toxic properties of this plant (*L'Esculape*, 2e année, 7 mars, 1840).

Two cases of poisoning were published by Magne (of Souillac) (*Gaz. des hôp.*, sept., 1859). Two children aged three years and a half ate of the leaves and had delirium, with pallor of the face and "enormous dilatation of the pupils;" they recovered the next day.

It is probable that, in order to produce intoxication, quite large doses are required, for when used as a food, like chicory and spinach, the leaves and the remainder of s. nigrum hardly produce the sedative effects of the other poisonous solanaceæ. But the water which is used for boiling or soaking, extracts the small amount of poisonous principle, and may be administered internally or externally, under the same circumstances as the infusions or decoctions of hyoscyamus. The plant has so little activity that it is hardly used, except for general baths or sitz-baths; and as it may always be easily replaced by the other solanaceæ, as a sedative, it would be better to strike it out from the list of the materia medica.

Solanin was discovered in 1821 by Desfosses, a pharmacist at Besançon, in the berries of solanum nigrum. Legrip and O. Henry found it in s. mammosum; Morin, in s. verbacifolium; Chevallier and Payen in the fruits of s. lycopersicum; Fodéré and Lecht, in s. ferox; Pelletier, Otto, and others, in the young shoots of the potato.

It is an ill-defined principle in a chemical point of view. Magendie, who experimented with it, found it to produce abundant salivation, violent vomiting, and afterward somnolence and sleep.

Hashish.

Hashish has been very little used as a medicine, but sooner or later this agent, which exercises so considerable an influence upon the nervous system, will enter into the domain of therapeutics and probably fill an important place.

Murray, in his "Apparatus Medicaminum," stated clearly the singular nervous troubles which hashish causes. English physicians in India have published interesting memoirs on the subject. We will particularly name Drs. O'Birest, Raleigh, O'Shaughnessy, Esdade, and our compatriot Léautaud, who has made interesting experiments on animals. Moreau,

of Tours, published in 1845 a very interesting work, in which he gives the results of numerous experiments made on his person, on physicians and others, and many more that he witnessed during his journey in the East.

Shortly after taking hashish, the person falls into a sort of revery which is almost always very delightful; he is, as it were, carried into an ideal world; the notions of space, of time, are effaced from his mind. There soon supervenes a sort of voluptuous ecstasy, usually free from a cynic element, which is indicated by sighs, cries, howlings, which are followed by a prostration that is full of languor and charm.

In some persons there occur hallucinations analogous to those which are caused by the poisonous solanaceæ; which suggest to the mind horrible or attractive ideas, and which lead either to suicide or to acts which severe morality might not perhaps sanction. These hallucinations are related to the habitual ideas of the person, or the thoughts which occupied his mind at the moment when the symptoms of poisoning began to appear, or those which chiefly occupied him during the day.

Thus one is to some extent able to control the ideas which enter into the one possessed: it is enough, to act strongly on the mind in a given way. It is thus, say the chronicles, that the "Old Man of the Mountain" acted on the minds of those whom he wished to make the tools of his ambition or fanaticism. He made them believe in the reality of the fantastic scenes and the celestial pleasures which they had dreamed in their delirium, and he urged them to all crimes as well as to the most heroic actions, by hope of eternal enjoyment, of which he had given them a foretaste.

As we said, hashish has been applied to very few medical objects. It is probable that in the treatment of certain neuroses it would render services which other narcotics might not. It is for clinical experience to settle this.

Moreau, of Tours, has proposed to use it in certain cases of monomania, to modify the morbid delirium by an artificial and necessarily transient one.

Corrigan, in the *London Medical Times*, has published a paper of great interest on the use of tincture of cannabis indica for St. Vitus's dance. The first case was that of a girl aged ten, who had been ill five weeks; she began with five drops of the tincture three times a day, and after eleven days of treatment there was considerable improvement; the amount was then gradually raised to 3 doses of 25 drops, and after a stay of a little less than five weeks she left the hospital cured. The second patient had been affected for a month, and required forty days of treatment; the dose was also 25 drops three times a day. The third, a girl of sixteen, affected for ten years, was cured in a month.

Though some cases of the improvement or cure of grave nervous disease by hashish are found in therapeutic collections, it cannot be said that the remedy has really been tried and can be relied on. Cases of cure

have been published in plague, cholera, hydrophobia, hysteria, epilepsy, chorea, tetanus, delirium tremens, asthma, etc. But we do not find that those who have had one or two successes continue to have more, though these diseases are common and usually without remedy. We will make an exception in tic douloureux of the face and painful dysmenorrhœa (Villard, "Du Haschich," 1872).

Let us hope that these curious experiments will be repeated, and that hashish will become an important gain to medicine.

Hemp has been analyzed by Personne, who extracted an essential oil lighter than water, of an amber color, coagulating at 12° and forming a mixture of two hydro-carbons, viz.: 1, cannabene, C_{36} H_{20}; 2, another hydrocarbon, C_{12} H_{14}, which crystallizes in alcohol.

Cannabene when breathed causes a singular tremor and an extraordinary desire to move about, followed by depression and even syncope.

The resin of hemp, cannabine or hashishine, is very active; in the dose of 2—20 centigrammes (gr. 0·3—3·0) it causes hallucinations and stupefaction; its effects are more persistent than those of cannabene.

Lobelia.

Lobelia inflata has been given in acute and chronic catarrhal affections as an emetic, and, in doses half as large, as an expectorant, under the same circumstances as ipecacuanha. But it has been especially recommended as a specific in nervous asthma by Cutter, Andrew, Elliotson and Michéa. It is given in tincture, in the dose of from 5 to 25 drops three or four times a day; or in an infusion of 1—4 grammes to a litre of boiling water ($\frac{1}{10}$—$\frac{4}{10}$ per cent.). It is found that patients who had been greatly relieved by stramonium or belladonna, but had become insusceptible to the action of these remedies, were afterward equally relieved and it is said cured, by lobelia. It is to be regretted that few physicians give it in France.

M. Barallier, professor at the École de médecine of Toulon, published in the *Bulletin de thérapeutique* (1864, t. I., p. 72), a memoir, in which he confirms the good effect of lobelia in asthma and the dyspnœa of phthisical patients in cachexia. He informs us also, that in the United States Dr. Livezey has popularized the use of the infusion in injections in cases of rigidity of the cervix uteri in accouchement.

Lettuce.

Only two species of lettuce are used in medicine—the l. sativa (common lettuce) and the l. virosa.

1. *Lactuca sativa.*—The use of lettuce as a food goes back to the remotest antiquity. It is eaten cooked or raw. In the latter form it is

usually seasoned with oil, vinegar, and divers condiments, and is known as salad.

It is remarkable that the habit of eating salad at the end of the last meal of the evening was founded on medical advice with the ancients, and has continued to our day; Dioscorides knew the hypnotic virtues of lactuca (lib. III., cap. clxv., clxvi.). Celsus placed this plant by the side of opium (lib. II., cap. xxxii.), and Galen, in his old age, obtained sleep by eating lettuce in the evening ("De Aliment. Facult.," lib. II., cap. xl.).

May we believe, as was popularly thought by the ancients, that lettuce' habitually used, destroyed sexual desire? This opinion, at best doubtful, has received a kind of sanction from the illustrious Linnæus, who tells how an Englishman of noble family who used lettuce in excess remained long without heirs; but that having renounced the use of it by his physician's advice, his wife speedily became pregnant (Murray, "App. med.," t. I., p. 167). Finally, we read in the same author that the Emperor Augustus, cured of a chronic disease by extract of lettuce, erected a statue to his physician, Antonius Musa.

The ancients dried in the sun the white juice which is obtained by cutting or scratching l. virosa when mature, and this juice, which is said by Dioscorides to have many of the qualities of opium, was mixed with the latter substance to give it a new action or to adulterate it (Dioscorides, lib. II., cap. cxl.). At the end of the last century, Dr. Coxe, of Philadelphia, did this with the juice of the cultivated lettuce, and obtained by the procedure indicated by Dioscorides, a thickened juice analogous to opium in its physical qualities. He found this juice to possess calming properties. Duncan, of Edinburgh, and Barbier, of Amiens, confirmed the experiments of Coxe. François, who came later, and who gave to the juice of lactuca the name of thridace (from the word θρίδαξ, lettuce), tried to give to the drug an extraordinary importance, which now seems at least exaggerated. He thought that thridace had an extreme activity, and recommended not to give more than 15 centigrammes (gr. 2·2) twice or thrice a day; but therapeutists soon made bold to give from 4 to 15 grammes (3 j.—iv.), which seemed to be required in order to obtain some of the calming effects which were so enthusiastically spoken of.

Thridace should be given in at least the amount of 50 centigrammes (gr. 7½) at once, and several times in the 24 hours. Then it sometimes gives sleep, calms pain, cough, nervous erethism, with less certainty but with less inconvenience than opium.

In the course of the year 1840, we made at the hospital Necker many trials of lactucarium prepared by Aubergier. That which we gave was procured by incision, and most carefully; it exhaled an insupportable virous odor. Some patients felt a sort of calm after taking 2 or 4 grammes (gr. 30—60), but we could not possibly ascribe to the remedy properties deserving the praise which had been given it. We cannot see how Martin-Solon, an enlightened experimenter and skilful therapeutist, could

say that 30 grammes of lettuce seemed the equivalent in effect of 15 grammes of syrup of white poppy (*Bulletin de thérap.*, t. IX., 1835).

In gastralgia, and when opium causes disturbances, thridace may render some special services.

Its success as an external agent is found in pure catarrhal ophthalmia, of erethic character; for this purpose Rau has used a solution of 10 or 15 centigrammes of thridace in 100 grammes of distilled water, and $1\frac{1}{2}$ grammes of quince mucilage, of which a few drops are put into the eye once or twice a day, especially in the evening before bedtime. The author used the remedy internally, in the dose of 10 or 15 centigrammes (gr. $1\frac{1}{2}$—$2\frac{1}{4}$) with much success, for other diseases of the eye dependent on a nervous affection with erethism (*Gaz. méd.*, 1838, No. 56; *Revue des journaux allemands*).

Water distilled from the flowering plant and redistilled has properties analogous to those of thridace, and should be given in the dose of 150 to 200 grammes (℥ ivss.—vi.). It is the excipient of most calming and antispasmodic potions.

The seeds of lettuce were among the four cold seeds.

2. *Lactuca virosa.*—Dioscorides (lib. IV., cap. xcv.,) informs us that in his time the juice of l. virosa was mixed with that of the poppy to sophisticate it. He ascribes to it the same properties as those which are now attributed to thridace, namely, the production of a drowsiness ("engourdissement") which calms pain and invites sleep, beneficial effects upon the various neuroses and dropsy, lessening of venereal desire, etc.

The epithet virosa, given to lettuce, seems to indicate the presence of some very deleterious property in the plant; but the experiments of Orfila ("Toxicologie," t. II., p. 184) prove in the plainest way that enormous doses of the extract are required in order to produce a toxic effect even on small dogs, so that we may say of the juice of l. virosa that which we said of thridace, that it must be given in the dose of 4—8 grammes (℥ j.—ij.) in order to obtain a stupefying action corresponding to that of $2\frac{1}{2}$—5 centigrammes (gr. $\frac{3}{8}$—$\frac{3}{4}$) of opium. Yet it is well to say that the inspissated juice of l. virosa is, like thridace, less exciting than opium.

In the second half of the last century, Durande, who praised more remedies than good ones, recommended it for a multitude of chronic diseases. Collin, the pupil and friend of Storck, whose testimony is doubtful in the matter of poisonous plants, gave from one to twelve grammes of the juice, chiefly for certain visceral obstructions, sometimes accompanied by dropsy (Collin: "Observ. circ. morb. et Lactuc., sylv. contr. hydrop. vires.") This simple statement suffices to show that we can draw no conclusion from these facts.

Schellinger, of Frankfort, praised the juice of lactuca in angina pectoris. He begins at ten centigrammes a day, and raises the dose gradually (*Journal général de médecine*, t. XL., p. 232). Toël combined the drug with powdered digitalis in hydrothorax symptomatic of heart-disease (*Journal univ. des sciences méd.*, t. XLVII., p. 127).

Aconite.

Gout.—Rheumatism.—Storck, who first experimented with aconite, having noticed that somewhat large doses produced a diaphoresis, which continued as long as the remedy was taken, applied it to the treatment of rheumatism, gout, and constitutional syphilis. In a great many cases he succeeded in quieting old pains. Murray was not slow to confirm these important results; he even claimed (on the authority of one fact) that aconite, if long used, could resolve arthritic tophi. Collin, Rosenstein, Chapp, and Royer-Collard, repeated the trial, and Chapp published in the *Journal de médecine* (t. XXIV.) four cases which seemed to show that violent rheumatic pains can be cured by aconite, given at first in small doses, and then gradually increased. We have seen Royer-Collard greatly satisfied with the result of extract of aconite, which he used to relieve gout in his own person.

Several practitioners who, in our own time, have tried to prove the therapeutic effects of aconite, have denied to the conclusions of Storck the sanction which Murray, Chapp, Royer-Collard, etc., had given them; Fouquier and Recamier, among others, had small success in the treatment of rheumatism with aconite.

Others, seduced by the results which were said to be obtained by aconite, applied it to acute articular rheumatism. They failed to see that the slow and equivocal improvement which they obtained might perhaps have been ascribed rather to a specific action than to the purgative and diuretic effects of aconite, which modified the rheumatism, as purgatives and diuretics more aptly chosen would doubtless have modified it more successfully.

Lombard, of Geneva, observed in eight cases of acute articular rheumatism that aconite quickly reduced the pain, swelling, and excess of synovial fluid, without causing diuresis or sweating. He gave the extract, beginning with one centigramme and rising gradually to forty-five per diem (gr. 0·15—7) (*Bulletin de thér.*, 1839). Fleming gave the alcoholic tincture, and claims the cure of twenty-two cases of articular rheumatism, the duration of which was reduced to a mean of five or six days.

Syphilis.—The pains of constitutional syphilis have also been combated by aconite, and its use has even been extended to cutaneous syphilidæ. Yet Tommasini states that he has had no success in similar circumstances, though he used considerable doses of the extract. Bréra, on the contrary, has advantageously combined aconite and mercury in treating venereal ulcerations of the skin, and Biett has given in the same case with advantage pills composed of five centigrammes of proto-iodide of mercury and ten centigrammes of thridace or extract of aconite. We have used this combination to cure syphilitic tubercles and venereal engorgements of cervical glands; but it would be hard for us to decide

whether the improvement we observed ought not to be attributed exclusively to the proto-iodide of mercury (see Mercury).

Dropsy.—The diuretic properties of aconite are better attested than those above named. De Candolle says that the peasants in certain countries use this plant to cure dropsies; and Fouquier, from many trials, ascribed to aconite the power of increasing the urinary secretion, a power which it shares with almost all remedies that act energetically on the nervous system, like hemlock, hyoscyamus, stramonium, belladonna, mandragora, nicotiana, etc. Hirtz has often used aconite where digitalis has failed.

Phthisis.—Portal, at a time when the writings of Storck had seduced the medical world, applied aconite in the treatment of tuberculous pulmonary consumption, but soon abandoned it. Dr. Busch took up the idea, and claimed to have cured many consumptives with powdered aconite in the dose of ten centigrammes (gr. 1½) every two hours, gradually increased to four grammes (℥j.) per day; he obtained a rapid and solid cure. Harel du Tancrel also published in the *Clinique* a series of observations from the hospitals of Strasburg, which testify in the same direction. He added small doses of sulphide of lime to the aconite. We should be glad to be able to believe in such results, but our own experiments on unequivocal consumption have proved to us the uselessness of the remedy. It is very probable that the patients treated by Busch and Harel were suffering from simple catarrh or some chronic inflammation of the organs of respiration, which had nothing in common with tubercle.

Uterine affections.—Dr. West, of Soulz, recommends aconite in cases of amenorrhœa dependent on a spasmodic state of the uterus or chronic engorgement. He considers the remedy an excellent emmenagogue, and quotes several cases in support of it. Marotte has quoted cases of active and sthenic metrorrhagia cured by the action of aconite (*Bulletin de thér.*, 1862, t. II.).

Erysipelas.—Aconite has been recommended in erysipelas, whether spontaneous or traumatic. The English surgeon, Liston, seems to be the first, according to M. Imbert-Gourbeyre, who used this remedy in this disease. According to his observations, the use of extract of aconite in erysipelas and other inflammatory affections, is often followed by a notable diminution of vascular excitement, which makes bloodletting needless. Fleming quotes several cases of erysipelas of internal origin, located in the limbs and accompanied by very acute inflammation, which yielded very quickly to a few doses of aconite. But M. Teissier, of Lyons, first insisted very strongly on the value of this remedy in the treatment of traumatic erysipelas. "I have repeatedly seen," says this distinguished observer, "erysipelas appear in the neighborhood of wounds or ulcers, and accompanied by general symptoms, as burning fever, chills, desire to vomit, delirium fugax, etc., which improved with remarkable promptitude under the administration of 10 or 20 drops of tincture of aconite per diem. I particularly remember," he adds, "two patients who had ex-

tremely painful traumatic erysipelas with febrile symptoms so marked as to make me anxious, but who were relieved in a truly astonishing way in the space of twenty-four hours" (Extract from a memoir on the therapeutic effects of aconitum napellus, quoted in the *Union médicale*, Sept., 1861).

Lecœur, of Caen, has since reported a number of cases which tend to confirm the value of this remedy, not only in spontaneous erysipelas, but in that of external origin. In the latter case he advises aconite in quite large doses. He has a tincture made with equal parts of the fresh root of aconitum napellus and alcohol at 32 degrees, which he gives in half-teaspoonfuls, or even whole teaspoonfuls, in a glass of fresh water; at first giving a dose every hour, and then every two hours, taking care to suspend the medicine whenever there is nausea or attempts to vomit, or only to make the intervals greater. "I have constantly," says Lecœur, "seen the pulse fall in a few hours, and sometimes stools occur, and, whether by coincidence, or as the effect of the drug, the erysipelas soon after was stopped or modified in intensity. The local treatment was limited to the continued application of compresses of simple cold water, or water slightly impregnated with vinegar or lead, to the diseased parts" (*Union*, juillet, 1861).

These results, without being entirely decisive, seem to us such as to encourage new trials; especially in traumatic erysipelas, which is always such a dangerous complication of wounds and operations.

Neuralgias.—We will add that aconite, the value of which in certain neuralgias, especially of the face, cannot be questioned, is one of the best remedies (according to Addington Symonds) for nervous cephalalgia. It would seem most useful in cases where cephalalgia affects a chronic form, in which there is a continual malaise or a constant disposition to headache. Three drops of the tincture are then given three times a day, alone or in combination with some tonic (*Bulletin de thér.*, juin, 1859).

Oulmont has given pills containing $\frac{1}{4}$ of a milligramme (gr. 0.004) of Duquesnel's crystallized aconitia in several cases of facial neuralgia. Several patients were relieved, and, Oulmont thinks, owing to the remedy (J.-J. de Molènes, "Thèse de Paris," 6 février, 1874); Gubler thus cured a most cruel tic douloureux.

Tetanus.—Aconite has not yet given any remarkable results in this disease, but there is reason to hope that this will not always be so, if we may trust the experience of several distinguished veterinarians. Reynol, among others, has many times cured trismus in horses by rubbing the jaws with alcoholic tincture of aconite. The cessation of the trismus, by allowing the horse to eat, has enabled the cure to be completed.

Various diseases.—The sedative action of aconite upon the circulation explains the good effects which have been obtained in sthenic inflammatory affections of various sorts. Hirtz and Debout say that it calms cough and dyspnœa remarkably. Marbot recommends it in dysentery (*Bulletin de thér.*, t. XXXVII., p. 105); Decaisne, of Namur, in chronic

farcy (*Arch. belges de méd. milit.*, 1852); J. P. Teissier, in purulent infection (*Gaz. méd.*, 1846); Pallas, according to Bordier (*Gaz. hebd.*, 7 janv., 1876), says that in Siberia it is a popular practice to use aconite for tinnitus aurium.

Conium.

Cancer.—In 1761, Storck, a physician in one of the hospitals of Vienna, against whom the illustrious De Haen has perhaps been too severe, published his famous experiments with certain poisonous drugs, including conium. Medicine owes to him several good remedies; but he exaggerated the virtues of conium in the treatment of cancers. After him, twenty others disputed the honor of being more enthusiastic than he; the false eulogiums heaped on hemlock soon ceased to be believed, and the remedy fell into a discredit which it did not entirely deserve, for the reputation of conium was based on some very real facts. These facts, though very often badly interpreted by their observers, are still precious; they prove that different tumors of the breast or testicles, apparently cancerous, have been either cured or improved by the external or internal use of conium.

Storck gave the extract internally at first in the dose of five centigrammes (gr. $\frac{3}{4}$) morning and night; he gradually increased it to four and six grammes (℥ j.—iss.) per day. He sometimes used the fresh powder instead of the extract. He used it but rarely as a topic; in this case he used the crushed leaves and stalk or root. Most of those who have imitated Storck consider the addition of cathartics very useful, and give daily a drastic purge (*Journal de médecine de Vandermonde*, t. XV., p. 121).

The accounts given by Marteau de Grandvilliers (*Ancien journal de méd.*, 1771, t. XIV., p. 121), Decôtes fils (ibid., 1762, t. XVI., p. 35), Porte (ibid., 1762, t. XVII., p. 346), Larranture (ibid., 1764, t. XX., p. 502), Renard (ibid., 1765, t. XVIII., p. 411), Masars de Caselles (ibid., 1770, t. XXXIV., p. 255), Lemoine (ibid., 1772, t. XXXVII., p. 129), Buissonat (ibid., 1787, t. LXX., p. 149), Collin (*Ann. méd.*, t. II., p. 84), and several other physicians of unquestioned good faith, prove that the internal use of the powder of the root, and the extract of conium, has cured various tumors of scirrhous character. But this is far from the infatuation of Storck and his pupil Collin, who, resting on a few successes, claimed to have found the means of curing all cancers. But we owe a confession here. When, in 1836, we printed the first edition of this work, we were more incredulous than we now are about hemlock; since then we have made great use of the drug at our hospital and in private practice, and now declare that is has seemed a most powerful agent in chronic engorgements. By the long-continued use of cataplasms of conium on the abdomen, we have seen ascites cured, some due to chronic peritonitis, others to the presence of numerous tumors in the abdominal cavity. In

some cases the tumors themselves were wholly absorbed. In other analogous circumstances we obtained a complete cure, or at least, a very considerable improvement; but usually the remedy has been ineffectual. In an old woman of sixty-one, the use of the same means arrested the progress of a tumor of the breast, the cancerous nature of which had been ascertained by Cloquet and Bérard, and ulceration seemed imminent. In all the cases we are here reporting, hemlock was not given internally, but applied locally in the form of poultices made with three parts of powdered hemlock and one of linseed meal. These poultices are more effective and much less costly when made by covering a flaxseed poultice with a layer of a broth made with powdered hemlock and very thick linseed tea. At the same time frictions were made twice a day to the part, with pomade of iodide of lead, and tincture of iodine was applied; internally we prescribed arsenious acid in the dose of $\frac{1}{4}$ milligramme (gr. 0·004) up to one centigramme (gr. 0·15). Though it seems hard to say, in a treatment so complex, just which substance is the most useful, yet we have obtained evidently valuable results by varying the accessory treatment (which is also important), and limiting ourselves to the external use of hemlock.

Phthisis.—We cover the whole chest with a sort of leather cuirass covered with a thick layer of hemlock plaster. This cuirass is renewed every four or five days. This simple plan relieves the cough, facilitates expectoration, and tempers the pains of the chest which are so common. Under the influence of this treatment the fever usually abates—in a word, in several cases where the tubercles were few and the disease was slow in its course, we have obtained an improvement and a suspension of symptoms which we could not have expected from any other known remedy.

Do we then claim to cure consumption and cancer, the stumbling-block of therapeutics and the despair of physicians? God forbid! but we think that by the aid of hemlock the intimate inflammatory process, which hastens the degeneration of cancers and their softening, or which disorganizes so rapidly the lungs of those who at first had but a few tubercles, can be modified in a certain number of cases.

Scrofula.—If, as we can hardly doubt, tumors of this grave nature have been resolved, it is reasonable to apply to scrofula the same treatment—which is free from objections.

The facts reported by the judicious Marteau de Grandvilliers (loc. cit.), Muteau de Roquemont (ibid., 1764, t. XX., p. 554), Dupuis de la Porcherie, (ibid., 1765, t. XXII., p. 219), Lemoine (loc. cit.), Collin (loc. cit.), and last by Hufeland ("Traité des scrofules," p. 236), prove that, if the internal use of hemlock does not always cure scrofulous tumors, it does make them disappear in a certain number of cases, and sensibly improves the general condition. Baudelocque, at the Children's Hospital, has also had much success with this drug. He used internally the alcoholic extract, which he gave in pills. Beginning with the dose of ten centigrammes (gr. $1\frac{1}{2}$) morning and evening, he increased it every week by twenty centigrammes.

Among seven girls treated with conium, five took as much as 3½ grammes (gr. 53) a day.

For external use, fresh conium previously mashed is placed on the scrofulous tumors and ulcers (*Bulletin de thérap.*, 1835, t. IX., 4e livr.).

In confirmation, we add that Bazin, having repeated the experiments on conium, has had very remarkable results during the first period of scrofula; in these cases he is accustomed to use it with preparations of iodine. Laboulbène has also obtained good results in chronic engorgements of single joints in scrofula (*Bulletin de thérap.*, 1862, t. II., p. 289).

Dartres.—The remedy has been recommended in certain diseases of the skin, as dartres (*Journal de Vandermonde*, 1772, t. XXXVIII., p. 139; ibid., 1790, p. 135; *Jour. gén. de méd.*, t. XXXVIII., p. 437). The facts given in these journals by Lecomte de Preval and Waton are far from conclusive. But the curious facts reported by Fantonetti (*Gaz. méd.*, t. V., p. 226) show that in the treatment of acute or chronic dartres, baths made with conium water are very efficient.

The author regards these baths and washing with the decoction or infusion of hemlock as very calming, resolutive and desiccative; he has tried them a great many times, and reports several cases in support of his views; the remedy acts promptly and never causes trouble when it is intelligently used. The bath is prepared by infusing 8 or 10 handfuls of dry or fresh conium in 8 or 10 litres (quarts) of boiling water over night, or by boiling the same, and adding it to the water of the bath-tub, which should have the temperature of 26° or 27° R. (90½° or 92¾° F.). The patient is to remain in it one or two hours: the tub should be well covered with a woollen cloth and another which is fastened about the neck, that the vapor may cause no headache or vertigo. According to the author, conium acts by the alkaloid principle it contains; this explains, according to him, why the decoction and infusion of this plant are equally efficacious, for this principle does not evaporate like the volatile part of aromatic plants which are used for the same purpose. In the most troublesome skin-diseases, Fantonetti considers the baths in question as the calming and contro-stimulant remedy *par excellence.*

Whooping-cough.—The stupefiant action of conium has been used in whooping-cough by Schlessinger (*Bibl. méd.*, t. LVII., p. 379), and Butter and Odier (Mérat and de Lens, "Dict. de thér.," t. II., p. 389). The first dissolved in 60 grammes (℥ ij.) of water, 5 centigrammes (gr. ¾) of tartar emetic, added to it 10 centigrammes (gr. 1½) of extract of conium, and 15 grammes (℥ ss.) of syrup of raspberry; this amount was taken in two days, with a prompt and decided success. Here evidently the treatment is too complex to allow us to judge of the isolated effect of conium.

Phthisis.—The inhalation of vapors charged with conium has been recommended by Alibert in phthisis, but it is to be feared that he ventured the advice without facts to support it. It is, however, a point to return to.

Satyriasis.—Aretæus thought hemlock suited to extinguish amorous desires; and his authority, and that of St. Jerome, who says that the Egyptian priests made themselves impotent by drinking a little hemlock every day, has been the foundation for the modern use of it in satyriasis and nymphomania. Chaussier, Duméril, Guersant, used hemlock in the neuralgias ("Dict. des sciences méd.," t. V., p. 212).

An isolated fact is reported by Masars de Caselles (*Journ. de Vand.*, 1770, t. XXXIV., p. 225): it is that of a priest who was affected with cataract, and was much improved by using hemlock. The author who reports this has neglected the fact that hemlock, like most narcotics, dilates the pupil; and that in virtue of this dilatation the field of vision enlarges, and the rays may fall on the retina without the crystalline undergoing any modification.

Hydrocyanic Acid.

Diseases of the nervous centres.—Hydrocyanic acid was recommended in tetanus by Bégin, in epilepsy by Ferrus; but no fact is quoted. We have tried it in a case of hydrophobia at the Hôtel-Dieu, and though we were able to calm the convulsive spasms, it is certain that we did not delay death.

Diseases of the skin.—Here prussic acid has been associated with other substances. Thompson recommends it, mixed with 2 parts of alcohol and 20 parts of water, to quiet the pain of impetigo. Schneider gives five cases which seem to prove its value in certain cutaneous diseases. A woman of fifty years, and one of forty-four, who had on their external genitals very painful old dartres, with itching, were cured in two weeks by washes composed of 2 grammes of the medicinal acid and 150 grammes of alcohol. If the mixture is too irritant, add distilled rose-water. He reports three other cases cured by the same remedy.

Diseases of the nervous conductors.—We have used it locally in superficial facial neuralgia, with much less benefit than cyanide of potassium, the poisonous solanaceæ and the preparations of opium.

Diseases of the circulatory and respiratory systems.—Bréra, Macleod and Heincken said that prussic acid quieted palpitation of the heart. It is possible that this is sometimes the case; but Bally, and ourselves, have had experience which does not confirm that of the above physicians.

Especially in diseases of the chest, acute or chronic, hydrocyanic acid has been lauded with an excess that nothing can justify. Borda and Bréra considered it a powerful sedative of the circulation, and therefore very useful in inflammatory diseases of the pleura and lungs; and Manzoni gives some cases of pneumonia cured by the simultaneous use of bleeding and prussic acid—as if it were possible to infer anything from such facts.

Its value in whooping-cough is easier to believe, and facts given by

Fontanelle, Granville, Heincken, and Heyward prove that the spasmodic attacks of convulsive cough may be modified by it; but this remedy, also recommended in nervous asthma by Granville, is much less reliable than the preparations of belladonna, stramonium, and opium.

Diseases of the digestive organs.—Elliotson gives forty cases of dyspepsia with or without vomiting cured by prussic acid; but what did he mean by "dyspepsia with or without vomiting?" This is not a question of words, since the term dyspepsia has lost its old significance. Prussic acid has also been advised as an anthelmintic.

Cancer.—The dangerous character of this remedy was sufficient to lead to its trial in the treatment of cancer; its being tried was enough to ensure the reporting of a few cases of cure. Bréra says that he cured by the internal and external use of hydrocyanic acid a woman who had at once a syphilitic disease and a cancer of the womb; but Bréra does not state the signs by which he distinguishes a syphilitic from a carcinomatous engorgement of the cervix uteri. Berndt says that he cured a scirrhus of the stomach by injections of prussic acid, afterward combined with belladonna; but here also, the diagnostic signs lack precision.

If Frick, of Nyborg, boasts of the remedy in the treatment of cancer, as adapted to relieve pain when applied locally, there is nothing that we need be surprised at, or which is not conformable to analogy.

If we refer to Becquerel's work, of which we have spoken, and which is the result of many trials made by Andral at La Charité, we shall find that hydrocyanic acid is often dangerous, almost always valueless, and very rarely curative.

Cyanide of Potassium.

Cyanide of potassium dissolved in water or alcohol and applied to the head for cephalalgia.—In trying to classify the headaches in a way that should show the influence of cyanide of potassium, we felt obliged to adopt a distribution founded on the concomitant symptoms, whatever might be their influence on cephalalgia; the remarkable phenomena which we observed in those which are accompanied by fever led us to study them by themselves, and we made a group of apyretic cephalalgias, which we subdivided according as they were, or were not, complicated with gastralgia, derangements of menstruation, disturbed respiration, or disturbed circulation.

Headache is very frequently seen coinciding with oppression of the stomach, disordered appetite, difficulty of digestion and disturbed menses, which are usually pale, scanty and less exactly regular. In this kind of cephalalgia we have often used cyanide of potassium, and in the majority of cases the cure has been rapid.

Cephalalgias connected with suppression of the menses are less happily modified by cyanide of potassium than those of which we have just spoken.

Our observations show that in cephalalgia complicated with disorder of the stomach relief may always be expected, but that relief cannot be permanent unless the gastralgias also disappear; it is therefore necessary to try to cure the gastric affection.

Cyanide of potassium has repeatedly been used for cephalalgia due to exostosis of the head, and dependent on a general syphilitic affection. It has generally exaggerated the pains so as to make them intolerable.

There is a cephalalgia, evidently rheumatic or gouty, which is remarkable for often alternating with rheumatic pains, or for being fixed a long time in the head, and when leaving that, going to some joint or other part. We knew an English officer who for twenty-five years had had every four weeks, on Wednesday, a migraine lasting exactly eleven hours. The migraine retained this singular and invariable periodicity while the patient lived in the Antilles. He returned to Europe in 1815, after which, until 1829 the headache became more irregular; it ceased, and was replaced by attacks of gout. Two women, aged 25 and 46 years, entered our hospital; when they were cured of the intestinal inflammation for which they had entered, they called our attention to a violent headache which began long before the accidental disease which they had just passed through. In both, the application of compresses wetted with a solution of 40 centigrammes of cyanide of potassium to 30 grammes of water (gr. 6— ℥ j.) to the forehead caused the pain in the head to disappear in forty-eight hours; but an acute pain showed itself in the forearm in one, and in the other, in the left shoulder and both knees. The pain in the forearm was not relieved by an application of cyanide of potassium to the affected place.

We have not always been as successful in the treatment of rheumatismal cephalalgia as in the two women of whom we just spoke; we have failed when we have thought ourselves best entitled to hope for cure.

Pyretic cephalalgia.—Our observation has shown us that in the course of a symptomatic fever headache might be cured by cyanide of potassium, and that the fever itself was modified under the influence of the remedy; we therefore tried it in intermittent non-miasmatic fevers, accompanied by cephalalgia. The most curious fact we have noticed is the following: a young girl was suffering with intermittent fever, if the name can be given to an irregular quotidian fever, due to the last stage of consumption. The headache had lasted two months; it was very painful and almost continuous. An aqueous solution of 40 centigrammes (6 gr.) of cyanide of potassium was applied for four days; at the end of one day the headache was cured, the chill less violent and shorter, the heat less. All these conditions reappeared when the cyanide of potassium was stopped. Such agreement between the result of the observations we have made on febrile cephalalgia permits us to hope that cyanide of potassium may be useful in some forms of symptomatic intermittent fever.

Dr. Lombard, of Geneva, was the first to employ a solution of cyanide of potassium locally in treating neuralgias of the face. He read to the

Académie de médecine, in 1831, a paper on this subject; but, misled by his previous success, he has, perhaps, attached too much importance to the sedative action of the remedy upon this disease.

Application to the denuded derma.—This application has been made to three women. One was phthisical in a quite advanced degree; she had an intermittent pain which seemed to be located in the lumbar nerves, which nothing relieved except, for a moment, the application of a salt of morphia to the blister. Cyanide of potassium produced the same effect. —The second case was chronic rheumatism of several joints. Vapor douches, muriate of morphia on blisters, had been used with some success; after the application of cyanide of potassium the improvement became again progressive, without its being possible to say whether the progress was slower or more rapid.—In the third case, the cure which it produced was astonishingly rapid; the patient, a woman of forty-six, had had for a week a very painful sciatica, reaching from the exit of the nerve to the external part of the foot, making walking extremely painful, and destroying sleep. Two ammoniacal blisters, as large as a half-franc piece, were placed, one on the external middle part of the right tarsus, and one above the corresponding malleolus; the first was covered with 5 centigrammes (gr. $\frac{3}{4}$) of cyanide of potassium; next morning the calf alone was painful; the second blister was dressed like the other, and all pain disappeared during the day, the movements became free, and the cure was complete in thirty-six hours.

This was encouraging; but the possibility of replacing so painful a remedy (which is always followed by an eschar) by another, prevented our repeating the trial.

It follows, in brief, that non-febrile headaches coinciding with gastralgias are temporarily relieved, and may be permanently cured if the gastralgia is; that one may equally depend on cure when the headache is due to suppression of the menses and outlasts its cause; that in all cases where it depends on a cardiac affection, only a momentary success may be expected, if the primary disease continues the same; that cyanide of potassium is probably injurious in cephalalgia from syphilitic exostoses; that headache accompanying fever may usually be benefited by this treatment, which seems to act sometimes on the fever itself. A remedy which is so successful when properly applied, ought to take rank among the habitual methods of the physician; there is only one circumstance which may prevent its acquiring extensive use, that is, that it changes in two or three months.

Bitter Almonds.

Bitter almonds, in the natural state or in emulsion, or the water distilled from them, are employed in medicine for the same purposes as hydrocyanic acid, to which they very probably owe their properties.

But there are certain special properties ascribed to them, which may be mentioned.

According to Dioscorides, five or six bitter almonds dissipate drunkenness. This opinion was probably held by the ancients, for Plutarch says that the son of the physician of the Emperor Tiberius kept up with the deepest drinkers by eating a few bitter almonds. But Lorry says he felt a sensation of drunkenness after eating twelve. This, if true, does not contradict Dioscorides' statement, for we know that ammonia, which itself causes a kind of intoxication, plainly dissipates the fumes of wine in a great many persons.

The diuretic virtue of the fruit was equally known ("Eph. nat. cur.," dec. 1, ann. 1, obs. 77, p. 883); and in the same article it is said that bitter almonds quickly killed intestinal worms. The latter property was proved by Wiebel, who thus expelled a tænia (*Journal d'Hufeland*, 1806).

Bergius ("Mat. méd.," p. 413), says that from ½ to one kilogramme of emulsion of bitter almonds given in the intervals of access cures intermittent fevers which resist cinchona. Cullen, Hufeland, Frank, and especially Mylius, sustained this view. The latter prefers bitter almonds to all other substitutes for cinchona. He makes an emulsion with six or eight grammes of almonds in 100 or 125 grammes of water, and gives this dose at once, an hour before the access. He says that he cured by this remedy seventeen patients within two months; some required only three doses, others took eleven (*Nouv. journ. de méd.*, t. V., p. 120).

Frank, who had repeated the experiments of Bergius and Mylius, approves the practice of the two latter; only he adds to the emulsion four or eight grammes of extract of lesser centaury.

As to the action of bitter almonds in hydrophobia, we cannot believe in it, though Thebesius (*Nova acta nat. curios.*, t. I., p. 181), quotes twelve cases of cure obtained by this remedy. The bitten part, however, had first been scarified and covered with cups; baths had been given, and a few almonds given to eat morning and evening for one or two weeks. Thebesius did not profess to have succeeded in established hydrophobia; besides, in reading his book, we are astonished at the omission of all important details, to such an extent that the author does not even state the number of almonds the patient took!

Cherry-Laurel.

The therapeutic uses of cherry-laurel are the same as those of hydrocyanic acid and bitter almonds. Linnæus ("Amænit. acad.," t. IV., p. 40), recommends it in pulmonary consumption, and says that it is in popular use in Belgium for this purpose. It is probable that the assertion of Linnæus, which is not at all justified at present, has encouraged some physicians of our day to prescribe hydrocyanic acid, and with equal want of success. Krimer has published cases which show, as he thinks, the use-

fulness of the vapor of cherry-laurel water in spasmodic diseases of the lungs and muscles of the chest. He causes the patient to breathe from four to fifteen grammes (ʒ i.—iv.) of the water, well prepared, poured into a warm vessel so as to evaporate in ten or twelve minutes ("Dictionnaire" of Mérat and de Lens, t. V., p. 175). Cherry-laurel is sedative in small doses, and is given as such in inflammations of the respiratory organs.

The remedy has been employed topically and internally, in the same circumstances as all substances containing cyanogen, and particularly the bitter almonds.

Curare.

Curare, being a drug of variable power, should always be tested before it is used for the patient. As regards the dose, the physiological effects and not the chemical character are to form the guide. To ascertain them, we take a frog, make a small incision in the skin of the back, and insert by the orifice a small fragment of the dry substance or a few drops of the solution; we wait for the frog's death, which happens in a few minutes, then open the animal at once, and find that the heart is still beating, but the motor nerves are not excitable. We are then sure that we have genuine curare.

The drug is given to men, at first in the dose of ten centigrammes (gr. 1½). According to Preyer, crystallized curarin may be given in the dose of one centigramme (gr. 0·15). A ten per cent. solution is made in distilled water, which is introduced by a subcutaneous syringe in the prescribed dose, taking the limbs by preference, in order to be able to limit absorption by a ligature if the dose is seen to be too strong.

Curare is a dangerous poison unless we minutely regulate the mode of administration. We ought, at the least, to make sure that we do no harm, especially when we are so little sure of doing good; for little benefit has yet been obtained from its therapeutical use.

Tetanus.—We know fifteen cases of tetanus treated by curare, including two cures; one belonging to Vella, of Turin, and the other to M. Chassaignac. In the other cases, the ill success may be attributed, to a certain point, to the use of insufficient doses. We may without danger, says Jousset de Bellesme, begin with an injection of ten centigrammes of the most active curara (gr. 1½).

It has been given in epilepsy and hydrophobia, but without success.

Calabar Bean.

(Physostigma venenosum.)

This remedy, being one of the most recently investigated, forms a valuable illustration of the modern method of studying materia medica.

Its therapeutical value is far from being as well known; and the rem-

edy has not been of much use hitherto; nor have we any very satisfactory account to give of its effects; we will, however, note the trials which have been made.

Diseases of the eyes.—Hutchinson treated a boy of seventeen, who, after a severe diphtheritic attack, had paralysis of the accommodation-muscles of both eyes. The visual point was remote, and the patient required convex glasses No. 12 + in order to correct his sight. The affection had resisted ordinary tonics for six weeks, and was rapidly cured by the application of paper soaked in a solution of extract of calabar bean. After each application, the visual point was found to come nearer (*Med. Times and Gazette*, September 3, 1864).

Mittenheimer treated a child of six months, which had a paralysis of the motor communis nerve in all its branches following the convulsions of teething; there were external strabismus, mydriasis, and complete immobility of the iris.

The application of calabar paper twice corrected the mydriasis for three or four hours, but the trial was not fairly carried out, and the child died at eight months in convulsions (*Memorabilien*, IX., 8, 1864).

Gustave Lebon likewise tried the effect of physostigmin upon a myope, and increased the range of his vision remarkably, but in an hour the myopia became what it formerly had been (*Bull. de thérapeut.*, 1865, t. II., p. 42).

Chorea.—In 1864, Harley gave to a young choreic girl 15—30 centigrammes of powdered calabar bean; he at first obtained an improvement, but the treatment was not continued (*Bull. de thérapeutique*, 1864).

MacLaurin gave a draught containing the tincture, at Greenwich Hospital, but without much success.

Dr. Ogle is the only one who has had success. He treated by this remedy, at St. George's Hospital, in London, a child of fourteen years, suffering from chorea which had resisted all treatment for several months. Iron, antimony, zinc, arsenic, valerian, and tonics, had been tried, and at last everything was about to be abandoned when Dr. Ogle resorted to calabar bean. The child took a few drops daily of a tincture of the extract, and recovered in three months without the pupils having been affected (*Bull. de thérap.*, 1866, t. I., p. 42).

Bouchut and Cadet de Gassicourt, who tried to cure chorea by this remedy, found its therapeutic action doubtful. But though this action had been very manifest, the terrible suffering which the medicine caused would have prevented its continuance; the children made the most painful efforts at vomiting, during which they threw up only a little frothy mucus; they were attacked with fainting, cold sweats, etc.; and the remedy was soon suspended.

Paralysis agitans.—Dr. Ogle treated in the same way, but without success, a patient suffering from this disease. His observation is interesting, because it may aid in determining the dose in which it is possible to employ the remedy without causing accidents. The preparation em-

ployed was a tincture containing 13 per cent. of the bean; the patient took without inconvenience as much as 18 grammes (℥ ivss.) per day, so that in fifteen weeks he had absorbed 144 grammes (℥ ivss.) of the bean. (*Med. Times*, Sept. 1865; *Schmidt's Jahrb.*, 1865, No. 4, p. 173).

Tetanus.—We know of seven cases of traumatic tetanus treated by calabar bean. The two first are Watson's, of London (*Bull. de thérap.*, 1867, 30 mars). They are very encouraging, not only because they were cured, but because each dose was seen to bring a remission of the symptoms. In the second case especially, the patient, aged 13, gained each time a respite of half an hour, during which he slept; at the end of this time the symptoms of tetanus reappeared; two days later it was still better—"Fifteen or twenty minutes after taking the medicine, each time, the pupils contract, and for an hour there is complete relaxation of all the muscles. This improvement then soon disappears, the pupils dilate again, and the tetanus comes back."

Campbell, following Watson, also cured a case (*Gaz. méd. de Strasbourg*, and *Bull. de thérap.*, 30 nov. 1867). Another patient was cured at Northampton by the same remedy, given hypodermically (*Bull. de thérap.*, 30 mars, 1868).

To these four cases three others must be added. One is reported by Bourrier (*Gaz. méd.*, 1864, No. 51, p. 775); a second by Giraldès (*Bull. de thérap.*, 15 mai, 1868); the third by Bouchut. The two latter were not cured.

In all, there are seven cases of traumatic tetanus treated by calabar bean, five of which were cured. To complete the list we must add that G. Sée states in his course that he has cured two patients of spontaneous tetanus by the same remedy. This experience is not a large one, but is certainly very encouraging, in so grave a disease, in which one is so defenceless.

Chloral.

Insomnia, agitation, delirium, insanity.—The most obvious effect of chloral is the production of sleep, hence its daily employment in insomnia. But insomnia is almost always secondary, and the best way to put a patient to sleep is to remove the cause of insomnia. The best remedy is usually the bistoury, if sleeplessness is due to an abscess, a panaris, etc.; if caused by a painful tooth, the extraction of the tooth is the most certain of soporifics, etc.

We must therefore first speak of insomnia of cerebral origin. Chloral produces sleep in these cases, but the dose has to be raised. It was thus that Lasègue was able to produce sleep in a patient affected with rheumatismal meningitis, after using unsuccessfully, belladonna, sulphate of quinia, etc. Nine grammes were required to produce sleep. The patient recovered (Lefèvre, "Thèse de Paris," 1875, No. 83). Desnos has

succeeded in a case of meningo-spinal congestion due to cold (*Société de thérapeutique*, t. II., p. 200, 1869).

The most effective result is that which is obtained in acute mania. When we had the charge of the hospital of Bicêtre, we often had patients brought in an agitated state, who could not be admitted into the section for the insane because their papers were not in order. We had to keep them in the infirmary for two or three days. The old custom was to put such patients in the strait-jacket, but this required a struggle, and before the bonds were applied the patient had often struck, and sometimes wounded the attendants. In certain cases they broke their restraints and all had to be done over again.

The attendants did not receive all the blows, for the patients often bore marks of the violence which had to be used in mastering them. Then they made disturbances, broke the rest of the other patients, and had to be constantly watched by an attendant.

To put an end to this deplorable condition of things, we were accustomed to give the patient, on entering, an enema containing 5 grammes (gr. 75) of hydrate of chloral. Soon afterward the patient slept, and there was no need of the strait-jacket. The patients and attendants could take rest at once. As soon as the patient awoke, he had something to eat, and afterward a second injection with 75 grains of hydrate of chloral. The remedy rarely failed us. It is true that we had to keep the patients only a few days.

Many alienists pursue the same plan, and chloral is to-day the daily remedy in asylums. In support of our experience we can quote the good results obtained in chronic mania by Voisin at the Salpêtrière (*Bulletin de thérap.*, 1871, t. I., p. 151); Holler (ibid., 1874, t. I., p. 522); Kyelbery, of Upsal (ibid., p. 523); Jastrowitz, at the Berlin Charité (*Berliner klin. Wochensch.*, VI., 39, 40, 1869); Griffith (*British Med. Journal*, May 8, 1875), and Ignazio Zani at Bologna (*Gaz. médicale*, 23 mars, 1872).

In hysterical mania the action is perhaps less certain, and Rougeot has seen a patient take 11 grammes (gr. 165) of chloral with but momentary relief ("Thèse de Paris," 1870, No. 266).

Chloral may not only quiet agitation and produce sleep, but in milder cases it may put an end to hallucinations (Voisin, loc. cit.; Siredey, quoted by Veyssière, *Bulletin de thérapeutique*, 1871, t. II., p. 560).

In depressed states, such as melancholia, paralytic dementia, or senile dementia, chloral is not useful, its depressive action may rather be injurious.

Delirium tremens.—Chloral is a precious remedy in this disease, though we are not without others. Large doses of opium, very large doses of digitalis, may cure it if we dare to use them with the required boldness. But both are slow in their action, and chloral has the precious advantage of acting more promptly, and with less danger.

A considerable number of cases are at present on record as cured by chloral. We will only mention the leading cases, those of Siredey, Panas

(*Gaz. des hôpit.*, No. 133, 1870); Négrié, of Bordeaux (*Bulletin de thérapeutique*, 1873, t. I., p. 134); Liebreich, Langenbeck, and Jastrowitz, of Berlin; Barnes, of Liverpool (*Bulletin de thérap.*, 1870, t. I., p. 476); Silvio Pera (*Lo sperimentale*, 1872); Chapman (*Med. Times*, Oct. 2, 1869); Ehrle (*Württemberg. Correspondenz-blatt*, XXXIX., 39, 1869), etc.

In order to obtain this result it is necessary to begin with 2 or 3 grammes (gr. 30—45) and repeat the dose during the day. The face usually becomes congested, the breathing hastened, and a little perspiration is formed. In this case, as in the preceding, chloral is preferably given by enema.

Painful affections.—The hypnotic and anæsthetic properties of chloral led at first to its use in painful diseases. We have relieved several kinds of neuralgia by injections of chloral; facial, intercostal, and sciatic. Intercostal neuralgia seemed to yield the most readily to doses of 2 or 3 grammes (gr. 30—45). Gombault obtained the same success (Rougeot, "Thèse de Paris," 1870, No. 266).

Old neuralgias are said to have been cured, that had resisted subcutaneous injections of muriate of morphia (Simpson, *Med. Times and Gaz.*, Jan. 1, 1870). In pain of the side, symptomatic of pneumonia or pleurisy, the success has been less.

The constitutional nature of the neuralgia has not always proved an obstacle. Mauriac showed that chloral relieves venereal and syphilitic pains (*Gaz des. hôp.*, No. 113, 1870). Weeden Cooke, physician to the Cancer Hospital at London, states that he relieved by chloral, pains symptomatic of cancer of the womb, rectum, breast, and tongue (*Med. Times and Gazette*, Sept., 1871). We cannot agree to this as respects the rectal form, where chloral has seemed to us to have very little calming effect, and where its local and often irritant action is opposed to its continued use.

Chloral seems to act much more satisfactorily in quieting attacks of articular gout (Bergeret de Saint-Léger).

Articular rheumatism resists more. It is true that Liebreich quickly gave sleep to a patient tormented with a very painful arthritis of the wrist; but in articular rheumatism the results have been almost negative (Offret, loc. cit.).

Zona has sometimes been very promptly relieved by 2 or 3 grammes of chloral in enema (Archambault, Société de thérapeutique, 21 janvier, 1870).

Chloral is very successful in painful visceral affections. We will first mention hepatic colic, which we have treated with chloral with almost as much success as when we used subcutaneous injections of morphia. The same result has been established by Puglièse, of Tarare (*Lyon médical*, 1871, No. 21). Bouchut made the same observation in nephritic colic, and the fact is confirmed by Canadax (*Med. Press and Circular*, Feb. 7, 1872).

Gastralgia and dyspnœa are little benefited by chloral. But false

croup or stridulous laryngitis is wonderfully relieved. We shall have occasion to repeat that *chloral is the opium of children.*

Parturition.—Chloral is supplanting chloroform as an anæsthetic in labor. By obstetrical anæsthesia we do not mean such anæsthesia as permits the performance of obstetrical operations, for this is really surgical anæsthesia; but that incomplete and slight degree which Simpson employed.

Chloral was first used in labor by More Madden of Dublin (*Union médicale*, 23 juillet, 1870); next by Lambert, of Edinburgh (*Lancet*, Sept. 14, 1870, and *B. de thérap.*, 1871, II., 43) and Gerson and Da Cunha; it has been practised in France by MM. de Saint-Germain, Bourdon, Lecacheur, Pelissier, Franca y Mazorra, etc. The number of cases treated with chloral is now large enough to estimate its value.

When given to a woman in labor in the dose of 2—4 grammes (gr. 50—60), by the mouth or rectum, the following phenomena may be observed. The patient soon falls asleep, and the sclerotica may at the same time be observed to become insensible. When uterine contraction occurs, it is performed regularly, and the woman feels only a very moderate pain; sometimes she is not conscious of it. The intensity of the contraction is not lessened; some accoucheurs, as Bourdon and Lambert, think it increased. We incline to the view that this interpretation is not quite exact, and that the contraction is, rather, more *efficient*, as being produced without resistance; for the other organs are not excited by the pain, and do not deprive the contraction of part of its effect.

At other times the sleep produced by chloral in women who are fatigued arrests the contractions; but this rest is not to be considered as a delay, for during the sleep strength is recovered, and on awaking the contractions are more vigorous and advance the labor.

Let us analyze the different cases and the results.

The first and simplest case is that in which everything is normal from the obstetrical point of view, but the fact of a first labor, and timidity on the woman's part, make the labor a painful trial, often deranged by all sorts of spasms, produced by the pain acting on an irritable and unbalanced nervous system. The action of chloral is chiefly of use in this case at the moment of the second period of dilatation of the cervix. We find two successful instances in the thesis of M. Lecacheur (Obs., XI. and XII., 1870), and others reported by Lambert, Da Cunha, Bourdon, Chouppe (*B. de thérap.*, 1875, II., 142), Franca y Mazorra ("Thèse de Paris," 1873), etc.

In a second form, the labor becomes painful through rigidity of the cervix or the spasmodic form of the contractions, which are usually only spasmodic. Good effects are obtained in this case also from chloral, in the same dose. More Madden stated it, and Lambert afterward observed it. In these cases chloral does not interfere with the use of the bath, as ordinarily employed to relieve these spasms. When protracted labor has

given rise to fear for the child and the mother, and demanded a speedy termination, the forceps has been applied very readily.

At other times the labor is made painful and toilsome by the premature rupture of the membranes and loss of the water. In these cases chloral has been of very great use, but the dose has had to be raised to 3 or 4 grammes (gr. 45—60). Lecacheur, who at first did not give more than 2 grammes (gr. 30), obtained inadequate results; he soon adopted the dose of 3 grammes (gr. 45) with success. Bourdon and Lambert, who began with 4 grammes, obtained the best results.

Inertia may be absolute or relative. In the former case, the contractions are powerless; in the second they may be vigorous, but are ineffective. The inefficiency may depend on the enormous volume which the ovum sometimes assumes, or on twin pregnancy, or on an excessive quantity of amniotic fluid. The uterine fibres, distended and thinned, may contract without giving energetic compression of the ovum and expelling the fœtus.

In a similar case, Lecacheur gave the patient three hours of sleep, and then ruptured the membranes, when the case was rapidly terminated. But in some of these cases chloral seems to us to have had no effect.

Chloral may, then, by giving calm and lessening reflex actions, indirectly increase the force of the contractions. But it is incapable of exciting them in a direct way. Lambert, of Edinburgh, inquired whether, by associating ergot with chloral, the force of the contractions might not be increased while the pain was more or less completely avoided. He gave to two patients four grammes (3 i.) of ergot and the same quantity of chloral at once. The result does not seem to have been satisfactory. The cases were breech presentations, and the children were born dead or dying ("Thèse" of Franca, obs. XV. and XVI.).

Let us continue the indications for chloral in confinement. We have hitherto not considered cases where there was any serious obstacle to the exit of the child. But if the contractions are neither irregular nor weak, but strong, yet are resisted by the rigidity of the perineum or the smallness of the diameter of the pelvis, or the position of the fœtus, chloral cannot replace the surgical care of the accoucheur; its only use would be to produce anæsthesia for the operation, for which purpose chloroform is much to be preferred. Let us add that if the woman has taken chloral, the action of chloroform is not interfered with.

After the close of accouchement chloral may be indicated if the woman seems enervated and agitated by the efforts she has made. Chloral will then be given as a hypnotic, to give rest and restore the strength.

Chloral may also, like opium, serve to prevent abortion, if the uterine contractions are the chief of the threatening symptoms. Martineau has thus twice arrested the uterine contractions in women from four to seven months pregnant, and prevented abortion (Société de thérapeutique, 8 avril, 1874). While remembering this most valuable indication, one

should not forget that it is limited to cases where the uterine contractions are the source of danger, and is not applicable to diseases of the fœtus or its membranes.

We have very lately treated a woman six months pregnant, in whom a metrorrhagia led us to fear abortion. Chloral stopped the pain, and this, with auscultation of the sounds of the heart, led us to hope that pregnancy would have its normal course. Unfortunately, on the ninth day after the bleeding, we lost the sound of the heart, and abortion followed in twenty-four hours.

Puerperal eclampsia.—This is one of the diseases in which chloral has certainly been of the greatest value. It seems to take the place of the ordinary remedies, bleeding, opium, bromide of potassium, and even chloroform.

We will review the published cases of this class; the greatest part of which are to be found in the Paris theses of Lecacheur (1870), Pelissier (1873), and especially that of Franca y Mazorra (1873).

First, cases where eclampsia appeared during pregnancy, before the commencement of labor. We have found seven cases of cure by Lambert of Edinburgh (1870), and one by Russell (*Med. Times and Gazette*, January 8, 1870). In this second case chloral was given at first in too small a dose, and had been abandoned; but when other remedies failed, chloral was again tried; the disease was quieted and the patient cured. There are also cases by French physicians: Bourdon, physician to the Charité (Société de thérapeutique, 7 janvier, 1873), Portal, of Saint-Geniès de Magloire, in the Département du Gard (*Bulletin de thérap.*, 1875, t. II., p. 121), Dumas, surgeon of the hospital of Cette (ibid., t. II., p. 317), and Allo, of Quinlin (ibid., t. II., p. 417). All those fourteen cases of eclampsia, treated by chloral, recovered. The patients were suffering from albuminuria, which may have been relieved by the cessation of labor.

The cases, which we shall hereafter give, in which eclampsia continued after delivery, prove that we must not rely solely on the fact of delivery, and that chloral was really useful.

In almost all these cases the patient fell asleep soon after taking chloral, and the attacks began to become less frequent, and then ceased.

But while chloral is a powerful aid in combating the attacks of eclampsia, surgical means must not be neglected, which bring labor to a speedy end, such as the forceps and version.

In a second class, allied to the former, we place the cases where eclampsia is developed during the act of parturition. Of these we know of twenty, most of which are given in the thesis of Franca y Mazorra.

In these cases, generally much graver than the former, the physician is often not called until the eclampsia is already pronounced, and the remedies thought most effectual have been first used, as bleeding, by Baudon of Mouy (Oise) (*Bull. de thérap.*, 1873, t. II., p. 506), Serrée of Bapaume (Société de chirurgie, 23 mars, 1870), and Tarnier. Others have used leeches (Campbell, Dowell), others subcutaneous injections of mor-

phia (Condereau, Rabl Burkardt, Dowell), and others chloroform (Booklees).

All these methods having failed, new ones were required, and chloral almost always gave rest, followed by recovery. We say almost always, for there were failures, though but few. These failures must be seriously considered, as they have been observed by men most worthy of confidence, Depaul, Tarnier, and Philipps. The latter failed only in two cases out of four. But Depaul, who used the treatment three times, states that he has not only seen chloral remain inactive, but aggravations of the attacks occur. This should inspire some doubt; for we are nearly sure of possessing all the cases of success, while the unfavorable cases have not probably been all published.

Yet, in view of the numerous cases in which chloral has succeeded, and the equally frequent failures of other remedies, we think we must regard chloral as one of the best remedies for puerperal eclampsia.

In a third class, we place cases in which eclampsia did not appear till after delivery; sometimes not till several hours after. Here also we find very marked effects from chloral; often cure. Maurice Raynaud, Lecacheur, Darin of Bordeaux, Hay, Allo of Quinlin, Seydewitz of Bâle, Mackintosh, Widborne, and Starlay, have relieved their patients promptly with chloral, sometimes with the first dose, while others were less fortunate.

It is quite difficult to judge accurately of this remedy, for nothing is harder than the prognosis of eclampsia, appearing after the close of labor. In certain cases only one or two convulsions occur, which may yield to a bleeding; at other times the attacks follow with extreme rapidity, and resist most treatment.

In the review of cases of eclampsia of the second class we find very encouraging facts; that of Raynaud, for instance, in which there were forty attacks, and chloral seems to have been the real agent of cure.

We will add that the administration of chloral in puerperal eclampsia was often preceded by that of opium and chloroform, and that the action of chloral was nevertheless manifest. If the former remedy acted on the latter, it perhaps assisted its effect, but did not interfere with it. Bleeding before chloral has seemed rather favorable, or at least, the most fatigued and anæmic patients have seemed the most sensitive to the remedy. This is the known opinion of Demarquay. But this law is not absolute, for chloral has acted with equal efficiency upon a manifestly plethoric woman.

We will add just one word on the treatment of eclampsia by chloral. If we desire efficient action, we must begin with 4 grammes (ʒ i.) and give fresh doses of 1 gramme as soon as the action seems to become feeble. In this case chloral is given by the mouth or by enema. An English physician, Widborne, has given chloral incorporated into suppositories (ʒ ii. in two), introduced into the vagina; the sleep was soon procured. It is likely that the chloral penetrated to the uterus, and was

there absorbed, for, except in the puerperal state, or rather, except just after delivery, the action of chloral thus given cannot be relied on; at ordinary times suppositories placed in the vagina, even when there are sore places in it, give rise exclusively to a local action, and produce no marked hypnotic effect.

Puerperal mania.—In this affection, so often connected with eclampsia, chloral is most efficient. Upon this subject there are very conclusive remarks in Franca y Mazorra's thesis.

Traumatic tetanus.—The first application of chloral in this disease is due to Langenbeck; the patient recovered. Soon after, in 1870, Professor Verneuil, having used the same remedy, also cured a patient ("Thesis" of M. Soubise, Paris, 1870, No. 209). Verneuil stated that chloral had the great advantage of producing sedation rapidly; also, that the action had been confirmed by observing that the symptoms reappeared whenever the remedy was suspended.

Verneuil added as a last rule, that chloral should be given in a large dose, that is, from 8 to 12 grammes daily (ʒ ii.—iii.), but in divided portions, until sleep was procured. The first trials having been thus encouraging, let us see what came of them.

We know of 34 cases of tetanus treated with chloral. Sixteen were cured—that is, nearly one-half. But it will be well to analyze them.

We will divide them into two categories; in one we will put those which are not very rapid and require from 10 to 60 days for their evolution; the slow tetanus of surgeons. In the second category, the disease has gone on more rapidly, and has passed through all its phases within from 2 to 18 days; this is rapid tetanus. In slow tetanus, convulsions do not usually appear before from the eighth to the fifteenth day. It is less surprising, therefore, to find eleven cures in fourteen cases of slow tetanus. This is a very encouraging result. In this case, the dose of chloral was from 6 to 12 grammes (ʒ iss.—iii.) daily, and the treatment was continued from 24 to 60 days, that is, about a month, and exceptionally, two months.

The fortunate surgeons were MM. Verneuil, Dufour, of Lausanne, Dubreuil, Bertrand, Ballantyne, Alphonse Guérin, Birkett, Spencer Watson, Boinet, and Bourdy. Guyon was less favored; in a patient whose thumb had been crushed, tetanus supervened at the end of 10 days and destroyed him in nine more, in spite of chloral. The failure is due, perhaps, to the smallness of the dose (4 grammes a day); but at that time chloral was in its early days, and it was not known how large a dose might be given with safety. As to the two other failures, they occurred in the practice of Boinet, who also had two successful cases.

We see that in slow tetanus—a much less grave disease than that of which we are going to speak—chloral seems to have a powerful effect, and rapidly relieves the patient. We know no remedy that is so active in the treatment of this disease.

Unfortunately, when tetanus is rapid, chloral is usually impotent, and

among 21 cases of rapid tetanus, treated by chloral, we must record sixteen cases of death and only five cures: and of these five, some were light cases. Edward Denton had to treat a tetanus which came on at the tenth day, and gave only from 4 to 8 grammes per day. Liégeois had a light case; Guéniot had a very light one, and needed to give only 2 or 4 grammes a day. The cases of Verneuil and Oré were more severe, but recovered. Oré gave only 9 grammes per day, but he administered it by intravenous injection; and the patient recovered in three days.

All the rest were fatal, though chloral was not spared. While MM. Dufour, Waren Tay, Lefort, Langier, Mollière, Blot, Tillaux, Cruveilhier, Labbé, and Lannelongue, of Bordeaux, did not exceed the dose of 10 grammes (ʒ iiss.) per day, others went much further without more success. Cusco and Chanvel gave 16 grammes (ʒ ss.) per day, and Blin 30 grammes (ʒ i.). The treatment did not fail through a deficiency of the medicine: it was impotent to control the terrible disease; and we must say to-day, that if chloral cures slow tetanus (the least severe form) it does not avail in rapid tetanus, unless it be very light.

Hydrophobia.—In 1874 M. Bucquoy, having to treat a case of hydrophobia at the Hôpital Cochin, administered chloral by intravenous injection. The operation was performed by MM. Hanot and Cartaz, internes of the hospital. They made a solution of one-tenth in water, and injected 13 grammes in an hour and a half (200 grains), using commendable slowness. The patient was considerably relieved. Next day the convulsive symptoms reappeared, and a fresh injection of 20 grammes (ʒ v.) was made. The result was sedation, but the patient died in two hours (Société des hôpitaux, 1874, and *B. de thérap.*, 1874, t. II., p. 16).

An English physician, Henry W. T. Ellis, had obtained similar results in two cases (*Lancet*, Aug. 7, 1871), but the patients had, nevertheless, died on the third and fourth days. We have lately treated two cases in company with an honored brother, Dr. Josias, of Charenton. In the first case, the patient was a forester at Vincennes, bitten thirty-eight days previously. We gave every three hours an injection containing 5 grammes of chloral, so that the patient got on the first day 25 grammes, and on the next 15 (gr. 385, 231). The sedation of the convulsive symptoms was so marked that the patient was able to eat and drink, and was so improved that we had hopes of curing him during the first two days. Unhappily, three days after the commencement of the convulsions, an attack of asphyxia came on, from which the patient recovered for a few hours, but during the day fell into a mortal syncope (*France médicale*, 1875).

In brief, chloral produces a precious sedation in rabies, which lengthens life a little, but has never cured a case; so that the remedy for rabies is still to seek.

Cholera.—The physicians of Riga, Reichard and Blumenthal, say that chloral has the property of quieting the spasms of the first period, relieving the precordial anxiety, checking the emesis, and procuring sleep.

For this purpose, 4 grammes (3 i.) of chloral are required in a tablespoonful of distilled water—to be repeated two or three times in an hour (*B. de thérapeut.*, 1871, t. II., p. 429, and *Gaz. méd. de Strasbourg*). Unfortunately, only cases of cholera-morbus were treated; and it is to be feared that in epidemics the remedy would prove powerless.

Sea-sickness.—Pritchard stated in the *Lancet* of 1871, that chloral, in a potion, was a good preventive of sea-sickness. Giraldès used it on four passages between France and England. The first time he used a dose of only 0·30—0·50 grammes (gr. 4½—7½), but on the two last, he took 1·50 (22 gr.), which procured sleep and prevented sea-sickness (*B. de thérap.*, 1874, t. II., p. 477; and *Journal de thérap.*, 1874, p. 812). Fresh trials seem to have been successful.

Infantile convulsions.—We have said that this remedy might be called, from its suitability to the case of young children, "children's opium." Among other instances, we will name the observations of Rougeot ("Thèse de Paris," 1870, No. 266), in which children of 2½ and 3 years were cured of convulsions by chloral in doses of $\frac{1}{10}$ of a gramme, or a whole gramme (gr. 15) in the day.

Severe chorea.—Rougeot gives three cases of chorea rapidly cured by chloral. In the first, treated by Lorain with two grammes (3 ss.) per day, there was a marked diminution of the movements at the end of three days; and at the end of a week, all had disappeared. The two other cases are from the practice of Barthez, and were cured in from two to three weeks. Bouchut cured a young girl of eleven, affected with hysterical chorea, by prescribing three grammes a day for twenty-seven days (*Bulletin de thérapeutique*, 1873, t. I., p. 128). Verdalle, of Bordeaux, likewise succeeded (ibid., 1876, t. I., p. 472). These were recent or febrile cases. In less acute attacks chloral was less successful. Moutard-Martin saw chloral, in the dose of two grammes=30 grains, increase the choreic movements (Société de thérapeutique, 7 janvier, 1870). He has reported a similar case from Dr. Noir of Brioude. Steiner (*Schmidt's Jahrbücher*, 1873, t. II., p. 258), in light cases found chloral without influence on the duration, and increasing the disorderly movements. It is true that the dose may have been insufficient (½—1 gramme=gr. 7½—15, per diem).

Whooping-cough.—Ferrand stated to the Société de thérapeutique (7 janvier, 1870), that he had given great relief to three children in whooping-cough by doses of half a gramme of chloral (gr. 7½) every night. This dose procured sleep, dispelled the nightly attacks, and rapidly cured the disease. Rougeot, in his thesis (loc. cit.), mentions two children of five and six years, who were quickly cured by the administration of 1½—2 grammes per day.

Karl Lorey reports in the *Deutsche Klinik* favorable results from using chloral from the beginning (No. 46, 1871). Dr. Canadax obtained analogous results (*Guy's Hospital Reports*, 1872, II., 44). Monté found chloral only a palliative in light cases (*Schmidt's Jahrbb.*, 1873,

t. II., p. 151), and Steiner and Hüscheler found it to be without marked influence. They considered it as contraindicated when the secretion was abundant, and there was cyanosis or dyspnœa; and in that point they may have been right, for the depriment action of chloral on the heart should be considered, when children are too much depressed by the disease and the pulse is weak. In the spasmodic form, when children resist well and there is little fever, chloral is entirely indicated.

Spasmodic hysteria.—It was hoped that chloral might be successful in hysteria, but the many trials that we have made have had no good result. Briess, of Vienna, says that he cured a case of grave hysterical chorea with chloral, but as he gave at the same time opium, baths, oxide of zinc and valerian, the credit to be given to chloral is very hard to determine (*Wiener med. Presse*, XI., 5, 1870).

Poisoning by strychnia.—Oré, of Bordeaux, in communicating to the Société de chirurgie (23 mai, 1872), the results of his intravenous injections, concludes that chloral is antagonistic to strychnia, but that the converse is not true (Acad. des sciences, 10 juin, 1872). Olafield had stated the contrary (*Union médicale*, 10 juin, 1870). We refer the reader to the article "Strychnine," in which this question is treated.

Nocturnal incontinence of urine.—William Thomson states that he cured this affection in children, both in old and new cases, in the space of a few days, by giving 0·8 gramme (gr. 12) of chloral at bedtime (*Bulletin de thérapeutique*, 1871, t. II., p. 527). Vogel says that the effect is wonderful (*Lehrbuch der Kinderkrankheiten*, and *Schmidt's Jahrb.*, 1872, II., 178). Leonardi says that he also obtained four rapid cures by the same remedy ("Ippocratico," XXXV., 19, 1872). This is a new method to be compared with that by belladonna.

Spermatorrhœa.—Davreux, of Liége, gives the case of a patient greatly weakened by nightly discharges which had lasted two years, who took three grammes (gr. 45) of chloral every evening and rapidly recovered. Bradbury has reported a similar case (*Journal de méd. de Bruxelles*, and *Bulletin de thérap.*, 1872, t. I., p. 328).

Surgical anæsthesia.—The experiments and theories of Liebreich at first led to the belief that chloral was destined to compete with real anæsthetics, like chloroform and ether. The French practice, or experience, which is the only criterion in therapeutics, shows that chloral is principally an hypnotic; we have therefore classed it with narcotics. After an experience of several years, we find that chloral cannot compete with chloroform, ether, or even nitrous oxide.

In spite of this, chloral is not absolutely without value as an anæsthetic. Bouchut has shown the value of the chloral-sleep for the performance of certain small and brief operations upon children. If a child of from six to twelve years takes a dose of three or four grammes, sleep follows in an hour. They may then be explored; and even small operations may be performed, such as extracting teeth, opening abscesses, cauterizing certain tumors, without awaking them. They are awakened at the

moment the pain is felt, but fall asleep again directly, and do not usually recollect anything on awaking, and have not seen the operator's face (*Bulletin de thérap.*, 1873, t. I., p. 128; and *Congress of Brussels*, ibid., 1875, t. II., p. 351).

Chloral is a poor anæsthetic for men, because it requires to be given in such large doses that the patient is in real danger. Oré, in obtaining anæsthesia by intravenous injections, has changed this view a little—which is still held by most physicians. But intravenous injections are still too dangerous to form a part of the current practice of anæsthesia.

It is otherwise when we have to relieve the pain of vivisection. Here the chances of death form a less powerful consideration; hence the procedure has become current in laboratories. It is now used in preference to curare, and gives a complete muscular relaxation, which is very valuable in performing the delicate operations which physiological research and demonstration require.

External use of chloral.—We will first repeat what is known of the immediate action of hydrate of chloral on the various tissues.

The coagulating effect was studied in detail by Djurberg at Upsal, in 1870, and Carlo Pavesi and Luigi Porta, in Italy. In the next year the subject was studied in France, by Magnaud. But it is to Personne that the honor belongs of fixing our knowledge; he showed that chloral forms with protein compounds an imputrescible compound, which seems to be definite. (Acad. des sciences, Janvier, 1874, and Acad. de médecine, février, 1874). Theory indicated that this compound should contain 17·36 per cent. of chloral, and Personne obtained 17·23 per cent. in his analysis of the compound obtained by him. More precision cannot be required, for Lieberkühn's formula for albumen is not universally accepted. Personne showed that chloral, in a 10 per cent. solution, preserved the cerebral substance remarkably; he showed to the Academy, as an example, a cerebellum which he had macerated three months in this solution, and which seemed not at all changed. A guinea-pig, injected three days after his death, dried up gradually, without any visible alteration after three months. A dog injected eight weeks previously was perfectly preserved.

Chloral has an irritant and caustic effect on the skin, the denuded derma, and the subcutaneous cellular tissue. The contact of chloral with the muscular tissue produces a coagulation with retraction. In contact with the nerve-tubes, chloral coagulates the albumen, which becomes granular without retracting. Robin has made use of this property in preparing nervous elements for microscopical study.

Local anæsthesia.—Horand and Peuch have produced local anæsthesia in the following conditions. There were six adolescent patients, scrofulous and affected with painful white swellings. The pains made it impossible to move the limbs, confined the patients to bed, and destroyed their sleep. Chloral having been given internally without success, Horand and Peuch introduced it into the sores, in form of powder and in the

dose of a gramme (gr. 15). At first there was a slight pain, lasting about an hour; this ceased, and a real local anæsthesia was produced, which permitted not only a complete painless exploration, but certain surgical manœuvres. The patients got rest, and slept at night. The next day a gray, soft eschar was found in each case on the ulcer and around it; like the false membrane produced by ammonia. We have repeated these experiments, and have invariably found the cauterizing effect and the false membrane produced by coagulation of the albuminoid matters, and the consecutive local anæsthesia. As to the general action, which has been compared to that of morphia, applied endermically, it seemed to us much inferior, and not at all likely to supplant it, any more than it will replace hypodermic injections. But the local anæsthetic action has enabled us to stop certain pains produced by cancer or cancroid of the uterus.

As for hypodermic injections of chloral in solution, we proscribe them on account of their danger.

Antiseptic action.— Use of chloral in dressing ulcers.—Before the valuable researches of Personne, Carlo Pavesi showed the antiputrescent, antifermentible, antizymotic action of chloral—as they say in Italy. The year following, Dujardin-Beaumetz and Hirne, led by these labors and those of Burgræve, of Ghent, reported to the Société médicale des hôpitaux (11 avril, 1873) the result of their researches. They preserved, without change, by means of small amounts of chloral, albumen for six months and muscular flesh for 34 days. They likewise preserved urine, milk, and soft gluten. Byasson has shown ("Étude sur l'hydrate de chloral," 1871) that in small amounts it prevents fermentation.

Lissonde (Thèse, 1874) showed that if 1 or 2 per cent. only retards the alcoholic fermentation of sugar, 3 or 4 per cent. completely arrests it.

Hæmorrhages.—The coagulant effect has been applied in hæmorrhage by César Ciattaglia, of Rome, and in France by ourselves in hæmorrhage of the cervix uteri affected with cancer or epithelioma (1872). This hæmostatic action was proved by Dr. Créquy (Société de thérapeutique, 27 mai, 1874).

Varix.—Porta and Valerani, in Italy, made intravenous injections for the cure of varix, in imitation of the injection of perchloride of iron practised by Pravoz. We doubt if the clot produced by chloral is as firm as that of iron. This kind of treatment for varix has lost much of its reputation.

Diseases of the skin.—Chloral has been used in a great many forms to modify chronic affections of the skin. Vidal, who has performed at the hospital Saint-Louis a large number of experiments intended to show the value of chloral as a local remedy, uses a two per cent. solution for pruriginous affections, prurigo, chronic eczema. Dujardin-Beaumetz uses a ten per cent. solution for alopecia, Créquy for lupus, and Martineau for pityriasis capitis. Féréol uses it in the form of powder of metachloral for pemphigus neonatorum.

Simple, putrid, and gangrenous ulcers.—Burgræve first pointed out the value of chloral in dressing ulcers, but its chief value is in ulcers of bad character, particularly if gangrenous.

Dujardin-Beaumetz, Hirne, Martineau, Cadet-Gassicourt, and Féréol, showed that one per cent. solutions had a most favorable effect on gangrenous bedsores in enfeebled patients, as in typhoid fever (Société de thérapeutique, 12 mars, 1873).

Créquy has used the solution for fissure of the anus with great success (Société de thérapeutique, 1874). It has also been used to sweeten purulent cystic cavities in the pleura or elsewhere, and in ulcero-membranous stomatitis. Guyon and Ollivier have used it for atonic and varicose ulcers of the legs ("Thèse" of Coignard, Paris, 1874).

Venereal and syphilitic ulcers.—In 1871 Francisco Accotetta used a twenty per cent. solution of chloral for soft and hard chancres, phagedenic chancres, and inveterate ulcerations. He thus treated 49 soft chancres, which he cured in from 8 to 14 days. We have also used metachloral, injecting it by an insufflator upon a vulvar soft chancre; the result was certainly satisfactory, but was not so rapid as that of calomel insufflated with the same apparatus.

Cadet-Gassicourt has found the chloral solution useful in a case of phagedenic chancre, and Dujardin-Beaumetz has cured a patient with esthiomère of the vulva by using a crayon prepared by Limousin, composed of solid chloral enveloped in paraffin (*B. de thérap.*, 1873, t. II., p. 49).

Cancer.—Chloral is the best local application for cancer, fulfilling three indications: it suppresses the odor and the discharge, arrests the hæmorrhage, and lessens the pain. These properties, which we reported to the Société de thérapeutique, in 1872, have been confirmed by Guyon and Martineau, Fleischer, and Goodell, of Pennsylvania. We have applied chloral in the vagina in the form of suppositories and tampons containing solid chloral, and in solutions. The two former modes of administration are the ones we prefer.

NARCOTIC TREATMENT IN GENERAL.

Narcotics are remedies which impress upon the nervous centres or conductors a modification, in virtue of which the functions of the nervous system are abolished or notably diminished.

Intelligence, sensation, and movement, act through the nervous system as the organ of their manifestation. The narcotics tend, therefore, to lessen intelligence, sensation, and motion.

The first stage of action is shown by a slight confusion of ideas, by a decided dulness of sensibility, by a certain sluggishness in moving; soon, the relations of ideas are not readily grasped, the senses become dull, the movements confused, and there comes a sleep analogous to natural sleep, except that it is harder to arouse the patient, and that he cannot be so fully aroused; if the dose has been unduly large, he passes from sleep to coma, from coma to carus, and finally total extinction of life.

Such is the general mode of action of narcotics; one may even say that all, without exception, produce similar effects at the two extreme periods, that is, at the commencement, and at the full development of their action.

Although in reality the anæsthetics are only narcotics of more rapid, more profound, and more transient action, we shall yet study them in a separate chapter, immediately after narcotics and before antispasmodics.

There are a multitude of special intermediate effects, which show that certain agents have the power of stupefying one portion of the nervous system, and increasing that of another. Thus, while the poisonous solanaceæ, in any dose, always relax the sphincter of the iris, and therefore completely stupefy it, opium and calabar bean increase the muscular action of this membrane, and the iris contracts so that the pupil becomes almost imperceptible; while opium stupefies the muscular layer of the intestines, belladonna and stramonium seem to increase the peristaltic movement of the alimentary canal, contrary to what we observed in regard to the iris; while the solanaceæ provoke a noisy and expansive delirium, and considerable muscular agitation, the papaveraceæ throw the person into a profoundly negative state.

If, then, when we wish to stupefy a part of the nervous system, we do not choose the agent which acts on this part specially, we risk a total failure, and the production of an effect diametrically opposed to what

was looked for. The choice of narcotics is therefore more important than that of antispasmodics.

Thus, when we wish to relax the sphincters, or the ligamentous rings, we turn to the solanaceæ, and we have stated under belladonna and stramonium what would be effected in diseases of the iris, and in aiding accouchement and the reduction of strangulated hernia; if we wish to lessen the internal secretions, moderate the flow of urine or bile, calm the movements of the intestinal muscles, opium is to be preferred; if we wish a sudden and brief perturbation, cyanogen specially recommends itself; if the heart's movements alone require modification, digitalis will be indicated, rather than any other narcotic.

Yet certain organic repugnances must be taken into consideration; one cannot bear opium without vomiting, which cannot be checked; another is made delirious by the least dose of belladonna or stramonium; a third is perfectly quieted by a milk of almonds, containing a very small proportion of cyanogen, while the most energetic and skilfully administered narcotics produce no effect on him. The physician's duty is to investigate these individual susceptibilities, and pay attention to them when observed.

We said that the narcotics had different effects on muscular contraction and intelligence; that some exalted, while others depressed these functions; but all, without exception, act on the centres and the nervous conductors so as to lessen pain, and this property is what recommends them especially.

The part played by pain in diseases is more important than many pathologists think. By itself, the element pain is a potent cause of disease; in combating and destroying this element, we often put a stop to the gravest troubles.

Among the irritants, there are some which at first produce only pain; one such is mustard; the sanguineous fluxion only becomes apparent after the pain has existed for a time; and if by any treatment we destroy the burning sensation left by mustard, the blood ceases to be present in excess. In neuralgia of the eye, pain sometimes persists for an hour or two without causing congestion; but soon the blood goes to the painful parts, and all the symptoms of local phlegmasia, not always without gravity, appear. Here the nervous modification which accompanies the pain is also the principle of the fluxion; and if, at the beginning of the most violent neuralgia, we can stupefy the pain by a narcotic, the inflammation does not appear. In toothache the pain precedes the fluxion; when fluxion occurs, the pain ceases, evidently showing that the congestion is here an effect and not a cause of pain. In rheumatism, the pain precedes the fluxion; in great traumatic disorders, cold water is very probably efficacious only because it stupefies, and thus prevents flow of blood to the injured parts.

But pain does not act on the system by local disorder alone; it often has a more serious reflexion toward the nervous and circulatory centres.

Surgeons have always observed the frequency of tetanus after painful wounds of the hands and feet. Children's convulsions under the influence of colics and toothache; the nervous and inflammatory accidents which put an end to life so quickly after large burns; the delirium, fever, and hysteriform convulsions so frequent in facial neuralgia; eclampsia in primiparæ, all show how much influence pain has over the functions of the heart and capillaries, over those of the brain, medulla, and nervous conductors; and on the other hand, vomiting in epiploic hernia, in nephritic colic, etc., sufficiently show that the functions of the digestive organs are equally disturbed by the pain.

This fever of pain, if we may so speak, is not always so violent and rapid; it often reappears once or twice each day, as the painful paroxysms are repeated, and then there is a true hectic of pain, analogous to nervous hectic, and very different from the hectic of suppuration. The hectic fever of pain is chiefly found in gout, rheumatism, and grave and obstinate neuralgia. It does not cause so rapid a consumption as the hectic of suppuration, but by degrees it alters the organs, and then come local disorders incompatible with life.

To quiet the pain is, then, always the first indication, and this is best done by narcotics.

There are three chief modes of using narcotics: local or direct application, indirect administration, and the mixed method.

By the first method, the narcotic is placed in direct contact with the nerves of the part, numbing them or extinguishing their sensibility; by the second the absorbed remedy strikes the nervous centres with stupefaction, so that they no longer receive the local painful impression; by the third the nerves and the nervous centres are acted upon at once.

Of all these methods, the best is certainly that which limits its action to the painful part; thus accidents are avoided, which may result from the impression produced on the nervous system by the drug; but when the pain is very tenacious, we are very often constrained to increase the dose, or to open to it a more rapid way of access, through the epidermis or cutis, for example, and then it is impossible that the remedy should not be absorbed and act on the nervous centres. This mixed action, if not always free from inconvenience, is at least far the most powerful, since the centres become less able to receive the impressions and react against them, while the impressions fail to be received and transmitted from the blunted nervous extremities.

As regards the indirect application, consisting in absorption of the remedy at a distance from the seat of pain, it is the most frequently used of all, because the most convenient, though less efficient than the two preceding methods. In fact, its action is really a mixed one, for the remedy cannot be carried through the circulation to the brain and cord without being at the same time in contact with all the other parts, and therefore with that which is the seat of pain and spasm.

There are some narcotics which have scarcely any local effect, and do

not influence the encephalon very strikingly, but which nevertheless powerfully modify the intimate structure of our tissues; such is conium, for instance. How does this remedy act? This is a problem which it is not given to us to solve, in the present state of our knowledge. Others, as stramonium, put an end, sometimes with a rapidity which seems marvellous, to extremely grave functional disturbances.

When the narcotics are given, the dose and the continuity of action are very important to consider; and this observation may be applied to all remedies. The therapeutic end can only be attained upon certain conditions as to dose and preparation. Opium, so useful in certain forms of tetanus, in chorea, in delirium tremens, in lead-colic, is perhaps injurious if not given in doses which profoundly stupefy. Belladonna, which has been praised in the treatment of mania, is only efficacious on condition of substituting another delirium for that of mania, the delirium usually produced by the poisonous solanaceæ; and per contra, when in a violent fever, not caused by pain, the physician perceives the indication for narcotic treatment, he ought to act with moderate doses, if he does not wish to produce a more active fever.

End of Volume II.

Summary –

Bleed – in

Acute Pneumonia, [illegible]

Bleed sparingly in [illegible]

Acute [illegible] (48)

[illegible] in Erysipelas [illegible]

Which [illegible]

Variola –

Discrete V. with [illegible] action [illegible]

Bleeding [illegible]

Confluent [illegible]

[illegible] see page [illegible]

Measles – use Antimonials & Blisters 721

don't bleed –

Scarlatina don't bleed –

Pitchers Bleed [illegible]

Specac given in – Dysentery (Gr 18 to 45).

Diarrhoea – Simple – Gr 18 in [illegible] 10 [illegible]

" Chronic Gr 0.7 1.5 every [illegible] hours –

" [illegible] see page 126

Children see page 124

Whooping Cough – [illegible]

Puerperal Stains [illegible]

Polygala – used in Chronic [illegible]

Violets – [illegible]

Apomorphia – Hemiptyses, [illegible] 133

Tartar Emetic [illegible]

188179 MT.
T.

Author Trousseau, A. and Pidoux, H.

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