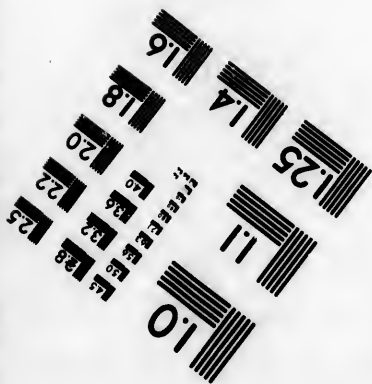
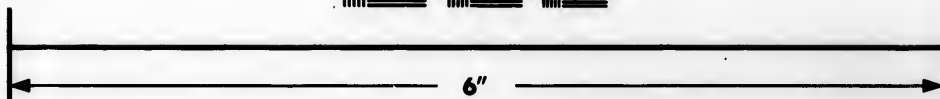
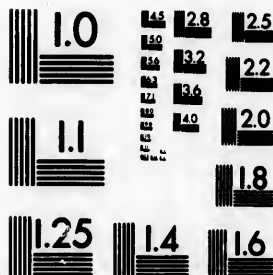


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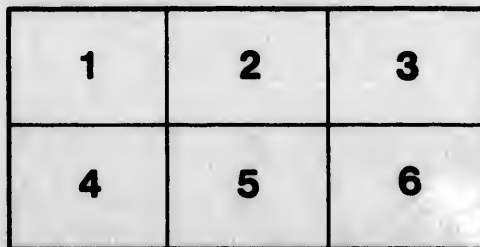
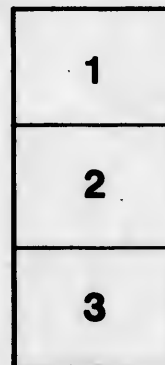
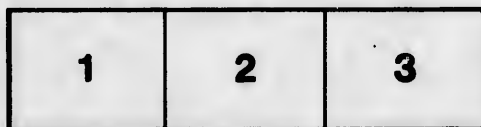
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THE

NATURE OF THE MORBID POISONS,

AND

THE DISEASES TO WHICH THEY GIVE RISE ;

BEING AN

INAUGURAL DISSERTATION

PRESENTED TO

THE MEDICAL FACULTY OF MCGILL COLLEGE,  
MARCH 1, 1854.

PRIOR TO RECEIVING THE DEGREE OF DOCTOR OF MEDICINE AND SURGERY.

BY

ROBERT CRAIK.

MONTREAL :

Printed at the Office of the Medical Chronicle, 42 St. Francois Xavier  
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1854.



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TO  
**WILLIAM FRASER, M. D.,**  
Professor of Institutes of Medicine in McGill College,  
AND TO THE OTHER  
**MEMBERS OF THE MEDICAL FACULTY OF THAT UNIVERSITY,**  
THE FOLLOWING PAGES ARE DEDICATED,  
AS AN ACKNOWLEDGEMENT OF DEEP OBLIGATION  
FOR THE  
BENEFIT DERIVED FROM THEIR VALUABLE TEACHING,  
AND FOR  
NUMEROUS INSTANCES OF PERSONAL KINDNESS,  
By their grateful friend and former Pupil,  
  
THE AUTHOR.

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## PREFACE.

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The present Essay was written during the progress of a College Session, in the intervals of close attendance at the Lectures, and without any view towards future publication. Professor Wright, however, for whose judgment I entertain the highest respect, and to whose scrutiny it was submitted, was pleased to mention it in terms of approval, and to express a hope that it might be put in a form suited for general circulation. These views having been shared by other members of the Faculty, and the Editors of the "Medical Chronicle" having kindly offered to publish it in their Journal, I was induced to furnish a copy for that purpose, and also to produce it in this separate form, not as possessing any great claims on public attention, but as containing some ideas that may at least repay the trouble of a perusal.

Montreal General Hospital, }  
September, 1854. }

# Nature of the Morbid Poisons

AND OF

## THE DISEASES TO WHICH THEY GIVE RISE,

BEING AN INAUGURAL DISSERTATION PRESENTED, MARCH 1854, TO THE  
MEDICAL FACULTY OF M'GILL COLLEGE.

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BY ROBERT CRAIK.

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It is not my intention in the following pages to attempt an elaborate description or explanation of all the phenomena connected with the diseases produced by the morbid poisons. The subject is too extensive to be included within the narrow limits of an inaugural dissertation, and too abstruse and intricate to be undertaken by any but those whose minds have been trained by long habits of research and discrimination.

But there are certain prominent points that stand out as landmarks, challenging the attention of every observer, and which have been subjects for investigation to men of science, ever since Medicine deserved the name of a science.

Some of the most remarkable of these features, for instance, are the contagious nature of the diseases to which the morbid poisons give rise; the great disproportion between the cause and the effect; the immense multiplication or reproduction of the poison within the system; the regular sequence which the symptoms generally preserve; the immunity from a subsequent recurrence which many of them have the power of conferring; together with other peculiarities less prominent, but scarcely less characteristic. It is the consideration of some of these prominent features, including the nature of the morbid poisons themselves, that I propose as the subject of the following essay. I do not intend to take them up seriatim, in the order in which I have just enumerated them, but as they suggest themselves in their appropriate places as I proceed. In the examination of the subject, cursory as it must necessarily be, I shall pass lightly over those parts which may fairly be considered as settled, and enter more fully into those which still remain in obscurity, alluding briefly to the various theories which have been advanced by different authors, stating the objections to them, and in some cases venturing to suggest others which may seem more strongly supported by

analogy, and which may explain as fully the various phenomena under consideration.

Of the names made use of by authors to designate the class of diseases produced by the action of the morbid poisons, the term "zymotic" seems the least objectionable, and I shall therefore adopt it. Cullen's order of exanthemata includes many of them, but not the whole, so also the term contagious or infectious diseases, though it would include all the diseases in question, yet it would comprehend others, as scabies, porrigo, and such other diseases as from their purely local nature are not generally ranked in the same class with the others.

The division of the subject which I shall adopt will be the following:—

Firstly, I shall consider the seat of the zymotic diseases.

Secondly, The conditions necessary or favourable to their production.

Thirdly, The probable nature of the poisons themselves, and their mode of action, which, together with the preceding divisions, will include the explanation of most of the phenomena of the diseases.

Lastly, I shall conclude by alluding briefly to the indications for treatment, furnished by the consideration of the foregoing divisions of the subject.

#### I.—*The Seat of the Zymotic Diseases.*

All pathologists seem now to be agreed in considering the blood as the primary seat of these diseases; the local affections being merely the result of the general contamination, and, for the most part, caused by the efforts of nature to expel the offending matter from the circulating fluid, and hence, these local affections are generally found in excreting structures, as the bowels, kidneys, skin, &c.

That such was also the opinion of the ancients, may be seen by referring to their old humoural pathology, by which they were wont to explain these diseases. The solidists have since then attempted to locate them in the solid tissues, but these opinions were grounded on mere speculations, and have yielded entirely before the modern views, based as they are upon actual experiment and observation.

That the blood is the primary seat of the diseases, may be proved in many ways. By the simultaneous appearance of eruptions over the whole body; the symmetrical distribution of some of these eruptions; and by the production of a specific disease by direct inoculation or transfusion of blood, as has been done in measles.

#### II.—*The Conditions necessary or favourable to the production of the Zymotic Diseases.*

That these diseases depend for their production, in most instances, if not in every case, upon some material introduced from without, seems

highly probable, though there are not wanting many who assert strongly the opinion,—that all of them may, and frequently do arise spontaneously under particular circumstances, and who deny altogether the infectious nature of many of them. These opinions will be again reverted to, for the present, let it suffice,—that many diseases are undoubtedly produced by the introduction to the system of morbid matter, from the person of another labouring under the same disease.

But this morbid matter is not sufficient alone to produce the disease; it can only co-operate with certain other matters within the system; and if these latter be not present, it can no more produce the disease than a candle can continue to burn, or an animal to live in an atmosphere which contains no oxygen.

These matters contained in the blood of persons susceptible to the action of the morbid poisons, constitute what Simon calls the “specific internal cause,” in contradistinction to the matter introduced from without, which he calls the “specific external cause.” The best example of the mutual action of these two causes, is the inoculation with small pox matter, of two persons, one of whom has previously had the disease, while the other has not. The former will remain unaffected by any amount of the matter, because the specific internal cause has already been exhausted, while in the latter, a minimum quantity will suffice to produce the disease, the internal cause being ready to respond to the external.

Again, there must be supposed to exist within the body a different specific internal cause, corresponding with each of the specific external. For example, after the susceptibility to small pox has been exhausted, the poison of measles or of scarlet fever will be found to act as readily as if small pox had not occurred, thus proving that each of them has its own particular cause, otherwise the latter two would have remained inert.

But, it may be asked—What evidence is there of the existence of this specific internal cause, and of what may it be supposed to consist? With regard to the first question; we have sufficient proof of the existence of a specific internal cause, in the circumstance, that after the occurrence of some of these diseases, and the consequent separation from the blood, of the matter peculiar to the disease, the susceptibility to a recurrence is exhausted, leading us to infer, that the particular ingredient of the blood which has thus been separated, was absolutely necessary for the production of the disease. But no analysis, however minute, has yet been able to detect the slightest difference in the composition of the blood, before and after the disease.

With regard to the other question—of what the specific internal cause

consists—it is evident that the search must be directed towards either the essential or incidental constituents of the blood. Simon gives strong reasons for concluding, that neither the blood corpuscles nor the salts can be the ingredients in question, inasmuch as their exhaustion or material alteration would of necessity prove fatal. He thinks that it will be sound, more probably, among the effete matters of the tissues, some of these existing in the system only once during life, and hence, when removed, can never be replaced. Such are the waste materials of the temporary cartilages, the thymus gland, &c., and some of these might be supposed to constitute the liability to such diseases as occur only once in life.

But it is not necessary for the explanation of these latter diseases, that their internal cause should be produced only at one particular period of life; for, as suggested by Mr. Paget in his lectures on surgical pathology, the immunity from future attacks may depend on what he calls—the assimilative power of the blood. Thus, when the structure of a part has been altered by disease or injury, as in scars, indurations, &c., the altered texture continues to be nourished, and its particular structure to be perpetuated, in the same way as normal tissue. So, also, when the constitution of the blood has been changed by any of these diseases, this assimilative power maintains it in its altered condition, as it formerly maintained it in its natural state.

But there is a constant tendency in the system, in these cases to return to the normal condition. Scars in process of time become lessened or obliterated, and indurations become softened and removed, so also the altered constitution of the blood produced by these diseases, may in process of time gradually subside, and finally altogether disappear; thus accounting for the wearing out of the protection afforded by vaccination, and the recurrence of small pox or measles, a second or even a third time.

A strong reason for supposing the susceptibility to these diseases to depend upon the effete matters of the tissues, is, that the accumulation of these matters in the system is well known to create a predisposition to the attack of epidemic and contagious diseases; thus, these diseases are generally found to break out first, and to be most severe, in those localities where impure air, imperfect ventilation, &c., prevent the proper elimination of these matters from the blood. So also with great muscular exertion, from the waste which it causes in the tissue. The influence which these matters have in promoting the tendency to the accession of zymotic diseases, with the conditions which favor their accumulation in the system, are well given in a paper by Dr. Carpenter, an

abstract of which may be found in "Braithwaite's Retrospect," (Part xxvii.)

But, as before hinted, neither can this specific internal cause be looked upon as sufficient in itself to produce the disease, notwithstanding the many persons who believe that these diseases may be, and often are thus produced, or how could the fact be accounted for, that villages, towns, and even continents have remained not only for years but for centuries free from them, so long as the inhabitants avoided all communication with those laboring under the diseases. That the same specific internal cause existed in these individuals, cannot be denied from the great rapidity with which the diseases were wont to spread, when once introduced by infection or contagion. With these facts before us, it is difficult to admit that these cases occur without any external cause, which are from time to time breaking out in localities apparently cut off from all sources of infection; for, taking into consideration the subtle nature of these poisons, their diffusion through the atmosphere, and the length of time they may remain in a dormant state in fomites and in other situations, it is more than probable that these anomalous cases owe their origin to some lurking infectious matter, which has been unwittingly communicated, and which has really kindled the flame ascribed by many to spontaneous combustion.

On the other hand, it is most difficult to conceive how these diseases first originated, if we do not admit their origin independently of contagion. We have no record of their having existed from the creation, the history of most of them dating back no farther than a few centuries; hence we are constrained either to admit that they have arisen without any external cause, or to seek for some way of reconciling their present prevalence with their former absence or obscurity. The reasons why the former admission cannot be made, have been already given; with regard to the latter circumstance, nothing can be brought forward except conjecture.

We are aware that there are many agencies, such as time, and a variety of circumstances, which exercise a powerful modifying influence on many things, and even on diseases themselves. Plants have been taken in their natural state from their native forests and plains, and by the force of circumstances arranged by man's ingenuity, have been transformed in the most wonderful manner. The same may be said of many of the lower animals. Man himself has undergone various changes, both in his physical and moral constitution; and even those very diseases of which we are now treating, have, at various periods of their history, presented characters widely different from those presented at other times;

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in fact, no two epidemics of the same disease can be said to have been perfectly alike in all their characters.

Is it not reasonable, then, to infer, that these diseases have been at one period of their history very different from what they now are, so different indeed, as to render their recognition as the same diseases highly improbable, if not impossible.

(It has been all but proved that small pox is greatly altered by transmission through the system of the cow. If this be correct, then, may not the systems of other animals possess the same transforming power over many of these diseases, some of them rendering them milder, while others render them more virulent; and might not even those diseases, now so distinct, and in many cases so malignant, have first existed as obscure and perhaps trivial disorders in some of these lower animals, and by various circumstances, have become developed and altered until their present condition has been attained. This suggestion is somewhat imaginative, and might almost be called chimerical; but it is not destitute of probability, and it is offered in a case where actual proof is out of the question.)

Taking it for granted then, that two causes of a specific nature cooperate in the production of these diseases, one of them existing within the body, and the other introduced from without, we have a clue to the explanation of many of their peculiarities. It explains the reason why small pox should in general be so much more mild when communicated by inoculation than when contracted by accidental infection, for the blood of those who take the disease in the latter way must be supposed to contain the specific matter in large quantity, and hence the disease is severe, while inoculation will produce the disease in those whose blood contains the matter even in minimum quantity, and in whom the disease will be proportionately slight.

For the same reason, those first attacked during an epidemic have the disease more severely than those attacked at a latter period, for the greater liability to the infection in the former, is caused by the large amount of the specific material in the blood. As already shown also, it explains the protection afforded by many of those diseases against their future recurrence.

### III.—*We come now to consider the probable nature of the morbid poisons themselves, and their mode of action.*

Although it may be very evident, that two causes of a specific nature are concerned in the production of these diseases, it is not so evident in what these causes respectively consist, or in what way they react upon each other. One of them has already been considered, it now remains for us to consider the other, and their mutual reactions.

Various theories have been proposed in explanation of these obscure and difficult points, but the most important hitherto brought forward have been, Liebig's fermentation theory, and the parasite theory of Dr. Holland and Professor Henle.

Liebig compares the action of the morbid poisons on the blood to that of yeast on the sweetwort during the process of fermentation. He points out the close analogy which exists between the two processes, the phenomena being so similar as to appear at first sight almost identical. This theory is so familiar to all, that it would be needless repetition to detail it here. An excellent abstract of it is given in Dr. Watson's lectures, under the head of Exanthemata.

Simon, in his lecture on the morbid poisons, summarily condemns this theory. He denies that the two actions are at all analogous, because, in the first place, the morbid poisons are very various, affecting the different ingredients of the blood severally and distinctively, while yeast is the only ferment capable of reproducing itself in the vegetable solution, and its action always gives rise to the same products. I need scarcely say, that this argument, however strong it may be against the *identity* of the actions, does not in the slightest degree affect the *analogy*.

In the second place, he objects that their sphere of action nowhere extends beyond the particular ingredients which they respectively affect to an entire fermentation of the blood. This objection also is overstrained, for the analogous part of the process of fermentation is the reproduction of the yeast, and not the production of alcohol and carbonic acid. The morbid poisons extend their action to all the ingredients of the blood susceptible to their influence, the mass of the circulation being protected by the vital power of the system. The action of yeast extends no further. If the solution contain matters not susceptible to this action,—under the control, it may be, of some power stronger than that of the yeast, that of chemical affinity for example,—these matters remain totally unaffected.

Thus the blood may be said to undergo as complete a change as the sweetwort, although the change may not be so practically demonstrable; but have we not sufficient proof of such a change, in the fact, that it now possesses a power which formerly it did not possess, namely, that of resisting contagion.

The fact that yeast is an organic production, instead of a chemical substance, as Liebig probably supposed it to be, is a stronger objection to the theory, as a theory, than any of the foregoing, for, from a chemical, it becomes changed into a parasite theory, a consummation which Liebig cannot be supposed to have either foreseen or intended.

But whatever may be the defects of this theory, it has served to call

attention to a striking analogy which had before been unnoticed, it has given definiteness to phenomena which were before vague and obscure, and it has pointed out the direction in which future investigations would be most probably attended with success:

After condemning Liebig's theory as inapplicable, Simon throws out a few suggestions of his own, regarding the phenomena of these diseases. He says, "in many respects they seem to be *sui generis*. Certainly they are chemical." Now, he brings no reasons to show why the phenomena should be looked upon as chemical, nor can I conceive why they should be considered as such, for they certainly have no analogue among ordinary chemical actions, properly so called: Proceeding from this assumption, he next assigns them a place among that class of actions styled catalytic, with the condition, however, that if included in this class, they must constitute a new species.

Now, whatever be the nature of the action which the morbid poisons exert upon the blood, it seems sufficiently clear that it cannot be catalytic, seeing that an essential law of catalysis is, that the agent which produces such action should not itself enter into any combination resulting from that action. The action of yeast in the alcoholic fermentation is catalytic, in so far as the formation of alcohol and carbonic acid is concerned; but the analogous part of the process,—the multiplication of the yeast,—cannot be considered as a catalytic action, for a direct affinity chemical or vital, exists between the yeast and the gluten of the wort.

With regard to the morbid poisons, it cannot be shown that they induce any new combinations in the blood into which they do not themselves enter, for the only appreciable changes which are produced, are the removal of the material which gives the susceptibility to the action of the morbid matter, and the increase of the morbid material itself, both effects evidently depending on an affinity exercised between the latter and the specific ingredient of the blood, thus placing the action without the pale of catalysis.

Another theory which has been considered by many as being liable to fewer objections than any other hitherto proposed, is the parasite theory. This theory was first suggested by Kircher, and has since been warmly advocated by Dr. Holland and Prof. Henle.

Prof. Henle argues in support of this theory. Firstly, That no substance other than an organic one is known to increase by the assimilation of foreign materials.

Secondly, The effect produced by the morbid poisons bears no ratio to the quantity of the substance introduced, which circumstance must evidently depend upon the prolific power of the latter, therefore, according to the foregoing argument, this substance is probably organic.

Again, The periodic nature of many of these diseases shows a close analogy with what occurs in the development of organic substances. The definite period of what has been called incubation, and the time which elapses between the commencement of the fever and the breaking out of the eruption, are very similar to what occurs during the progressive development of organisms.

The same means, also, which favor, limit, or prevent the formation or development of organic substances, also favor, limit, or prevent the action of infectious matter, as heat and moisture, which are favorable to both; and acetic acid, which acts as a poison to organisms, and whose influence in checking contagion is well known. Moreover, organic substances, as infusoria, and parasitic vegetables, may, like contagious matter, remain dry for years without losing the activity.

In addition to these general arguments tending to prove the organic nature of the morbid poisons, Henle endeavors to support the theory still further, by referring to several diseases found among the lower orders of animals, and especially to one, eminently contagious and of a parasitic nature, existing among silkworms. He attaches great importance to this disease, (muscardine,) evidently considering the analogy to be perfect. If the contagious nature of the disease be alone considered, the analogy is certainly complete; but the resemblance does not extend to other equally important characters of the zymotic diseases, for, as shown by Simon, this disease, together with other diseases commonly known to be parasitic, such as scabies, the various kinds of porrigo, hydatids, &c., are of all diseases the most essentially local, proving injurious only in one of two ways; 1. Locally, from pressure or irritation. 2. Generally, from the local irritation becoming inflammatory, or by the system becoming animated. This is especially true of muscardine, to which Henle attaches so much importance. The disease is purely a local one, extending from the point of inoculation until it involves the whole body, and proving fatal only as the extreme result of pressure or exhaustive drain.

The course of most of the true zymotic diseases differs widely from this. In them the local symptoms are generally trivial when compared with the constitutional affection; indeed, in the severest forms, as in cholera, plague, &c., the disease often proves fatal before the local symptoms have begun to show themselves.

This theory, then, in its present form, cannot be considered as sufficient to explain the phenomena of the zymotic diseases; for none of the examples cited are so closely allied to them as to admit of our inferring a similarity of cause. It is true, that of late years animalcules have been seen among the products of one or two diseases, sometimes included un-

der the same head, such as gonorrhœa, glanders, &c., but these diseases are so different in most of their characters from the true zymotic type, that the propriety of admitting them into the same class may well be questioned.

But though the arguments brought forward in support of this theory, have failed to prove that the active principle of the morbid poisons consists of parasites or animalcules, according to the common acceptation of these terms, yet they go far towards proving that it is organic; so that, instead of condemning the theory as altogether erroneous, we should rather attempt to modify or remodel it, in such a way as to obviate the difficulties which hitherto have opposed its adoption.

The animalcules or organisms found in the products of parasitic diseases, seem to me to be too highly organized, or of too large a size, to admit of their existing in the blood and circulating with that fluid. They have been found in various extra-vascular situations, as between the fasciculæ of muscular fibre, in the mucous and cutaneous follicles, &c., but I am not aware that any such have been found within the vessels.

But organisms may, and do exist in the blood. Modern physiology has shewn us, that nearly every function of the body is performed through the instrumentality of cells; indeed, so numerous are they, that the whole body might almost be considered as an aggregation of them. These cells are possessed of vitality, at least they are subject to its ordinary laws. They have a period of progressive development, a period of maturity, and one of decadence, and they perform vital functions, as those of nutrition and secretion. In the healthy state, the blood is loaded with these organisms in the shape of corpuscles, which, in countless myriads roll on with its ceaseless current.

But it is not in the healthy condition alone that living cells exist in the blood. Pathology has also pointed out to us more than one disease, whose proximate cause consists of the development and multiplication of cells within the blood.

Take for example, Pyæmia. A vein inflames and suppurates. A circumscribed abscess is formed which contains pus. This pus, so long as it is separated from the circulating blood by the fibrinous barriers, produces only local results. It probably goes on increasing at the expense of the superimposed textures, until it reaches the surface and is expelled, scarcely any constitutional effect being produced. But suppose the abscess does not reach the surface. The dykes are broken down, and the pus cells make their way into the circulation along with the blood corpuscles! What then is the result? Do they act as simple foreign bodies, suffering themselves to be quietly extruded from the system, or at most, giving rise to small and circumscribed abscesses in some

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of the organs? On the contrary. The disease from being purely local and of little moment, at once becomes constitutional and most intense; a fire is instantly lighted up which soon spreads over the whole system. The pus corpuscles are reproduced in immense numbers, infiltrating the internal organs or forming large purulent depots externally. The pus here comports itself in a manner very similar to the morbid poisons, producing immense results from a very trifling cause.

Another example of the presence of morbid cells within the circulation, may be found in secondary cancer. These secondary formations are produced by the arrest, in some organ or tissue, of cancer cells or their germs, derived from a primary cancerous growth, and circulating with the blood. The prolific nature of the cancer cells, explains the rapidity with which whole organs become converted into a cancerous mass.

Primary cancer, like a common abscess, is purely a local disease so long as it remains primary, producing only local results, and in most instances curable by local means. But if in any way the cancer cells or their nuclei, like the pus-corpuscles in pyemia, find their way into the blood, then again, an intense constitutional disease is lighted up, the products of which, as in the foregoing case, are identical in character with the primary matter introduced into the blood.

Cancer has been all but proved to be transmissible from one individual to another. Langenbeck produced cancerous growths in the lungs of a dog, by injecting cancerous matter into the veins. The disease, however, is far from being contagious to the same extent as most diseases commonly known as contagious; but this is easily understood, if we bear in mind the comparatively large size of the cancer cells and their nuclei, which precludes their entrance into the circulation under ordinary circumstances, or their dissemination in the atmosphere, like the poison of infectious diseases.

Here, then, are two diseases in which cells figure as the active and essential cause, proving not only that morbid cells may exist within the circulation, but that they may there reproduce themselves, acting in a manner very similar to some of the morbid poisons, and in one of the diseases at least, (if the contagious nature of cancer be admitted,) giving rise to a remarkable property, common to all the zymotic diseases, namely, the capability of being transmitted from one person to another.

These diseases constitute another link in the chain of evidence supporting the organic nature of the morbid poisons, while at the same time they lead us towards the conclusion, that as in the former, so in the latter, cells constitute the active principle.

Another argument in favor of the organic nature of the morbid poisons,

(and which I have purposely kept back until after the consideration of cancer,) may, I think, be drawn from the action of some of that class of remedies commonly known as alteratives.

Let us take a common example. Arsenic has been found useful both locally and constitutionally in the treatment of cancer; in fact, it is almost the only substance which can be said to possess any power whatever over this disease. It has also been used, it is said, with great success in cases of poisoned wounds from the bites of serpents. In intermittent fevers, and in other periodic diseases, it has often proved successful after all other curative means have failed. There are some other diseases not very closely allied to zymotic diseases, but which have many characters analogous to them, in which arsenic forms almost the sole remedy: such are some of the squamæ, as lepra, psoriasis, &c. As an external application, arsenic has been found preferable to more powerful caustics in cancer, and in such diseases as lupus, and an ointment of it has been found almost a specific in onychia maligna. But arsenic is not the only one of the class which possesses this extensive range of specific actions. Many others possess similar powers. The curative power of mercury is well known in at least one contagious disease. It has also been found to possess great power in checking the progress of cholera, and its use in many forms of fever is well known. Many chronic skin diseases have yielded to it, when all other remedies have failed. Local applications of it also, in the form of corrosive sublimate, have been found very useful in some forms of porrigo.

Nitrate of silver is another of this class, so is iodide of potassium, and I might go on enumerating others, all of them possessing the same qualities; let these, however, suffice for our purpose.

Now, how are these actions to be explained? I am not aware of any satisfactory or definite explanation having ever been given. These remedies are said to exert a peculiar influence on the system, by which its morbid functions are corrected, &c. &c.; but the nature of that influence has not been satisfactorily explained.

It will be observed that those substances which I have mentioned, and many others belonging to the same class, possess properties highly destructive to life in all its forms. Now, may not their alterative action depend upon this property? Some of the diseases in which their beneficial influence is exhibited, have an organic cause, such as cancer, porrigo, &c., and in most of the others there are strong reasons for inferring the cause to be of a similar nature.

The well known beneficial effect of mercury in common inflammation might be explained in this way. Inflammation is a disease commonly connected with increased vitality of the system. In those persons pos-



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sessed of the inflammatory diathesis, the blood corpuscles exist in large proportion, and all the functions of the body are carried on with unusual activity. May not the mercury, then, act beneficially by reducing this superabundance as it were, of vitality, by virtue of its specific power; possibly by retarding or preventing the growth of the blood corpuscles; while bloodletting produces the same effect by directly withdrawing from the system a portion of its vitality, represented by the amount of the vital fluid abstracted? This view will be still further strengthened if we consider the injurious effects of mercury in strumous or cachectic habits, where the vitality of the system is already low, and where the depressing effects of the medicine must of necessity prove deleterious.

There are other substances, such as cod-liver oil, sarsaparilla, &c., commonly classed among the alteratives, and which cannot be said to possess these destructive powers; but the impropriety of placing these substances in the same class with the others, seems sufficiently manifest, for their beneficial effects are much more easily and satisfactorily explained, by ascribing them to their tonic and dietetic qualities, than to any specific power which they can be supposed to possess.

The conclusions to be drawn from the action of alterative medicines may be stated briefly as follows. 1st, That most substances properly included in this class possess properties unfavorable to the development, and destructive to the life of organisms in general. 2d, The beneficial operation of these substances is manifested in diseases known to depend on the development of organisms, as in cancer, porrigo, scabies, &c. 3d, That their beneficial action is also often seen in diseases known to depend on the action of morbid poisons, as in syphilis, cholera, fevers, &c. 4th, Their beneficial action in these cases will be best explained by supposing the proximate cause of such diseases to be organic.

To sum up, then, how stands the case? The action of alteratives adds another item to a mass of evidence almost incontrovertible in favor of the organic nature of the morbid poisons. The only question which yet remains to be definitely settled seems to be, the precise grade or class to which the organisms belong. I have stated my reasons for believing that they cannot belong to any class commonly understood by such names as parasite, animalcule, insect, &c., and I have also given reasons for supposing them to belong to the class of organisms known as cells. Whether these reasons will be as satisfactory to other minds as they now are to my own, remains to be seen. It is true, the cells which have been assumed as the agents in the zymotic diseases, have not as yet been physically demonstrated; but may we not hope, and indeed predict, that accurate observation will yet enable us to identify the peculiar cell or germ of each disease, as unerringly as we can now identify those of cancer or pus.



In such an investigation, our search is not to be directed towards objects so palpable as a pus-corpuscle or a cancer cell, but towards objects so minute as to be capable not only of diffusion through the atmosphere, but of finding their way into the blood, through membranes now considered to be perfectly continuous.

The disease which offers the best prospect of success in this examination, would seem to be small pox, or some disease abounding in material products, in which the contagious matter is unquestionably given off, mingled with the products of common inflammation. The matter taken from a small pox pustule, for instance, must contain ordinary pus, and, in addition, the specific contagious substance, whatever that may be. Now, the microscopic characters of pus being tolerably distinctive, its admixture with this foreign material must necessarily be supposed to alter its appearance, the only difficulty being, that our present means of examination are not sufficiently refined to enable us to detect the difference; but when these means shall have been rendered more efficient as science advances, we may, I think, reasonably expect such discoveries, nor would they be so surprising as the original discovery of the pus or blood corpuscles themselves.

IV.—*We come now to consider briefly the Indications for Treatment, suggested by the foregoing views.*

In the first place. By way of preventing the spread of these diseases, every effort should be made to destroy the infectious matter external to the body, in fomites, &c.; and this will be best accomplished by the use of means or substances which have the power of destroying the vitality of the poison; such as exposure to heat, cold, chlorine gas, solutions of chloride of zinc, arsenic, corrosive sublimate, &c. &c.

Secondly. In view of the great predisposition to these diseases, engendered by the accumulation of effete matters in the blood, all circumstances should as much as possible be avoided, which tend to produce such an accumulation, as fatigue, exposure to noxious exhalations, damp and low situations, crowded dwellings, &c.

Thirdly. Whenever a specific antidote or preventive is known to exist, such as vaccination, its use should be made as universal as possible.

Fourthly. When the poison has already been introduced into the blood, its development might be prevented, or at least diminished in many instances, by the timely use of alteratives.

Fifthly. The system should be supported by nourishing diet, and stimulants if necessary, to enable it to bear up against the depressing effect of the poison, and of the remedies necessary for counteracting it.

Sixthly. All the excretions of the body should be kept as much as

possible, in a healthy condition, that no obstacle may be presented to the elimination of the poison.

Lastly. All complications which arise during the course of the disease, must be treated on general principles, avoiding as much as possible, everything which may tend to reduce the strength, or impair the vital energy of the system.

Thus, then, I have endeavored to embody in as concise a manner as possible, a few ideas which suggested themselves with regard to these obscure diseases. As stated at the commencement, I have not attempted an elaborate or complete treatise on the subject of morbid poisons; but have mostly confined myself to those prominent points which have from time to time been the subjects of controversy and investigation. Any suggestions which I have made, must be regarded more in the light of first impressions than as the results of mature reflection. The impossibility of obtaining many of the most valuable works on the subject, and the hurried and interrupted manner in which I was obliged to use those within my reach, have prevented me from bestowing upon the subject that amount of care and deliberation which its interest and importance demand. It is with diffidence that I have ventured to give an opinion on subjects which have occupied the attention of some of the most eminent men of our profession, but I have endeavored to consider each theory on its own merits, without regard to its authors, and when I have ventured to differ from them, I have been careful to state as clearly as possible, my reasons for so doing.

Experienced readers will, no doubt, find many, and perhaps important defects in the foregoing pages, but I trust they will make some allowance for inexperience and many disadvantages, and if they find in them anything worthy of their approval, or which may serve to render the obscure diseases under consideration one whit more clear, my utmost expectations shall have been fully realized.

