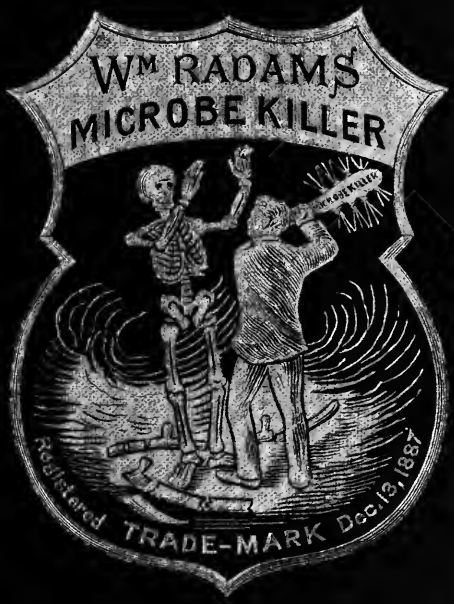
Wm RADAMS
MICROBE KILLER
Registered TRADE-MARK Dec. 13, 1887

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Mrs M B Jones.

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WILLIAM RADAM.

MICROBES

AND

THE MICROBE KILLER

BY

WILLIAM RADAM
DISCOVERER OF THE "MICROBE KILLER"

NEW YORK
PUBLISHED BY THE AUTHOR
1890

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1890

The Knickerbocker Press, New York
Electrotyped, Printed, and Bound by
G. P. Putnam's Sons

PREFACE.

NO apology is needed for the appearance of this volume. The contents are unique. The theory I set forth is new, but the proofs of its truth are forceful. The discovery I tell of is fateful to many interests—for good to those of the people, for evil undoubtedly to those of pretenders and others who have so long depended on public ignorance to profit by public credulity.

The object I have in view is very plain, and can be readily defined. Circumstances of my early life placed me in close commune with Nature. I studied her ways and observed her laws, not thinking at the time that the lessons learned amid some of the most beautiful adornments of this world would ultimately lead to consequences of vast personal importance to myself. Business considerations first set me on the path, a tasteful interest held me to it with steadfast care, and the prospect of a brilliant discovery in the remote distance gave me energy and zeal to progress towards what seemed to be a goal that promised an enduring benefit to the whole cause of humanity.

I attained to it after long and careful experiments, and I have held to it despite the wildest efforts of jealous rivals or fearful opponents to displace me.

Many men, among them some of the most prominent in the field of science, elaborate a theory and then work with one end in view till they establish it, or think they establish it. My methods were not of that character. I fashioned

no hypothesis. I did not look for something previously outlined in the mind. I simply studied and investigated, and the light at length broke in upon me, and opened out a discovery that I at once recognized as being of the utmost interest and importance. I tested its value, and found nothing wanting. It withstood the severest trial, and maintained itself under all circumstances. It promised to reform existing methods in the treatment of disease, to expose the errors that have been for centuries in vogue, to simplify human knowledge in fields of vital moment to the health and welfare of my fellow-men. Sweeping in its influence it was simple in its nature, and calculated to wipe out all the complexities of hygienic and curative principles by its oneness and intensity.

If I had withheld it, I should justly have exposed myself to condemnation, and might, with equal propriety, have been called upon to justify my conduct; to make it known is, therefore, a duty which I owe to myself, and yet more to the people who must be benefited by my work.

Ill-health had long held me in its toils. Every curative resource known to medical science had failed to afford me relief. My condition was growing worse, and hope was well nigh abandoned, when, in the line of my life-long studies, I found something that did what physicians and their materia medica had not done. I applied to my own case principles which I had learned were those of Nature herself, and they profited me where art had not availed. As soon as this result was realized, and I had leisure to weigh the full force of my discovery, I began to look backward, and to reason from the results of my experience back to first causes. My sufferings had been complex, my ailments had been various, and, according to medical theory, very different in origin and kind. But one form of treatment cured me, and the inference was inevitable that, if one method sufficed for a few diseases, it would probably suffice for more, and possibly for all. I recalled the drift of my inquiries and of my knowledge in the plant world, and formulated the idea

that all disease might perhaps be the consequence of a single cause. Following up this train of thought, I had no difficulty, in course of time, in strengthening the theory by practical experiment. By observation and inquiry, I soon had the soundness of the suggestion sufficiently established to carry conviction to any unprejudiced mind. But more was needed. If all diseases are traceable to one cause, all should alike yield to one mode of treatment. Of the truth of the former I had no doubt, but the latter could only be proved by experiment, and by satisfactory results ensuing from actual trial. The opportunity for this soon came. The remarkable fact that I, a chronic invalid, abandoned by the doctors because unrelieved by any of their medicaments, had cured myself, speedily became known abroad among my neighbors and friends, and some of them came to learn whether I could do for them what I had done already, so well, for myself. Thus was I afforded the chance I sought. I cautiously gave them the benefit of my discovery, and with only one uniform result. All were cured.

My position was made at once impregnable. My knowledge of Nature's laws had served me in a dire extremity. The experience so gained had led me to outline a theory which reason convinced me was correct, and finally that theory had been established by incontrovertible testimony, in the course of which no flaw or error could be detected.

There now remained but one thing of much weight to be decided. It was apparent that I held at my disposal a discovery of no small importance and value. Should I reserve it to myself, or give it to the public? Either course presented a difficulty. If I retained it I should lay myself open very justly to the charge of withholding something replete with advantage to mankind, and if I should publish it such a fundamental upturning of all existing methods and practices in medical science would follow that I must be prepared to encounter violent antagonism, and to defend myself against the disciples of a system that had a record of ages to sustain it.

If nothing else, a sense of duty to others must alone have speedily solved that question. I certainly had no right to retain an exclusive knowledge of any thing calculated to benefit others, and neither had I any right to allow some personal inconveniences to stand in the way of such a course. My resolution was accordingly soon made. I extended the operations of my discovery so as to leave no possible room for doubt as to its universal application, and then I determined to submit the whole case to the public.

This book is the consequence of that resolve. In its pages I have given a detailed statement of the new discovery which points to a unity in the cause and treatment of disease. From day to day steps are being made by advocates of the old theories which advance them slowly in the direction I have taken. Intermittent fever, cholera, scarlet-fever, influenza, and the recently named "Grippe," as well as other diseases, are acknowledged due to the presence of microbes, but the time will come when the people must free themselves from the bondage of ignorance now urged upon them, to accept the undoubted fact that all disease is due to the same cause, and that treatment to be beneficial must be directed to the single object of stopping fermentation in the system by destroying the micro-organisms that give rise to it. This is no longer a theory subject to refutation or needing proof. In the subsequent pages I have endeavored to bring it within the grasp of the most superficial reader, but I have also furnished irrefutable testimony to its truth and stability. It is not an hypothesis but a demonstrated law, and its reality is well fixed by practical experiment and by the evidence of accomplished facts.

The subject is of interest not only to a few, but to the many; to everybody in fact who may be subject to disease or ailments of any kind. It promises relief where cures have hitherto been deemed impossible, and it places the sick and ailing in a position where they shall be free from the expense and uncertainty of customary methods, and able to follow out the only known rational treatment for themselves.

I do not expect to be exempt from criticism. On the contrary, I invite inquiry and examination in a spirit of honest impartiality. Physicians will probably act under the customary impulse of doubting, possibly of condemning, until my remedy shall have been subjected by them to the full light of actual test,—and that I solicit. At the same time it is but just alike to myself and to the profession of medicine, to add that many members among the most progressive in that profession have already accepted my teaching and availed themselves of my discovery.

Thus far, no explanation or statement of it has been given to the world except in brief notices and superficial sketches for the benefit of those who have displayed an interest in the subject. This book was therefore necessary. It could not have been omitted, neither should it be delayed. It is a challenge to the world of science, and a help, perhaps even it may be a salvation, to the sick. It will be a revelation and a source of instruction to all. It will work a reform in the treatment of disease, and a commotion among the disciples of antiquated teachings. I understand its force, and can estimate its influence. I realize already the criticisms that it must encounter; but I ask for it a careful perusal and can wait with equanimity for the time near at hand when it will receive the approval and indorsement of every impartial reader.

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CHAPTER I.

INTRODUCTION.

If we attempt to trace back any great element of knowledge to its primary source, we find ourselves inevitably led up to Nature. Not the Sciences only, but the Arts, the appliances, aids, and engines of modern civilization, the devices of Humanity, the weapons with which natural forces themselves are overcome, and by which wondrous powers are controlled and utilized, are but the outcome of knowledge that sprang from intricate causes in the material world around us, and which experiment and experience have put into practical form.

A great book of revelation has lain open before the human intellect at all times and throughout all ages, which, if properly studied, contains the germ of all knowledge. Its pages are the blue skies and the green fields; they are seen in the rocks and the oceans, in the rivers and the rain, in the air and the clouds, in the sunshine and the darkness. In Nature's laws we have guides that put us on our way and indicate the course that must be pursued if any useful goal is to be attained. We have enough within the scope of vision not only to explain the phenomena of life, but to bring within our comprehension the first steps in human progress and the incentives that stimulate the life and energies of man.

Not this only, but amid the refinements of human knowledge at this day, if we would probe farther into the mysteries that even yet surround us, and ever will, we must, if we are wise, take our first lesson at Nature's hand. Even the mechanical inventor, the engineer, the architect, far as their calling seems to be removed from Natural Science, must often unwittingly fall back on first principles and be forced to acknowledge that Nature has been before them in the field. The steam-engine is but a machine where fuel is transformed into power, and the human body is but a like device only vastly more perfect,—one, that is to say, in which greater results are obtained from smaller causes, and which in truth forms the standard to which men still are aiming in the workshop and the laboratory. Insects afford to the mechanician examples of the power which he fails to rival, but which he seeks to imitate and in which he learns a lesson. The human eye is repeated in the telescope and the microscope, the stereoscope plays upon the phenomena of double vision, the familiar zoetrope takes advantage of the duration of impression on the optic nerve, and the phonograph reproduces the atmosphere's vibrations and those of the mechanism of the organ of hearing.

But simple as the problem seems to be when we say that Nature, as a teacher with an open book before her, is ready to be our guide,—simple as it seems to be to follow the instructions put before us, the cost and the trouble are great when success is to be attained. We are apt to think that man in this nineteenth century has arrived at a high degree of civilization. So perhaps he has, but it is only relative. The possibilities of the future cannot be divined. Yet the expenditure of human energy necessary to bring about even the present condition of the race has been enormous, something beyond computation, beyond, indeed, any thing that the mind can realize. Sometimes we hear of great discoveries being stumbled over unexpectedly, but such stories are too often fiction. A pretty tale was told of Sir Isaac Newton, but it was mythical, and the laws of gravitation were

the result of prodigious mental labor and research. Darwin did not formulate the theory of evolution and the origin of the species till after years of observation and earnest toil. James Watt, at much cost of labor, thought, and time, built the steam-engine, but it has taken years of earnest endeavor and thousands of able men to bring it to that degree of perfection which places us within a few days' reach of the Old World. Twenty-four hundred years ago, when ancient Rome was but a village, hardly older than is this Republic, Thales discovered electricity. Benjamin Franklin drew it from the clouds, and a century has passed since Galvani saw its relation to the human body. A generation that has gone remembered the electric light and the principle of the telegraph as playthings for students, but it is only now that we have attained to any thing like a conception of the powers and uses of this unseen but universal force, still less had it until recently been brought under man's control. Even now its full capabilities are unknown, and its nature is only in part comprehended by philosophers and not at all even by those who handle it most frequently. Yet it is serving us day and night, aiding the operations of commerce, facilitating trade, contributing to our comfort and convenience, protecting our houses, lighting our ships, and adding to the machinery of war as well as of peace. But all is the result of a vast expenditure of mental power, and all has come about from a beginning that finds its place in Nature.

So in like manner the natural properties of air and water have been made subservient to human wants. The elasticity of the one is equally applicable to check the recoil of great guns, to stop our trains, to fire a bullet, or to close a door; while the unyielding resistance of the other raises elevators, compresses merchandise, launches ships, assists the engineer in his grandest works, and is applicable to numberless uses that go almost unnoticed in every-day life. But again lives have fallen, energies have been exhausted, and numberless experiments have been gone through before these results could be attained.

The action of Nature is unceasing. There is no such thing as rest.

There is no Death! The dust we tread
Shall change beneath the summer shower
To golden grain or mellow fruit,
Or rainbow-tinted flower.

The granite rocks disorganize
To feed the hanging moss they bear,
The forest trees drink daily life
From out the viewless air.

There is no Death! The leaves may fall,
The flowers may fade and pass away;
They only wait through wintry hours
For coming of the May.

There is no Death! An angel form
Walks o'er the earth with silent tread;
He bears our best-loved things away,
And then—we call them dead.

Ceaseless energy is everywhere apparent. Let the mind sweep for a moment through the boundless realms of space; all is motion. An infinity of worlds is circling with inconceivable velocity under unerring laws through every region in the boundless universe, and intervening space is quivering with the invisible influences of light, heat, electricity, and gravitation. There is no rest.

Look again with the eye of Science into the inmost composition of a piece of metal, and what do we see? Myriads upon myriads of indivisible atoms separated from each other in a never-ending, never-dying state of rapid vibration; of extreme susceptibility to the faintest influence of heat or magnetism, bound into close proximity by an inconceivable force, but ready to enter into new conditions whenever the circumstances are favorable.

And as there is no rest, so there is no destruction. With all the changes that are going on in consequence of the restless energy of man and the unceasing operations of Nature, the amount of matter on this globe is hardly different from what it was thousands of ages ago, when fern forests covered

the earth or Tangles flourished alone in the hot, damp atmosphere that surrounded primordial life, when skulless creatures monopolized the waters and before the first land animals had appeared.

Matter is never destroyed. Forms may change, but that is all. The candle burns and it ceases to exist, but it has only been altered. The material is there. The carbon and the hydrogen have made new combinations and have gone away into space. Heat and electricity were developed during the change, but nothing is lost; nothing is destroyed.

> "Earth that nourished thee shall claim
> Thy growth, to be resolved to earth again,
> And, lost each human trace, surrendering up
> Thine individual being shalt thou go
> To mix forever with the elements,
> To be a brother to the insensible rock
> And to the sluggish clod, which the rude swain
> Turns with his share and treads upon. The oak
> Shall send his roots abroad and pierce thy mould."

We do not know what life is. We cannot confidently define its origin. We are unable to say with certainty how Nature begins her work, but we can see how she proceeds after she has begun. We dare not affirm positively what produces the monera, but we can trace the growth of cells, the assimilation of food, and the processes by which Nature carries out her never-ceasing law of change. For the continuance of the functions attendant upon the presence of life, the imbibition of new matter is constantly necessary, and with it the exudation of the old tissues and of the refuse, as it were, left after a process of chemical combinations, is equally essential. The complex action of glandular organs, the means by which various chemical processes are brought about and perfected, are among the things which Science has not yet taught us, but we have advanced to the point where organic compounds may be produced in the laboratory, and it is impossible to say how far that step on an entirely new road may take us. The manufacture of salicin is one of the best-known illustrations of this.

Organic bodies are adapted to the conditions that surround them. Reference is made particularly to conditions of atmosphere, temperature, and moisture. The vegetation of the tropics is vastly different from that in northern latitudes, and marine and aquatic plants differ in construction from those which flourish in the air as much as fishes differ from the amphibia. In both the animal and the vegetable kingdoms again, parasites exist in the utmost variety of form and in the greatest number, plants passing through the whole course of their existence on other plants, and both vegetable and animal formations preying upon the highest forms of organic life. No observant person can fail to see examples of this, for they are before him at every turn. Many of these are direct descendants from the first forms of vegetable life that appeared upon the earth. The well-known and popular mistletoe is but a parasite like the lichens that give color to the bark of old or unhealthy trees, or the mildew that in wet seasons dims the beauty of the lilac leaves. Some are absolutely microscopical, not visible to the naked vision, appearing as discolorations only under a low power, but developing into well-formed organisms when submitted to the eye through the medium of high magnifying instruments.

The distinctions between animal and vegetable life have at no time been well defined, and recent investigations into the causes of disease and into the nature of the simplest organic forms render the possibility of such distinction more difficult than ever.

Both organic worlds have the same origin. The primitive organism probably branched off into three, one leading onwards to animal life, another to vegetables, and the third to a neutral formation, some members of which are more nearly allied to plants and some to animals. This division is found chiefly in the waters, both saline and fresh, but in incalculable numbers. Some of them form the slime that is found in damp places, among decaying vegetation in the humid atmosphere of some forests, and again forming the

yellow discoloration that is often to be seen in the tan beds. Others still very minute are covered with a flinty substance, and when accumulated in masses they form the peculiar kind of slate known as Tripoli, while again others are nothing more than floating particles of matter whose prime object of existence seems not to extend beyond a division and subdivision into innumerable repetitions of themselves.

It is more than probable that in the human body there are at all times and under all circumstances myriads of these minute organizations. If they be of an inert character, or limited in quantity in a strongly healthy person, their presence may be unnoticed. But if the system be weakened, or the nature of the parasite be changed, or if its numbers be greatly increased, disease and death are the result.

A remarkable discovery has recently been made in the West. For some time a disease has been prevalent among cattle, which has been known to farmers as the "corn-stalk disease." It appears that in late autumn or winter cattle are turned into fields of Indian corn, from which the ears have been removed, or which has been "topped," to clean up the remnants of leaves and tops. After a few days one and another of the cattle are taken ill with a malady which may cause death in from twenty-four hours to ten days. It is said to be an acute blood-poisoning, with high fever. The pulse is weak and respiration rapid. The animal sometimes bellows, and will chase other animals, or will stand by itself apart and be loth to move. They drink and retain the power to swallow. The mucous surfaces are congested. The secretion of milk slackens and ceases. A post-mortem examination shows evidence of acute septic febrile disease, which, however, is not contagious.

At first the malady puzzled the farmers, who failed altogether to account for it. Only certain fields, or parts of fields, were dangerous, but stock-owners never could tell whether it would be safe, or what would be the consequences of turning a herd into a fodder field. Various theories were raised, but only to be knocked down by ex-

perience. It was thought to be caused by lack of salt or water, but it was seen in cattle that had both. The dryness of the fodder was blamed, but without reason, as experiment showed. It was attributed to smut, a vegetable parasite known to botanists as *ustilago maidis*, but cattle fed with large quantities of smut were not made ill. At last the growing corn was examined, and patches were found where the plants were stunted if attacked in early summer. The lower leaves died, becoming yellow, with colored streaks. The roots were unhealthy, and the ears did not mature. Resort was had to the microscope, which at once revealed the presence of a minute organism that is sufficient to account for the whole phenomenon. It is a germ or microbe closely resembling that of the Southern cattle plague. In shape ovoid, its length is not more than one sixth that of a blood corpuscle, and it moves by a sort of rolling motion. These organisms have been cultivated in media outside of the body, and the injection of the cultures into animals has produced symptoms exactly resembling those of "corn-stalk disease."

Here we have a close connection between cause and effect, and one that is absolutely proved in both directions. We trace disease back to the microbe, and then producing the microbe by artificial means, we are enabled in turn to produce the disease. Nothing could be clearer, nothing more emphatic.

It must, however, be remembered, that although these minute organizations have been studied so closely that they have been formed into a separate kingdom and accurately classified, we have no knowledge as to how many different varieties of them there may be. They differ greatly, but when occupying the system of the higher animals the same form always produces the same disease. The microbe which gives rise to the symptoms of the corn-stalk disease is very similar to that which has been identified in the Southern cattle plague. Whether they are the same is not yet ascertained; if they are, the cattle plague is more than probably

caused by the animals eating diseased food. But as the symptoms are different, it is likely that the microbes in the two cases will present some minute distinctions when closely examined, and that the differences are not due to extraneous causes, as has sometimes been suggested. This is rendered more probable from the fact that in the West it is chiefly horned cattle that are affected, while in the South pigs are seen to suffer most.

For just as all animals have special parasites, so they are more or less susceptible to different microbes. For example, the germ which produces a certain disease in man may not necessarily give rise to a similar disease, or to any, in a lower animal. It does sometimes, but not invariably. As a rule, it may be taken that each disease has its special germ ; and again, although this is given with more reserve, that each animal is distinctively susceptible to special germs. A horse may be placed in proximity to horned cattle and not be affected by the disease from which they are suffering, and in like manner a cow may be in the same stable with a horse that is sick and not be inconvenienced. Such examples illustrate the rule.

Among the exceptions may be instanced the undoubted fact that glanders in a horse may be conveyed to man, as has frequently been attested. One of the most recent illustrations of this was the case of Dr. Hoffman of the Vienna General Hospital. That gentleman had been making some observations about the bacillus of glanders, when, suffering from a slight attack of muscular rheumatism, he gave himself a hypodermic injection of morphia. The syringe he had, however, had been previously used for inoculation of the cultures of glanders bacillus, and care had not been taken to cleanse it. The disease was thus conveyed through probably a few only of the microbes being left on the instrument, and in less than three weeks Dr. Hoffman died.

From all of which it follows that one species of animal may eat with impunity impure food which in another species of animal would bring about disease. It will also be under-

stood how the cooking of food may make it harmless simply by destroying the vitality of the germ. This, nevertheless, is not to be received as a never-failing protection, because it has been proved by experiment repeatedly that the degree of heat usually required and used in cooking is not sufficient to remove the danger, but, on the contrary, that a high degree of temperature, continued for a considerable time, may be, and most generally is, requisite for that purpose.

Nor is it necessary that food should be impure or diseased before microbes or protista are taken into the system. The atmosphere is full of them. The difficulty of investigation is great. Lives have been devoted to an endeavor to solve the question of spontaneous generation, and many capable observers are of opinion that these germs may, under favorable circumstances, be originated, those conditions being merely a suitable medium and a steady, uniform, and proper temperature. If that theory be correct, it is clear that no precautions can be used which will prevent the formation of microbes in the human system, and then we must be content to destroy what we cannot prevent. If they are produced spontaneously we may possibly limit the production by changing the conditions necessary to their existence, but the more practical resort would be to kill them after they are formed, and thus remove their power for evil.

But independently of all this, they abound in the atmosphere. We take them into the system through the lungs. In close rooms, where several persons are collected, as in factories, workshops, and often in theatres, public rooms, law courts, churches, and in ill-ventilated bedrooms, they are most abundant, and they increase with such marvellous rapidity that in an hour a comparatively pure atmosphere may be converted into one that is exceedingly unhealthy.

It may be asked, that being the case, why persons who breathe in such places are not always struck down with disease. Because, probably, the particular germs floating in the air are not such as would give rise to a particular com-

plaint in man, but in all such instances they render the air unhealthy and unfit for respiration. In a sick-room it is more likely that they are of the variety which would originate a given disease in man, and then we apply the word infection.

CHAPTER II.

EFFECTS OF CLIMATE.

How do these atmospheric microbes come into existence? Some investigators still maintain that their carefully conducted experiments show the truth of the theory of spontaneous generation. Many, especially in the German schools, hold the view that primitive organisms, of which more will be said in a subsequent chapter, are formed by means of an inherent force in matter drawing together the elements which we know to prevail in, indeed to constitute, organic forms.

From a strictly scientific, or especially from a biological, point of view this question is of vast importance, but in the present consideration it is of less moment. We are dealing not with the origin of life, but with the presence and destruction of microbes, and can afford to regard the more abstruse problem as one of incidental interest only. This, however, we certainly know—that atmospheric microbes may, and do, come from the earth and vegetation, or from the lungs and exhalations of animals. We have no reason for saying that they may not multiply in the air itself, but we know that they are ever floating about us in inconceivable numbers, and that while they are more numerous in cities and towns than in the open country, and in wet places than in a dry soil, yet they are found appreciably everywhere, except, so far as we can ascertain, on the tops of high mountains. Moisture is favorable to their propagation and existence. Some are adapted to live in cold regions,

but more require a warm temperature. Changes of weather seem also to favor them, and a marked rise or fall in the barometer has been noticed to affect their numbers and vitality.

I have observed that in plants which I had kept too warm and then suddenly exposed to cold, a fungoid growth could be detected in twenty-four hours. The leaves would then change in color and either shrivel up or wilt. The roots would fail to take up moisture, the spongioles being apparently paralyzed and their functions destroyed. Examining them carefully it could be seen that something like a process of fermentation was going on around them — in other words, that fungoid exhalations or microbes were gathering upon them, that these gradually extended through the rootlets, while those on the leaves were reaching out to the stems and buds. All the green color of the plant disappeared, the coloring matter apparently yielding to chemical decomposition under the exhausting influence of microbes, and finally the plant would turn yellow, droop, and die.

Place a child predisposed to indisposition, or even a healthy person, in circumstances equally unfavorable and the consequences are similar. A change from a warm to a cold atmosphere is one of the most common causes of disease. The conditions of life in this country are especially calculated to furnish ample illustrations of this. In summer, people are apt to counteract the effects of heat by removing portions of their covering and seeking a cool resting-place, glad sometimes of a current of air which feels refreshing yet is fraught with peril. In winter most of us live in overheated houses, from which necessity takes us often suddenly into a wet or cold external atmosphere. The consequence is a cold, or inflammation of the lungs, or worse. A cough is one of the first symptoms, and on examination it is found that a peculiar microbe has attached itself to the bronchial tubes or upper air-passages, producing an irritation, and the cough is Nature's effort to get rid of it. Or it may become attached to the mucous membrane of the nose, giving rise

to what is variously known as "cold in the head," coryza, and acute catarrh. It can readily be understood that in the latter case it is more easy to remove the cause of the trouble, but where there is a cough the disease germs may spread downward to the lungs, extending their influence throughout the tissues, and producing bronchitis or pneumonia as the case might be.

Dr. Wetter is of opinion that the special disease-germ in pneumonia, *pneumococcus*, may be conveyed for short distances through the air, or by a third person, or by clothing. This would rank pneumonia as both contagious and infectious, which accords with the modern idea that it is something very different from a simple inflammation, as was supposed a few years ago. The microbe of this disease is not killed by drying, and may, as is believed, be preserved for years in a dry condition and then made to renew all its activity on being placed under favorable conditions again. It has been found in the saliva of a person who had recently recovered, and thus there is every indication that the disease so common in this country should be regarded as dangerously contagious. If the microbe be not destroyed the disease may become chronic, or develop into asthma or consumption, and end only in death. The propagation of microbes is rapid and enormous, some calculations having led to the belief that in one hour less than half a dozen may, under favorable conditions, increase to fifty millions.

In the course of my observations and experiments I have often observed that in times when coughs were prevalent, and when what appeared to be ordinary colds assumed the character of an epidemic, vegetation was also affected. Plants did not flourish in their customary manner. The young leaves chiefly suffered; sometimes evidences of the existence of microbes became visible on the more tender parts, and the whole plant would assume a stricken and unhealthy appearance.

The changes which generally occur in spring-time—changes not only in temperature but in the degree of moist-

ure or dryness of the atmosphere—are especially calculated to produce disease in vegetation exactly as they do in man, and the affection is more severe, more difficult to combat, and more apt to lead to a bad termination than is the heat of summer or the steady cold of winter.

Plants kept in places where they were away from the full exhilarating influence of light, or in an atmosphere where there was no free circulation of air, would speedily become sickly, and their growth, if any, would be weak and unhealthy.

Man, submitted to similar conditions, suffers in the same way, and children brought up in close places, or even being made to work in them, where air and light are insufficiently supplied, become stunted in growth. The tissues of their bodies are weakened, their senses are not fully developed, and their minds are imperfectly formed. Poverty, crime, and much misery are too often the lot of such persons, and all their misfortune may be attributed to the fact of their having been confined in surroundings where disease germs are so abundant that the microbes necessarily obtain access to the blood and are circulated with it through all parts of the system.

I may here direct attention to two well-known diseases, whooping-cough and diphtheria, by way of illustrating further some points that I have mentioned. Both of these may result from infection, and one, if not both, may also arise from the use or presence of impure water or decaying vegetation. They are, however, produced by a different form of germ, although in each case the seat of the trouble is very local and well defined. It is always primarily in the throat, but the microbe that produces diphtheria cannot engender a whooping-cough, and, *vice versa*, the germ that gives rise to whooping-cough never excites diphtheria. That they do not bring about disease in everybody who inhales them is simply due to the fact that the condition of the throat is not favorable to their development, or that the vital powers of the individual are sufficiently strong to resist

them. It will be understood, therefore, how it is that almost all cases of diphtheria are preceded by what is called a cold.

The special germ of this terrible disease has been identified and isolated by the director of the Pasteur Institute and M. Versin. They have succeeded in reproducing the disease in rabbits, fowls, pigeons, and guinea-pigs by inoculating these animals with cultured microbes. They have also been able to isolate the special product of fermentation caused by these microbes, and by using that, without the germ itself they have brought about all the symptoms of diphtheria, including the difficulty of respiration and paralysis of the muscles. They have further shown that a person who is perfectly healthy may inhale these microbes with impunity, but that if there be any weakness of the mucous membrane of the throat the disease is speedily developed. This accounts for the security enjoyed by many people, and also for the frequency of the disease after attacks of cold, scarlet-fever, or measles. It points to the necessity for giving attention to sore throats or slight ailments when diphtheria is prevalent, and to the necessity of frequently washing the mouth and throat with such an efficacious destroyer of microbes and micro-organisms as that which, in my hands and among thousands of my patients and correspondents, has not yet failed.

Irrigations such as those mentioned should be made with copious quantities of the fluid, a rule which my own experience has taught me, and which is recognized by all who have used less powerful parasiticides than mine. The New York State Board of Health on one occasion recommended sulphurous-acid gas—the fumes of burning sulphur—as a preventative and disinfectant for diphtheria. But the special germ, the *streptococcus diphtherialis*, is not destroyed by that gas. It yields to three agents only—carbolic acid, corrosive sublimate, and my microbe killer, and the first two of these are powerful poisons, and as dangerous to the patient as they are to the microbe.

It is worthy of mention here that diphtheria is not con-

fined to members of the human family. Animals are liable to it, and a case is mentioned where a kitten conveyed the disease to four members of one family before the truth became known and the animal could be killed. The symptoms in that instance were unusually virulent, but no deaths ensued. It is beyond doubt that the germ of diphtheria, like that of tubercle, may be conveyed through the atmosphere, as, indeed, may the microbe of malarial or intermittent fever, and many others, hence the facility with which a child may take the disease from any pet animal.

Most of the microbes or bacteria that are to be found in the atmosphere come from the ground, or from the breath, or sputa, or persons of individuals. Heavy rains tend to wash them out of the air, but, when thus thrown to the soil, the moisture favors their increase, and thus, as the ground dries, they may be carried back into the atmosphere in increased numbers.

Something similar may be illustrated in another way. It has been shown by actual observation that the tubercle microbe exists in the perspiration of persons suffering from phthisis or consumption in any form, but they are not an exudation from the skin. They come from the sputum, possibly from the breath, and, being suspended in the air, they are carried to the limbs or the bedclothes of the patient, and thence to the surface of the body.

It is an error, however, to suppose that the atmosphere is the principal nidus of the disease forms. Bacteria, microbes, and micro-organisms of all kinds exist in infinite numbers in the soil. Some observers consider that to be their chief breeding-place. All are not disease-producers, but all seem to exercise some useful function, and the most plausible suggestion yet made upon this is that, by inducing a process of fermentation in the soil, they bring about chemical decompositions which liberate elements that are necessary to the nutrition and development of higher forms of life.

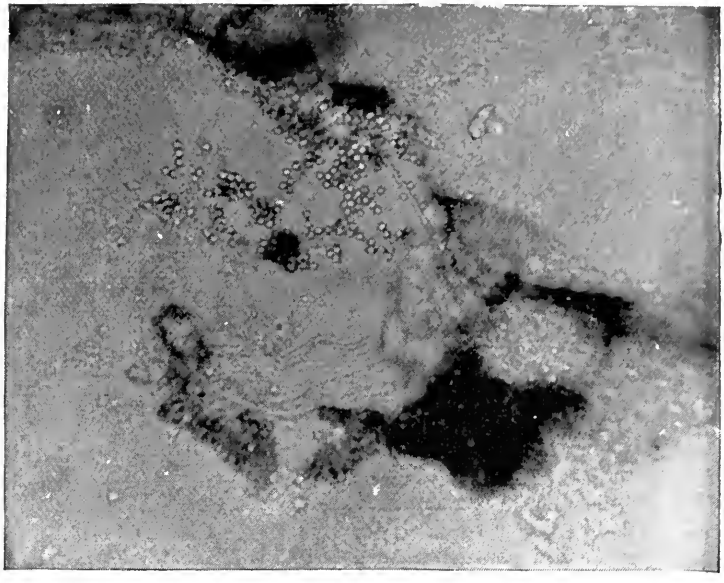
Among disease germs that are found in the soil, those of typhoid fever, malaria, and tetanus are most frequent, and

hence it is that the breaking up of new land, especially in damp places, so frequently produces ague or "chills and fever" among local residents. It is a popular error to suppose, therefore, that the earth destroys microbes, and it seems to have arisen out of the fact that dry soil renders them for a time comparatively innocuous.

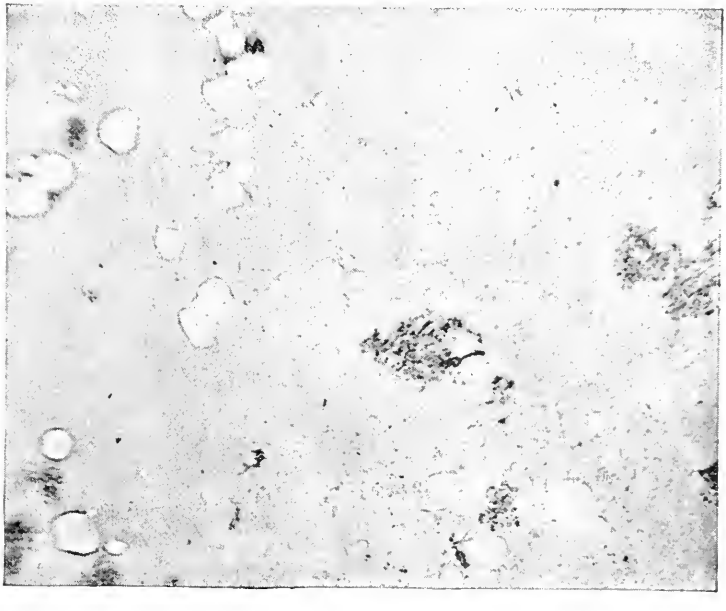
It had long been supposed that tetanus or locked-jaw follows as an injury to the nerves in certain wounds, although how it could so result was never explained. It is now acknowledged to be the work of a specific microbe, and it has been shown experimentally that the disease may be produced in animals by inoculation with the organism as it is found in the soil. In Cuba tetanus is very common. Statistics taken at Havana show that 82 per cent. of wounds of the lower extremities are followed by tetanic symptoms. It is a practice there among the country people to dress wounds with dry earth, and tetanus invariably follows. For a long while this fact remained unexplained, until a microscopic examination of the soil showed it to be particularly rich in the special microbe of that disease.

The ground is the great resting- and breeding-place of micro-organisms of all kinds, whether they be harmless or capable of producing disease. It is easy to foresee, therefore, how they can pass into the atmosphere, or on to the surface of bodies, and thus be spread everywhere. It becomes apparent, also, how animals and plants may be alike affected by them, and how rapidly they multiply under favorable conditions, which may be briefly summarized as warmth, moisture, and usually a deficiency of light.

If we cover up a pit of potatoes without the precaution of keeping down the temperature and moisture, fermentation sets in, and soon fungoid growths are everywhere perceptible, while the substance of the potato becomes diseased and rots. If the atmosphere of the greenhouse be kept too warm and moist, fungoid growths begin to show themselves directly, and in due time the plants become sick. Or again, the same circumstances arise if two or three weeks pass



MICROBES IN STALE MEAT.



FUNGUS AND MICROBES ON DECAYING POTATOES.

without the assistance of the sun's rays to purify the atmosphere. Although this is well understood by persons who have charge of flowers, I can imagine an objection which those to whom the suggestions may be new would be likely to raise. For most people have read of, if they have not seen, the rank vegetation of the tropics, where, amid an abundance of heat and moisture, often with an absence of sunlight, the most luxuriant and healthful vegetation that the world knows, may be discovered. Or again, we may go into the deep woods in our own country, and there, in shaded nooks and corners, find specimens that are not to be found elsewhere, and which, notwithstanding their healthy appearance, will wither and die as soon as they are transferred to the garden bed.

How is this? In the first place, certain germs must, as I have already shown, have certain suitable conditions in which to increase and flourish, and although they may be produced in abundance in such locations as those described, yet the plants that grow in the same spots are proof against them, they are not suited to their development, and, in fact, they grow in spite of them. That germs are produced in such places, every victim of malaria can testify.

But this calls for another observation. Plants are adapted to the conditions that surround them, and conversely the climate of any locality has vegetable growth adapted to it. High latitudes and high elevations in low latitudes are the homes of the pines and firs, while more temperate regions give us the olive and the oak, and in the tropics the palms and all the grandest development of endogenous vegetation most abound. This is nothing more nor less than a law arising out of the circumstances attending the formation of the earth itself; nevertheless, it is everywhere evident that Nature leaves nothing unoccupied, so that when the conditions are such that one form of life cannot continue, we find another especially adapted to it.

These, however, are exceptions in the vegetable world; but similar exceptions are to be found in the animal creation.

Life that flourishes in the tropics would perish in Labrador, and the seal of Alaska would soon disappear if removed to the waters of the Amazon. Animal life is also to be met with under exactly the same conditions as those in which we find the flowers that grow apart from light and air in the dim recesses of the woods. But this only proves the rule. The highest and most complete forms of vegetation exist only under the requirements given, and man, as the highest form of animal life, requires the same. Like the oak and the elm, he needs light, air, and a more or less equable temperature. He does not flourish where the mushroom and the snail are most at home. The gas that kills a rose will destroy an animal. You may drown the one almost as readily as the other. Both succumb alike to poisonous compounds. Both are subject to disease, and very often are alike affected by the same causes. Hence the relevancy of studying Nature in all her varied forms, if we would come to a correct understanding of the conditions of life and disease.

It is advisable, even, not to be content with a comprehension of the organic world alone, if we would fully appreciate how much there is to learn outside of it, and how thoroughly all bears down upon the same conclusion—change is universal. The rocks, even the mountains, are wasting away, slowly, it is true, but none the less surely, under influences that are unceasing. Among them, light, air, and moisture fill a prominent part, but minute, invisible growth is a powerful aid likewise. The disintegration of the solid rock is influenced largely by the growth, in the first instance, of minute fungi, and afterwards upon their remains by structures of a higher organization as lichens and allied plants; and where there is a crevice or a crack in a rock, even a disruption may in time be produced by vegetable formation.

The indications in such instances are to discover a means by which the growth may be prevented, or if that fail, then a means by which it can be killed. In business this is constantly being attended to. Shippers of fruit, for example,

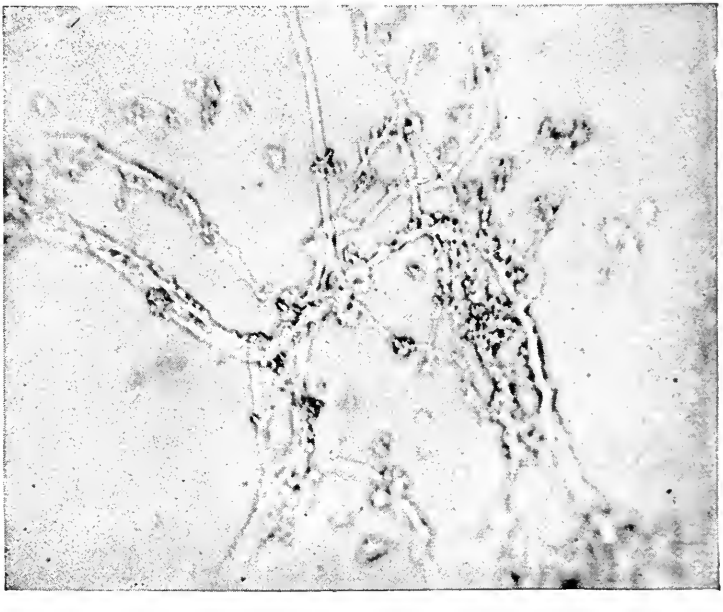
pack their produce as dry as possible and keep down the temperature, so preventing the formation of fungi and the process of fermentation. Ice is oftentimes used for this purpose. Florists, too, when shipping plants in the warm season are careful to secure ventilation by means of holes in their packages, or in cold weather to line them with some material capable of absorbing moisture. Without such precautions it would be a hazardous business to send fruits from California or the extreme South to New York, but with them even the most delicate produce of warm climates can be transported with safety and advantage, as the condition of grapes of St. Angeles, as seen in New York, sufficiently testifies. In the same manner the produce of the West Indies is safely carried to the markets of London and Paris.

A great deal has been said about the disintegration of the Egyptian obelisk in Central Park. It was well known by people who understood such things that that would be the inevitable result of transferring the monument to this climate, which on account of the great variations between extremes of heat and cold in summer and winter respectively is very detrimental. It is true that the means taken to prevent destruction were well calculated to bring it about, submitting the stone to high degrees of temperature being about the worst course that could be pursued. It should, therefore, be no surprise to find that the surface of the stone is falling away, although the finer monuments, one in Paris, the other in London, are well preserved. But independently of the injury which has resulted from the display of so much ignorance, it is certain that fungoid growths have done their work, and that to this cause very much of the trouble is due. A damp season gives ample illustration of the rapidity of these formations in New York, where a green fungus, the *protococcus viridis*, forms abundantly on the brown sandstone, of which so many of the houses are constructed. It is more rare to find this on marble or limestone, where the absorption of moisture is more difficult.

If we examine a piece of lumber that has been lying for some time under the influence of air and moisture, and especially if the sunlight has been limited, fungoid growths may be seen upon the surface,—and the practical problem put before us is how to get rid of them, and so to preserve the timber from destruction. Let any textile fabric, a man's coat or a woman's gown, get wet and be put away in that condition in a close closet. In a very short time fungoid matter can be detected by the musty smell that is given off, even though it may not be perceptible to the unaided eye. Leave the clothes in these conditions for a short time and they rot and fall to pieces. In each of these illustrations the fungi are different; and our purpose is not so much to know how they would be classified by the biologist, as it is to learn the means by which to get rid of them. It is the same throughout. It would be easy to enumerate hundreds, aye thousands, of similar examples, and in every one the cause is the same; the proofs being so marked and so unanswerable that none but a person who is wilfully ignorant, or who is blinded by prejudice, could possibly question them.

The special study of microbes as a branch of biological science is full of interest and value, but it is not material to a practical application of remedial agents in the treatment of disease. It is well to identify the special microbes of typhoid and tetanus in the ground, but when it comes to treating either of those diseases, it is of no moment that two specific germs are there. It suffices to destroy them, and one treatment will do that. Thus then it is not necessary to my present purpose to classify the microbes that are met with, and it is only as indicating the progress of the study that I refer to that. My object is rather to point out the all-important part they take in the causation of disease, and to make known the means by which they may be destroyed, and prevented from increasing, that thus the substance in which they are found may be preserved. In subsequent chapters I shall show how this is done by myself and attempted by others.

RUST ON ROSE LEAVES.



FUNGI AND SPORES FROM CLOTHING.

CHAPTER III.

THE CAUSE OF DISEASE

A PERUSAL of the preceding pages will have suggested a question which it is time that I consider. Assuming the force of the undoubted facts that have been given, how does sickness begin? What causes illness in the animal frame?

I have hinted at this, but only briefly and incidentally, and it is necessary now to review the subject more in detail. Microbes may be taken into the system in various ways. They may come to us not only by the lungs from the atmosphere, but with the water that we drink, the food that we eat; or again by contact with other bodies, and also by inoculation when there is any abrasion of the surface of the skin. Water that is ordinarily used for drinking purposes always contains them. The water of rivers, lakes, and pools is full of them. Rain-water, collected as it falls in perfectly clean vessels, is found to contain them, sometimes in very large quantities. In this case they have been gathered from the atmosphere. Spring-water, at the moment that it issues from the ground, is the purest in this particular, but water immediately after distillation is alone free from them. I say immediately, for if distilled water be allowed to stand for only a short time exposed to the atmosphere, an examination with the microscope readily shows that microbes have begun to collect in it. Mineral waters are not free from them, and sea-water contains them in wondrous abundance. Filtering does not suffice to purify water from these minute

organisms. I have already stated the measurement of some of them as about one sixth the diameter of a blood corpuscle, but others are too minute for any estimate to be formed, actual measurement being out of the question. They are quite able to pass through any filtering medium with which we are acquainted, not even excepting porous stone.

The minuteness of such bodies is wellnigh inconceivable. An idea of it can best be formed by stating what is the power of a good microscope. It has been found possible to rule lines upon glass which are a ninety-thousandth of an inch apart. And an accurate and experienced observer is capable of distinguishing objects that are the one-hundred-thousandth of an inch in diameter. Microbes of this dimension would be so small that ten thousand millions would be required to cover a square inch of surface. Microscopes can be made of much greater power than this, but Sir John Lubbock is of opinion that, by the very nature of light, investigations of greater minuteness become uncertain and untrustworthy. In this view he is sustained by Sir Henry Roscoe; but skilled microscopists are also to be found, and among them is Dr. Dallinger, the President of the Royal Microscopical Society, who fix the limit of vision at the five-hundred-thousandth of an inch, which gives us the enormous multitude of two hundred and fifty thousand millions of these little creatures on an inch of surface. Nor may we stop here, for it is beyond doubt that there are yet others smaller, so small as to defy all the powers which man can bring to define them. It will readily be understood, therefore, why no process of filtration that is known to us will suffice to render water absolutely free from them, and the only remedy at our command implies then their destruction.

I have already given, when speaking of disease, an explanation of the reason why unpleasant consequences do not always follow from taking microbes into the system, as we certainly do whenever we drink water. It is because the particular form of microbe may be harmless, or because the conditions surrounding it in the system are not such as are

adapted to its increase. They are then either harmless or they perish and pass away. But where water is very foul the quantity of living organic matter is increased, and the chances of being able to resist them are diminished. The disease then ensues—and may become epidemic—which is produced by that particular microbe which is most abundant in the water.

A few years ago a manufacturing town in New England suffered for nearly a year from an epidemic of typhoid fever and diphtheria. The latter was severe, nine tenths of the children in a particular locality being affected by it. But it was limited to a district that could readily be defined. Inside of the line few children escaped, outside of it none were afflicted. After careful investigation it was discovered that the families that lived where the disease prevailed all obtained their water from the same source, and microscopical examination showed that it was filled with organic matter and with microbes of a peculiar form.

By a strange coincidence, typhoid fever of a remarkably virulent type prevailed at the same time in the same town, but on the opposite side of it, and more than a mile from the diphtheritic district. This, too, was confined to a small settlement of about fifty families, but every one of them was attacked. These people got their water from a spring that flowed from a hillside, and for a long time it was not suspected. It looked clear and sparkling and was pleasant to drink. As a last resource it was submitted to examination, and to the surprise of everybody it was found to contain microbes and much organic matter. The use of it was given up and the fever ceased. Pursuing the inquiry further it was afterwards discovered that this water, apparently pure and from so unsuspected a source, actually percolated through ground that had become impure from causes attending the construction of some houses a year before on the high ground above where the water made its exit from the earth.

In this connection it is well to repeat that the microorganism of diphtheria has been certainly isolated and

cultivated. It was at one time thought to be a form that had been described by Loeffler, but more recent investigations show that it is a different variety, and that it is usually accompanied by others which appear to be found also in different diseased conditions. It is about one micromillimetre in length, and they tend to form chains as they grow. When the cultivated microbes were injected into other animals, as rabbits, pigeons, and hens, they always produced disease, sometimes with suppuration, and it is a curious fact that at present no distinction has been found between the microbe of diphtheria and those found in inflamed wounds and erysipelas. It may yet be discovered, although phlegmonous inflammation and erysipelas are so closely connected that it is more than probable that the micro-organisms in both are identical.

The vitality of these bodies is very great. They are not killed by drying even at a high temperature, and even the vapor of burning sulphur cannot be relied on to kill them.

In the case above mentioned, it became evident that filtration through the earth of impure water does not necessarily purify it. It has, however, been proved that if it be sufficient to remove the bacteria, the water, although otherwise apparently impure, does not produce disease. Within the last few months the students at Yale College have been suffering from an epidemic of typhoid fever which in some instances assumed a virulent type. When it became so bad as to excite attention outside of New Haven, it was admitted that typhoid disease is almost endemic there, that in fact it is always more or less prevalent, although the truth has hitherto been carefully concealed. On investigation it became known that the system of cesspools is commonly followed throughout the town, that bad plumbing is everywhere to be found, that very little attention is paid to sanitary engineering, and that most of the buildings, especially those of the College, are damp, musty, and in the basements covered with vegetable microbes and mildew. Yet in spite of all this evidence of the true origin of the

disease, scientific men in New Haven insist on saying that the fever was brought into the place from outside sources. In truth it was carried by negligence, by wilfully overlooking causes that were every day before the eyes of every observer, and they whose duty it is to guard the welfare of the students, and who from ignorance or perversity omitted to take the necessary precautions, were responsible for whatever disease and death ensued.

Records show, as might be expected, that mortality in that College has hitherto increased year by year. The cultivation of the micro-organisms goes on, and as they increase so their work extends. Thus in 1883, there were twenty deaths from typhoid in New Haven. In 1886, the number of deaths was fifty per cent. more than in 1885, and 125 per cent. more than what it had been a few years previously. In 1888 no less than eight cases occurred in one house, and in five months in 1889 there were 104 cases and 24 deaths! The general condition of health among the students at Yale is acknowledged to be not good, and it is worst among those students whose rooms are so situated that sunlight and free ventilation cannot be obtained. Diseases of the throat and lungs, besides malarial and typhoid fevers, are most prevalent, but there is no affection which may not be brought about by such causes as there exist.

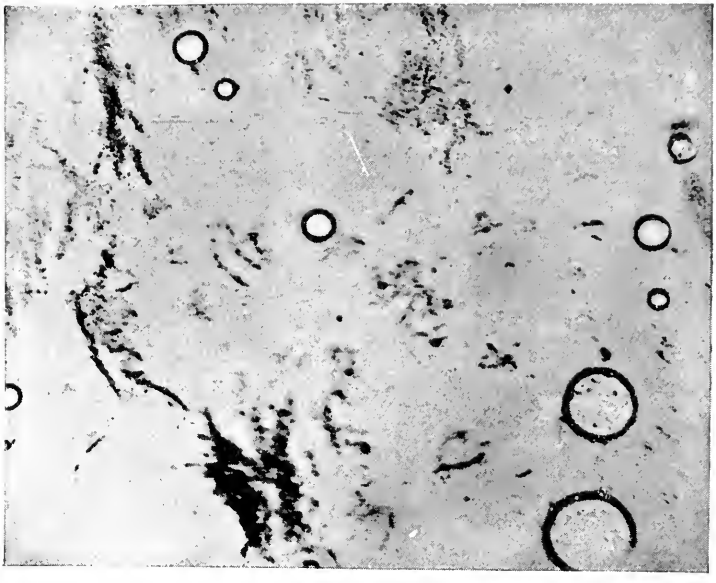
The popular idea which is at variance with this is in error. Take, for example, pneumonia, which, because it is most frequent in certain conditions of the atmosphere, people are apt to attribute to that cause. There is now no longer any room for doubt that this, instead of being as was once supposed a mere inflammation of the tissues of the lungs, is a specific infectious disease. Wherever it exists there is a microbe, or micro-organism, in the lungs. This is so certain that it was classified and named—*Micrococcus Pasteuri*, after the distinguished French experimenter.

The influenza epidemic afforded opportunity for examining various forms of bacteria, and Dr. T. M. Prudden furnished some interesting notes of observation on the subject.

Where it was complicated with bronchitis he found the microbe known as *Streptococcus pyogenes* always prevalent, but other forms were observable, notably *Diplococcus pneumoniæ* of Fraenkel, and *Staphylococcus pyogenes aureus*. This last is common in cases of common cold in the head. Where pneumonia was the principal concomitant of the epidemic the *Diplococcus* was most abundant, and it was fully identified both by culture and animal inoculation. The *Diplococcus* is almost always found in the saliva of healthy persons, but this, as Dr. Prudden observed, does not militate against its etiological importance, but furnishes a most satisfactory rationale of the occurrence of the disease. Under ordinary circumstances it is harmless. "It is only when the suitable predisposing conditions—which we recognize in injuries and in exposure to cold and wet, but which in many cases we do not understand at all—are fulfilled, that the growth of the microbe in the lungs and its accompanying lesions can occur.

If passed into the blood of tender animals, such as rabbits or mice, it produces blood-poisoning and death. In less susceptible animals, such as dogs and sheep, it produces all the symptoms of pneumonia, or, more correctly, pneumonic fever. This particular microbe acts upon the lung tissues, just as that of typhoid fever attacks Peyer's patches in the intestines, and that of malaria enters the blood; but sudden changes of temperature bring about the conditions most favorable to its growth.

In one section of the work on the Croton Aqueduct pneumonia was for some time extremely troublesome. Most of the workmen were attacked and several died. The disease resisted all efforts on the part of the physicians, who failed to lay stress upon the circumstance that, where it was worst, the rooms were badly ventilated and dark, as well as damp. At last it occurred to somebody to clean out the place, to have the walls and ceilings limewashed, to purify the bedding and clothes of the men, and generally to take measures customary in cases of fever, and from that time there were no more patients suffering from "pneumonia."



PNEUMONIA.

SCARLET FEVER.

To the casual reader there may seem some features that are obscure in this subject, and which it may be well to explain before proceeding further. The danger of infection through the atmosphere is probably exaggerated in some directions. Some microbes, like that of malaria, for instance, are more active in this way than others. The cholera germ is more readily destroyed by desiccation, so that, taking these two instances only, it will be seen that a healthy person may be much more readily affected with intermittent fever than with cholera, assuming that he is placed in circumstances apparently favorable to both. But again, a disease germ that shall be harmless when taken into the lungs may enter the stomach by having first been deposited in the food. There it may find conditions congenial to it, where it may multiply, and thus disease will ensue, the activity of the organism depending solely on the conditions surrounding it. A more marked illustration of this is presented by the process attending the healing of wounds. The atmosphere of a room may apparently be perfectly healthy, that is to say, a person may live in it without fear or liability to infection, or without the chance of incurring disease as a consequence of taking microbes into the system by food ; and yet if he be suffering from a wound, there may be sufficient micro-organisms in the air to produce suppuration and prevent a healthful and rapid healing. From all of which it must be apparent that in forming an estimate of the danger or activity of disease germs various things have to be taken into consideration, especially in regard to the nature of the microbe, the manner in which it is received, the nidus where it rests, and the proneness or otherwise of the person at the time to be affected. A man in vigorous health, who lives regularly and is a slave to no bad habits, being often well able to withstand an attack which would speedily invalidate or even be fatal to one less able to resist the action of the germ.

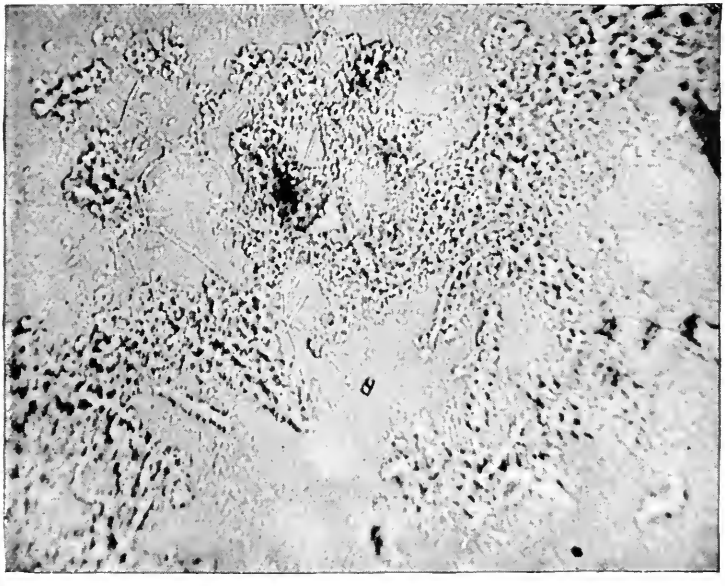
I have mentioned incidentally that in malarial fever the microbe does its work by directly entering the blood, and thus affects not any special tissue or location as in diphtheria,

typhoid fever, or pneumonia, but the entire system, producing the effects which are so well known in this country, as ague or chills and fever, intermittent fever or *Febris recurrens.* The parasite in this instance has been identified. It often attains to a considerable size, varying from two to twenty diameters of a blood corpuscle. It is a dark body, containing a multitude of dark, round, movable granules and a large nucleus. The cells divide, and one may then be seen to attach itself to a blood corpuscle, with which it seems to unite and to grow again into another of the large bodies first mentioned. This shows that in malaria the parasite is not only in the blood, circulating with it throughout the tissues, but that it actually eats up, as it were, the corpuscles themselves, thus destroying the life-giving energies of the fluid. It has long been known that healthy blood contains parasites; it is only when it contains others which are injurious that any evil results ensue.

Microbes are taken into the system in vast numbers with food. I have examined old canned goods, for example, and sausage meat, using a one-eighth inch homogeneous objective and C eye-piece. Microbes can be detected at once, not in isolated spots, but in millions, and I have kept them alive in glass bottles in a suitable medium for six months without any apparent loss of their vitality. It is well known that instances of disease being produced by eating stale canned meats are not uncommon; they are, in fact, very common, and physicians always describe them as cases of blood poisoning, but they never acknowledge, if they know it, what the nature of the poison is. Death frequently ensues. The real cause is nothing more nor less than the microbes which, forming in the meat as a result of a chemical change, are taken into the blood through the stomach.

Vegetables in a state of fermentation also produce disease germs, but they are not as dangerous as those which are generated in the animal tissues. Nevertheless, even they sometimes give rise to diseases of the bowels or some portion of the alimentary canal, and for that reason Boards

MICROBES IN A STALE EGG.



MICROBES IN A STALE SAUSAGE.

of Health should forbid the sale of fruits or vegetables that are in a state of fermentation. Ripe fruit is rarely injurious. To a healthy person it is perhaps never harmful, but much of the diarrhœa and so-called cholera, although it is not cholera, that prevails among children, especially in the summer season, may often be attributed to the use of over-ripe fruit, fruit in which a process of fermentation has begun. Some kinds of dried fruits are found likewise to be the seat of various forms of microbes, and experiment has shown that except at a high temperature their vitality is not destroyed; yet it does not appear that any of these have been identified as disease germs, although the subject presents room for further investigation.

From this it will be gleaned that disease germs may be taken into the system by food in two ways. They may be inherent in the food itself, or they may have become conveyed to it from the atmosphere or from contact with other substances. The process of cooking has a sterilizing effect. It tends to destroy germs; hence we find, as might be expected, that disturbance is most frequent when raw meats are used, as they are very largely by some people, and where uncooked fruits and vegetables constitute a chief article of diet. Instances are recorded where several persons have partaken of the same food, and only one or two have suffered. This may be explained on the theory of superior resistance above mentioned, but also by the fact that certain microbes appear to increase in colonies, so to speak, whereby one portion of meat may be free from them while another portion is largely supplied with them. In liquids, such as milk, they are of course more generally diffused, and one portion then is as injurious as another.

Micro-organisms capable of producing disease may come to us in meat without any communication from outside sources, and this is where the public is at the mercy of sanitary inspectors. Just as tubercle may be conveyed from an unhealthy cow through the milk to a child, so disease germs may come direct from the tissues of a diseased animal, be

taken into the human system, and there propagate and renew the original affection or one allied to it.

In an important paper read before the London Pathological Society it has been shown that tubercle of the udder is very frequent among cows which are in other respects healthy. The milk is then full of microbes and highly infectious, and it is well ascertained that such milk is the cause of choleraic diarrhœa and consumption of the bowels in children. Some breeds of cows are more subject to tubercle than others, and they are usually those with large udders and which yield a copious supply of milk, consequently being most sought after by milk dealers. A remedy is at hand in boiling. Milk should be cooked as meat is, and for those who profess not to like boiled milk, a little sugar or salt added to it, as may be preferred, will be found to very much improve the flavor.

It can be well understood from this that a child may acquire disease from a wet nurse. A case has been recently recorded where a perfectly healthy child, born of healthy parents, was given to a woman to be suckled. Unknown to the parents, the wet nurse had tuberculous tendencies, and in a very short time the infant contracted tubercular meningitis and died. On examination the nurse's milk was found to contain tubercle bacilli, but the discovery was made too late. Other diseases, as well as hereditary taints, are liable to be conveyed from wet nurses to children.

When cows' milk is used for infants, it should not only be boiled, but boiled thoroughly—that is, kept at the necessary temperature for several minutes at least. The custom too prevalent in America of eating meat underdone or "blood rare," as its advocates delight to describe it, is bad also and in all likelihood dangerous. Every form of animal food should be completely cooked.

Thus then either through the air we breathe, or the food we eat, or the water that we drink, disease-producing microbes may be taken into the system. There yet remains another means—that of inoculation. I have found by

actual experiment that if the sap of a diseased plant be removed to a healthy plant, the disease goes with it. The second plant soon falls into a condition resembling that of the first, and the same symptoms are repeated. So it is with man. The blood of a sick person injected into the veins of one in health, reproduces the disease through the bacteria that go along with it. The bite of a dog suffering from hydrophobia becomes dangerous to man by reason of the microbes that are carried into the system through the saliva. The time that is required before their presence is observable varies, but it may be years. All depends upon the suitability of their surroundings for proper development. But in time, unless checked by some means, the blood becomes saturated with them, and death after much suffering ensues inevitably. The doctrine that hydrophobia is merely blood poisoning is simply absurd; at any rate it is quite untenable in view of facts now known to us. There is no danger in the bite of a dog when his saliva is free from microbes, and this accounts for the circumstance that hundreds and thousands of persons are bitten by dogs every year and without experiencing any ill effects. It is true that death may ensue from the scratch inflicted by an old nail, or in many similar ways, but in all such cases microbes had been introduced into the system. Where injuries are received and no serious results follow, it is simply because bacteria have been kept out of the blood, and the truth of this is so fully recognized, that now surgeons adopt every means known to them to prevent the inoculation of wounds in operations by any thing of the kind. If a person be pricked with a needle that had previously been passed into the tissues of a person afflicted with leprosy, the disease will be conveyed to him, through the microbes that remain upon the instrument. I have handled these microbes, preserved them in suitable media in bottles, observed their development day by day under the microscope, watched their action, seen the fermentation in the blood caused by their presence, and finally have observed the gradual decomposi-

tion and destruction of the fluid itself. It cannot be doubted that if anybody with an abrasion of the skin comes in contact with a leper, he will have the germs of the disease conveyed to him. Leprosy may not and probably would not develop immediately, but sooner or later it would certainly come.

A paper was read at the Dermatological Congress at Prague last year describing the inoculation of a condemned criminal at Honolulu with leprosy. Briefly the case was this. An apparently healthy, vigorous man, without any hereditary taint, was in September, 1884, inoculated with lepra material, which had been taken directly from a child who was the subject of leprosy, and who had passed through an attack of leprous fever. A small piece of matter was inserted in the left forearm. Four weeks afterward pains like those of rheumatism were experienced first in the left shoulder, then in other joints of the left arm, but without fever. During the next six months inflammation of the nerves abated and small leprous nodules began to appear near the site of inoculation. At the end of sixteen months, leprous bacilli were present in large numbers. In 1887 the symptoms had become general, and in 1888, four years after inoculation, the patient was the subject of fully developed leprosy.

Every disease may be conveyed in this way, both in plants and animals. The familiar operation of vaccination is nothing more than the conveyance into the system of microbes pertaining to a mild form of small-pox. And the methods pursued by Professor Pasteur are identical, only he transfers the microbe peculiar to hydrophobia. From what has been already said it will be understood that many alleged cures that are put to the credit of M. Pasteur are no cures at all, because if no microbes had been taken into the wound no evil consequences could ensue, and consequently the patient would have had no trouble, even though he had done nothing.

Readers of the daily papers probably noticed recently

how a little village in Massachusetts had been worked into a state of unwonted excitement by a minister of one of its churches trying to suppress the kissing games at sociables and society meetings. He did this under some sort of sense, apparently peculiar to himself, that kissing is immoral. *Honi soit qui mal y pense*, and I fear that that worthy pastor must at times have had evil thoughts. If he had objected to kissing on scientific grounds he would have been less severely criticized probably, for certain it is that disease may be conveyed in that way. Microbes have been found in the saliva of healthy persons, and sometimes they are unmistakable disease germs. It would appear that they do not evince their presence as long as the person is in good health, or unless there is any injury or abrasion of the mucous membrane. But those conditions being present they are apt to produce suppurative inflammations extending from the lips down to the pharynx or larger air-passages. The presence in moderate numbers of a peculiar microbe, which has much the character of a fungus may be normal, but if it increases largely in numbers it sets up inflammatory action as a sequel to fermentation, and disease of the glands and throat is the consequence. A patient suffering from this may convey the disease to any one by being kissed on the lips. It is generally known that a severe cold in the head or coryza may be transmitted in like manner, and in common with tonsillitis, quinsy, sore throat, and other local ailments, be the price paid for this brief indulgence. The Princess Alice, second daughter of the Queen of England and aunt to the Emperor of Germany, who died in 1878, incurred the disease which proved fatal to her through a kiss.

There is an apparently slight affection of the nipple of the human breast which sometimes develops into cancer. It is sometimes hardly perceptible, or only showing itself as a slight irritation or roughness of the skin. Various theories were for many years put forth to account for it, and to make clear its true nature. But if some of the small scales of the skin of the part are removed and placed on the field

of the microscope and treated with a little bichromate of ammonia, microbes at once become apparent. They are small, round bodies, nearly the same size as that of the epithelial cells, and consist of an outer membranous covering containing a number of small corpuscular bodies. In incipient cancer similar parasites may also be discovered. Operations for this terrible disease fail because microbes are not entirely removed. If only two or three are left behind in apparently healthy tissues they increase, and the disease will assuredly return.

In the summer diarrhœa of children microbes are always present, and they are of various forms, but if they in any way get upon an injury to the skin they produce the same disease. Injected into the veins of animals they cause drowsiness, stupor, convulsions, and death.

I ought not to omit all mention of yet another possible means by which disease may be transferred by microbes, and in which infective diseases could become hereditary. A vast number of experiments has been made in Europe to test the value of this theory. In one instance a young woman became a mother while in the most critical stage of typhoid fever. The child died in a few hours, and when examined typhoid microbes were found in some of its organs and tissues.

A case has also been reported from a town in Iowa where a young German woman, while suffering from a severe attack of measles, was delivered of a female child before the eighth month of pregnancy, and the infant at its birth was covered with the same eruption. It survived only two days.

This would seem to prove that such organisms are conveyable from mother to child, but most experiments have gone to weigh down a negative proposition. They have, however, been confined to a class of complaints where the microbe is acknowledged to take the prominent place in causation. It is certain that syphilis, for example, may be transmitted from parent to child, and this is only one of

many that might be cited. It is quite distinct from mere hereditary tendency to disease, which is also fully acknowledged.

The conveyance of disease germs to children by means of milk comes, in one sense, under the head already given of the imbibition of microbes with food, but there is a distinction. A person taking typhoid fever through using impure water is impregnating himself with microbes from a third source, but in the case of the infant it is taking the evil directly from another animal. I know of no article of food that is better adapted than milk to preserve and convey bacteria. The germs of cholera have been found in milk after standing for six days, and they have, under favorable circumstances, shown activity at the end of a month. In cheese they do not retain their vitality more than twenty-four hours. The bacilli of typhoid will remain active in milk for thirty-five days, in butter for about three weeks, but only for two days in cheese, and less than twenty-four hours in whey. Tubercle microbes are capable of development in milk after ten days, but in butter they retain their full power for four weeks, and they will live for two weeks even in whey and cheese. Many remain full of activity for a considerable time in water. Some interesting experiments made and frequently repeated in Europe prove that the microbes of typhoid fever will remain alive in pure water for periods varying from 20 to 80 days; that of cholera from 16 to 40 days; of tubercle from 20 to 118 days; of glanders 57 days; and that found in pus from a healing wound as long as 73 days. Some germs are capable of increase in distilled water.

In the course of my experiments I once left a glass slide with a few drops of water on it over night on my table, and on examining it the next morning with a powerful objective, I had certain evidence of the impure state of the air of my room. I have often repeated that observation, and to my surprise I have always been able to detect the presence of microbes. If they were all disease germs, we could not

live a month ; but many of them, indeed, the majority, are harmless.

I noticed in San Francisco that the dew that rests on vegetation there in early morning often contained a small globular reddish-colored microbe, but it was quite harmless. There is a microbe in beer that is likewise innocuous, but which, like the yeast plant, has its uses.

These facts are of more importance than they perhaps appear at first sight. In a sick room the air is more or less permeated with disease germs. This is especially true in the instances mentioned—cholera, typhoid fever, and consumption. Now, if in such a room an open vessel containing milk, or a plate of butter, let me say, be left about, it is certain of contamination. Food of the kind so affected should not be used therefore. Yet how often do we see this important point neglected. I may illustrate the same thing in possibly a more marked manner. Suppose a healthy person to be sleeping in a close apartment. If a bowl of water be placed on a table and left through the night, it will be found on careful examination in the morning to be full of impurities, and to contain micro-organisms which were not present the night before. The larger the exposed surface of water the greater would be the quantity of foreign matter. It is not a bad plan, as may be judged from this, to keep such a bowl of water throughout the night in every occupied bedroom. It tends to purify the air.

CHAPTER IV.

INOCULATION AS A PROPHYLACTIC.

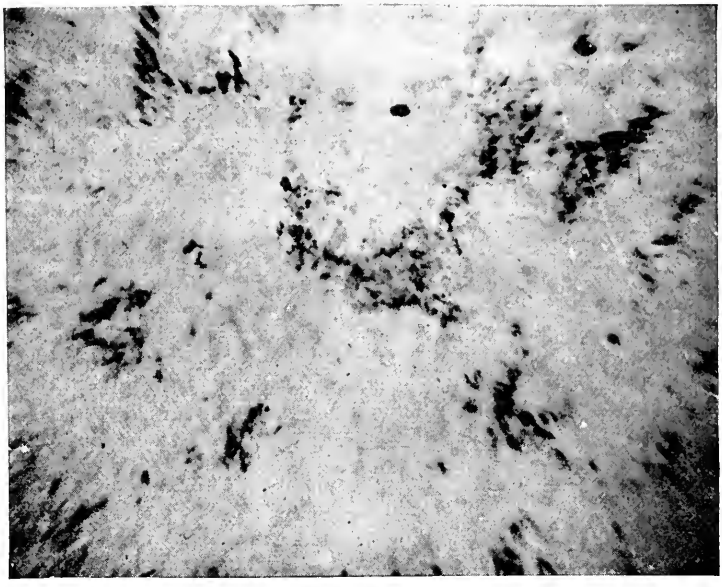
It is a remarkable fact in Nature that while disease germs and consequently disease may be conveyed by inoculation, the same process is used to prevent disease, or, more correctly speaking, to mollify it. Small-pox has been relieved of much of its terror by vaccination, the principle apparently being that a mild form of certain affections renders the system less liable to a severe attack of the same. It is on this that the disturbance caused by vaccine virus protects from small-pox, and M. Pasteur follows it up when he inoculates for hydrophobia.

The rationale of the process is not understood. M. Pasteur has formulated a theory, but nothing more. He thinks that the white blood corpuscles are concerned in it. He supposes that the virus developed by fermentation, due to the presence of microbes, first attacks those corpuscles whose activity is thereby soon arrested. The microbe continues to develop, and the disease proportionally advances. But where the system has been influenced by previous injections of attenuated virus the white corpuscles have got accustomed to the action of the microbes, and thus their activity is undiminished, and they are able to overcome the action of the parasites. But this, after all, is but a little circumlocution. It merely states a simple fact in more words, and it is as well to acknowledge at once that we do not know precisely what the process is.

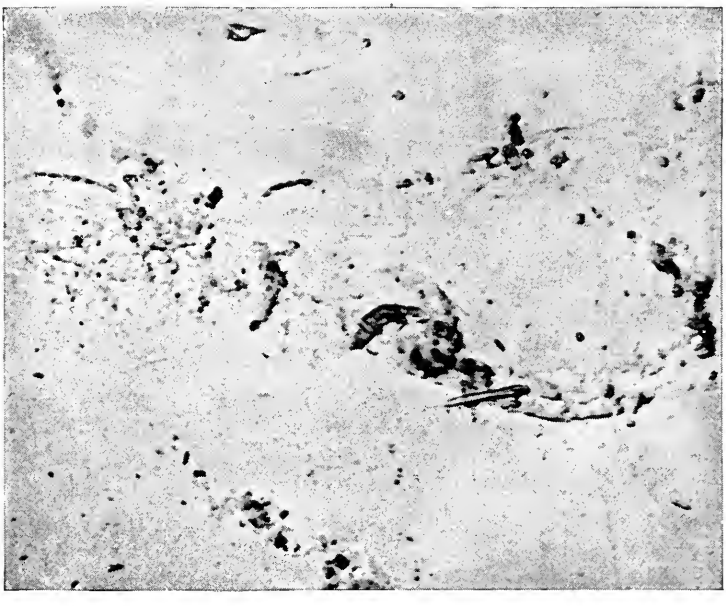
This much, however, we do know: that it is constantly being acted upon by Nature. Nothing is more common in

plant life than the prevention of development of one form by another. Some of those which we term weeds are incapable of flourishing in the presence of others, and farmers know and take advantage of this when they plant a crop that grows exuberantly for the purpose of getting rid of troublesome weeds. The two processes may not be precisely the same, but in principle they are, when the soil is by artificial process rendered unfavorable to the development of a particular growth. It has been proposed to check the inroads of yellow-fever by similar means, but whether this is an advance in medical science is not clear. Many experiments to discover the microbe of yellow-fever have been illusive, especially a series conducted at Washington and Baltimore. It is doubtful whether the cases submitted for inquiry were genuine yellow-fever, and next whether the microbes found in the tissues examined had any thing to do with the disease. Nevertheless, Dr. Gibier, of Paris, thinks that yellow-fever may be prevented, or at least palliated, by inoculation. The identification of the special microbe is not an element in the question. The microbe of hydrophobia has not been isolated, but no one doubts its existence. In some countries hydrophobia does not exist. It has never been heard of in Australia, or in some parts of northern Europe, and never will be unless it be conveyed to those places. M. Pasteur says unhesitatingly that the so-called virus of the disease is a microbe, and that rabies is certainly not of spontaneous origin ; but he believes that all virulent microbes may be attenuated and made useful for inoculation against the severe forms of the disease.

My own experience has led me to the conclusion, which I put forward without any doubt as to its accuracy, that in all cases of disease, whether in plant or in animal, there is some form of micro-organism connected with it, and that this will increase and propagate itself, and that, too, when it is transferred to a healthy organization of the same kind. If I take seed from an unhealthy, sickly, yellowish-looking



FRESH VACCINE VIRUS.



VACCINE VIRUS. (OLD.)

plant and sow it, and if it germinates, unhealthy, sickly and yellowish-looking plants will be the result. The germs of disease were there. "Rust," which is common on oats and some other cereals, is nothing more than a fungus and disease germ. Farmers recognize this, and they call for rust-proof seed. That does not imply that the plants grown from such seed are not subject to disease, but it does mean that the germs are not already in the seed. It means that the seed is healthy, that it came from healthy plants, and that it contains no microbes, fungi, or micro-organisms. Acting upon similar knowledge, he plants only healthy potatoes, he breeds his sheep, cattle, and horses only from healthy stock, and, in short, in all his farming operations he avoids, as far as possible, contact with disease in any and every form. In doing this he is simply avoiding the transfer of disease germs or microbes.

The same thing occurs in the human race. It may not be going too far to call it a law of Nature, that diseased parents have diseased offspring, in which case the children have inherited a constitution which favors the growth of the same microbes, or they have received from their mother's organization the actual germs which develop into the more active micro-organisms. A florist takes his cuttings only from healthy plants, because he well knows that if he did not, either the cuttings would perish through lack of vitality, or they would produce diseased plants like those from which they were derived, and his trouble and care in raising them must be increased. Moreover, he perpetuates a disease by neglecting this precaution, and it may be conveyed to others, whereas his first consideration necessarily is to have all his floral family as free as possible from every deteriorating influence. I have frequently noticed that when rose cuttings are touched with even the smallest particle of black rust or other fungus, they are certain to cause trouble, the rapidity with which the disease is spread being very remarkable, and it is difficult to stop it, still less to eradicate it. The same applies to the animal

world, with only this distinction, as a rule, that plants suffer from fungi peculiar to plants, while animals perish from microbes peculiar to animals. In the many instances already adverted to, as, for example, in affections of the alimentary canal, where disease is caused by the imbibition of unwholesome fruit or vegetables, a process of fermentation is first set up which causes the generation of microbes peculiar to the organization, which in turn produce a special abnormal condition.

I do not suppose that advice to people who have already made up their minds to marry will be likely to be followed. The temporary madness which carries young men and women into the bonds of matrimony places them, for a time, outside all influence of reason. They know not what they are doing. They are being carried away by a superhuman infatuation, and they have neither the time nor the inclination to pause for the reception of counsel, be it never so wise. But very often they are rushing into an abyss which they never anticipated. If they possessed their full senses they would, before entering upon the first step towards matrimony, first enquire into each other's healthfulness. It is, in truth, as important, and much more so, as if they were about to insure their lives. Nay, they would go farther, and a sensible man, for instance, would not be satisfied to learn that the lady whom he contemplated making his second self was healthy, but he would ask about her parents and her grandparents; and she would do the same by him. Disease is constantly being perpetuated by injudicious unions which result in the production of diseased children, who thus convey the weakness onward through generations, in all of which the bacillus, microbe, disease germ, or micro-organism is performing its special function, debilitating the mind, deforming the body, disorganizing the tissues, destroying the energies, lowering the standard of the race, and bringing death. The hereditary character of tuberculosis or consumption is popularly understood, but it was long since shown that this disease is due to a microbe, Koch's bacillus

which also may in many ways be conveyed to a healthy person. I may here remind the reader of the passage in Scripture where punishment to the third and fourth generation is promised to those who by forbidden intermarriages promote disease, which they would do by transference of disease germs.

We often hear a great deal about affinity in its effect through marriage of deteriorating offspring or perpetuating disease. Thus it is said that intermarriage of families through the second generation should be avoided, and we are told that a degenerate offspring necessarily ensues. Experience says that this is not absolutely true, although it is often justified by facts. Among the Hebrews such unions are common, but the race is prone to hereditary disease. No one doubts, however, that unions of affinity are undesirable, and why? The micro-organisms which produce disease, as I have already shown, need congenial surroundings in which to propagate and to flourish. The organism of individuals presents some differences; and one person may be a better medium for the growth of a particular parasite than is another. This peculiarity is hereditary, just as facial expressions are hereditary. Thus it is tolerably certain that two persons closely related, as cousins for instance, possess to some extent the same favorable conditions for the development of a particular disease germ. If they marry, these conditions are intensified in their offspring. Two persons may have a tendency to tuberculosis or consumption, which is not in itself sufficiently strong for development, but when the combined tendency is found in a child it overcomes all other opposing influences and disease and death follow. Two persons not related may also have predisposition to disease, but in different forms. In that case the one might counteract the other, and so a negative result would be brought about; but if they did not counteract each other, both would descend to the child, each in a mitigated form,—that is neither being stronger than it existed in the parent,—but at the same time the offspring would

inherit the weakness of both father and mother, and thus its susceptibility to disease would be increased.

If the same precautions were taken in perpetuating the human family as are taken in breeding the lower animals, we should not only attain to physical and mental superiority, but we should in all likelihood obliterate the causes of very much disease. Many of the Australian sheep-runs are far larger than any thing we have in America, either in the west or in Texas, and the superiority of the climate of that great island continent is specially adapted to the growth of sheep, cattle, and horses, who suffer from drought at times, but never from frost or snow. Sheep are the principal product of those great runs on account of their wool, cattle are used for tallow, and horses receive the least attention of the three, the pastures nearer to occupied territory being reserved for the best breed of horses. The consequence has been that no particular care has been given to horse breeding in the far interior. The first animals that were taken there were possibly any commonplace stock that served the requisite purposes of stockmen, shepherds, or for ordinary work around the home station. By degrees these have increased. The surplus have been turned out upon the run to shift for themselves over vast areas of grass land, and to breed indiscriminately. They have increased to such an extent that large herds of horses are now to be met with in some parts of the interior, but most of them are worthless. They have deteriorated in all the qualities that are looked for by the horse buyer in the markets, and so far as can be learned, an old horse is rarely if ever met with. They appear to suffer from some inherited disease, or they are more susceptible to disease than animals that are more carefully bred usually are found to be. These horses are occasionally to be met with in the markets of Melbourne or Sydney, where they may be bought for about five or six dollars each when two or three years old.

Now the system which we find to produce such deteriorating consequences in horses, is exactly that which we are

carrying out every day and from year's end to year's end in the propagation of mankind. We follow not the course that gives us a Hanover or an Ormonde, but that which in two or three generations runs down the value of a horse from five hundred or a thousand dollars to five. In the human family we cannot follow the methods under which the English race-horse of the present day has been developed, but we might find it not so difficult to guard against the propagation of disease. Let every man marry none but a healthy woman, and let every woman be careful to select none but a healthy husband, and much disease, deformity of mind as well as body, and general debility would be avoided, and in course of time killed out. No hereditary disease owing its existence to micro-organisms could possibly be continued. But where one or both parents has the germs of disease, the offspring is not only liable but is almost certain to be sickly and unhealthy, and the doctor will be called simply to watch their downward progress towards dissolution—victims of disease germs and of a process of fermentation.

CHAPTER V.

HABITAT OF DISEASE GERMS.

FORMS of vegetation, and also of animal life, vary in different latitudes. The fauna and flora of the tropics bear no resemblance to the animals and plants that have their home in temperate zones, and in like manner the micro-organisms, fungi, and microbes of various parts of the earth have distinct characteristics.

Some plants can be transferred from the places where they are indigenous, and they can be grown and made to flourish in places which are quite foreign to them; others will only vegetate in their native home and they perish when transferred to another region. The same applies to animals, not only to the larger but to the microscopic members of the animal kingdom. The bacillus of Koch cannot live in air. It can subsist and reproduce itself only in the organism. The yellow-fever germ likewise requires certain climatic conditions, as is well known, in order to propagate rapidly and produce disease. When those climatic or atmospheric conditions do not exist, the germs perish and the disease dies out. The regions where it is most prevalent in this hemisphere, and it is worse here than elsewhere, are the Isthmus of Panama and some parts of Mexico and Cuba, though Louisiana and other portions of the United States, as is well known, are subject to it; but in the latitude of New York, even on the sea border, it is comparatively harmless, the microbes ceasing their activity almost on entering the harbor of New York.

Yellow-fever is acutely infectious. The microbes are in the atmosphere. That is their primary characteristic. But under favorable conditions, which are not yet accurately defined, though they probably are due to local impurities in the soil, the disease becomes contagious and endemic, as it ordinarily is at Colon and Panama. The differences thus noted are due no doubt merely to varying degrees of activity or vitality of the microbes. The worst form of the disease is found at Panama, and there no condition of health is sufficient to ward off the attack. The old and the young are alike affected. Persons in robust health may be struck down sooner than those whose appearance would indicate a less power of resistance, and so powerful is the micro-organism that causes it, so rapidly do they multiply, and so actively do they operate to bring about a fermentation and destruction of the blood that a few hours sometimes suffices to bring death. It is a remarkable fact that, notwithstanding the energy of the bacillus the mortality among children is less than among adults. What does this show? How can it be accounted for? Easily enough on the theory that there is something in the adult system to favor the growth of the microbe which does not exist to the same degree in the constitution of children before the age of puberty.

The microbe of cholera is different from that of yellow-fever, but it is equally energetic in growth and action, and causes death quite as rapidly. Both probably arise from the same source, though in different parts of the world, and in that respect they are not unlikely to resemble the common microbe of summer diarrhœa. This has been ascertained to exist in the superficial layers of the earth, whence it may extend to water or to the various articles used as food, the vital manifestations of such micro-organisms depending on conditions of season, heat, and moisture, and on the presence of dead organic matter, animal or vegetable, or both. The microbe so produced may pass likewise into the atmosphere, whence undoubtedly it causes its evil effects in the three

diseases under consideration. Thus it passes into the system, where it brings about a process of fermentation or decomposition, producing changes that result in giving the symptoms noticed in yellow-fever, cholera, and diarrhœa. The microbe is not the same in the three cases, but it may be similar, and certainly it may be produced in a like manner in a similar nidus and on a corresponding pabulum. But in the one it flourishes in Panama and Havana, in the other in Asia, and in the third in New York, or anywhere if due regard be not paid to drainage and to general sanitary requirements.

It is not to be supposed that the germs of the atmosphere are essentially different from those in the soil or in vegetables or animal matter. The latter constitute the nidus or place in which they are originated, and there, too, they find the pabulum, or food on which they thrive, but the same may quite readily be passed into the atmosphere, to float away to another place, then to increase and multiply according to the universal law of nature. The motes that are visible in the line of a sunbeam are often mere particles of lifeless matter, but often, too, they are minute organisms, with more or less power for mischief as soon as they fall upon a place that is suitable to their growth and development.

Many plants have seeds that are furnished with a feathery structure which facilitates the action of the wind to raise them in the air and waft them sometimes many miles away from the spot where they grew. The thistle and dandelion are familiar illustrations of these. On my grounds at Austin I made some fish-ponds, and in one of them fish made their appearance, apparently spontaneously, certainly without my introducing any. All were quite small, as though recently hatched. How did they come there? Is it not possible that the spawn might have been carried by high winds or water fowl? I certainly think so, and I believe also that the careful observer of Nature will agree with me.

The microbe that gives rise to Chagres fever is similar to, though not identical with, that of yellow-fever, and it has

the same habitat, but it is even more delicate, and it perishes as soon as it is taken away from the neighborhood of its early development. The microbe of leprosy is another example in the other direction, for although it is chiefly at home in parts of eastern Europe, western Asia, and some of the islands of the South Pacific, it manages to live in other climates, though not with a like degree of activity and vigor.

The greatest variety in vegetation is found in the tropics; there, too, we find the greatest variety of animals, and logically we should expect to find there—and we actually do find—the greatest variety of fungoid growths, microbes, and micro-organisms. Warmth and heat are favorable to organic life, but with the increased development of that, we see also an increased development of disease. The temperate zone produces fewer microbes, and it also generates a higher physical excellence and more perfect health to resist their action, hence follows a minimum of disease, so far at least as the habits of people and the requirements of society permit.

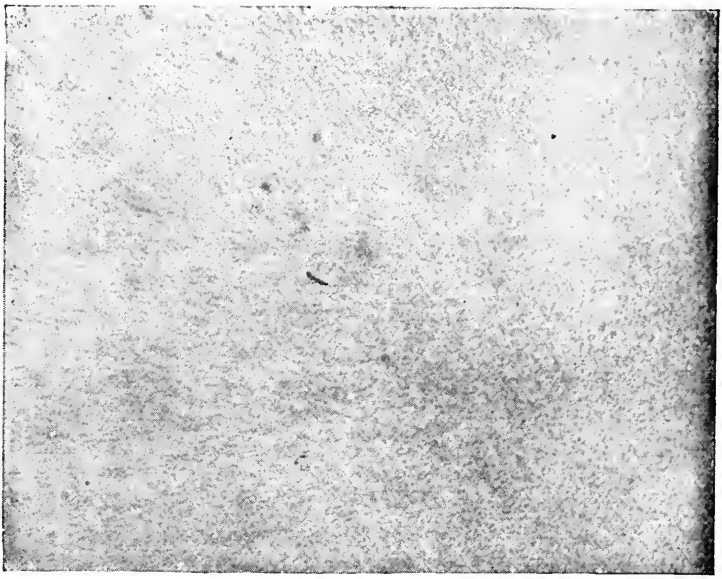
In the tropics there is not only a higher development of micro-organisms, both animal and vegetable, but also a lower power of resistance in the human frame, and, in consequence, a larger amount of disease, especially of those forms of disease where changes in the blood are brought about by fermentative processes, through the presence of microbes, in the shortest and most thorough manner. It is a matter of common experience that, if we go south in this country, malaria and diseases allied to it are more frequent there, especially in swampy districts, than they would be in similar localities in Canada. There ague is scarcely known; and if we pass to Australia, where the vegetation is immediately antagonistic to the growth of microbes, ague is unknown. A physician, who has been a resident of that country for nearly fifteen years, and who has travelled over many thousand miles of it, tells me that he never met with a case of intermittent fever there, and never heard of one.

Two centuries ago ague was one of the most common diseases in England, and also one of the most fatal. Some

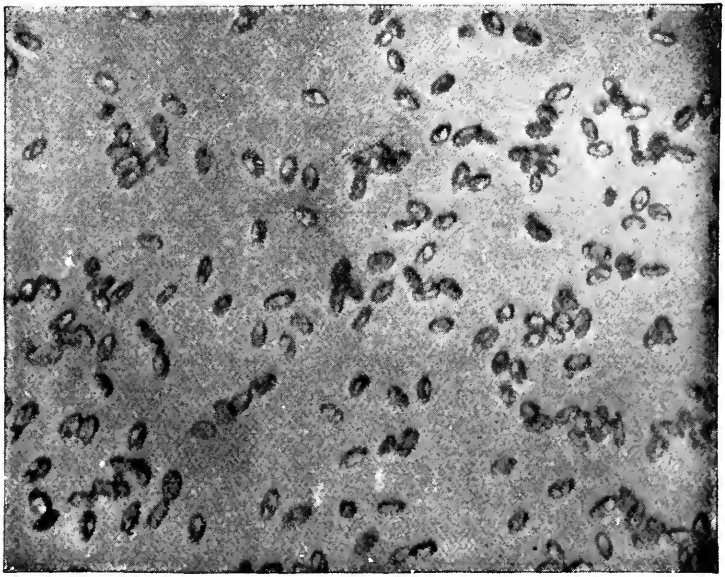
of her kings and many members of the royal family died of it; but as the population increased and opened up the land, as agriculture improved and drainage of the soil became general, it gradually disappeared, until in this century it had become limited to the low lands of Norfolk and Huntingdonshire, and in these, as a consequence of still more perfect drainage, it is becoming yet more rare, and always less fatal.

But take another picture. By actual survey, made under government authority, it is found that two thirds of the peninsula of Florida are under water, covered by slowly flowing rivers, lakes, lagoons, and swamps. The whole atmosphere there is malarial. A high form of intermittent fever may not be very marked, but most of the inhabitants show symptoms of suffering from that cause, and evince nervous excitement and irritability, physical weakness, loss of mental equanimity and force, and all the other marks of an unwholesome, microbic atmosphere. If the country could be drained, which unfortunately is impossible, the health of the people would be entirely changed. In one sense it is fortunate that the soil is poor—95 per cent. sand,—so that it is almost as unfavorable a nidus for microbes and fungi as it is for the ordinary crops of the farmer. If the soil were rich, Florida would hardly be endurable for white men, for the heat and moisture of the atmosphere would render it a most perfect nidus for dangerous vegetation, and the unhealthiness of Panama would most likely be extended to our country. Florida is now one of the most unhealthy States in the Union.

Notwithstanding all this, the limit where microbes cannot exist has not been discovered. Possibly there may be some line in the northern and southern hemispheres beyond which micro-organisms are not found in the atmosphere, although it is difficult to suppose, indeed it cannot be supposed, that they do not exist on the earth wherever higher forms of animal life are in existence. They may not be as numerous nor as full of vitality, and hence not as dangerous, but they are there. At the same time, if we wish to



CELLS OF THE YEAST PLANT.



SPORES OF FUNGUS ON A RIPE ORANGE.

propagate them we find that the most favorable conditions are warmth, moisture, and frequently a deficiency of sunlight. It is too much a custom among Americans to close up their houses, excluding light and air alike. But what I have said shows the folly of such habits. Sunlight purifies the air, and while it aids the higher forms of vegetation, it is apt to destroy fungoid growths: not, however, by its direct influence, which is always salutary, but by withholding the moisture that is necessary to micro-organic production.

Some interesting experiments on this subject have been made by M. Duclaux on various forms of microbe, and he states that exposure to the sun's rays for a few hours sufficed to destroy their vitality, or at any rate to arrest their activity. This is doubtless true; at the same time the absence of moisture tends to accellerate such a result. Throw a wet dress into a trunk, and mildew or some form of fungus will form upon it. Hang it above the ground, where it can receive air and sunshine, and no such result ensues.

In hot and dry countries, such as New Mexico or Arizona, meat may be hung in the hot sun and it merely drys and remains fit for food. But let the atmosphere be moist, under similar conditions, and fermentation soon begins, leading up to putrefaction.

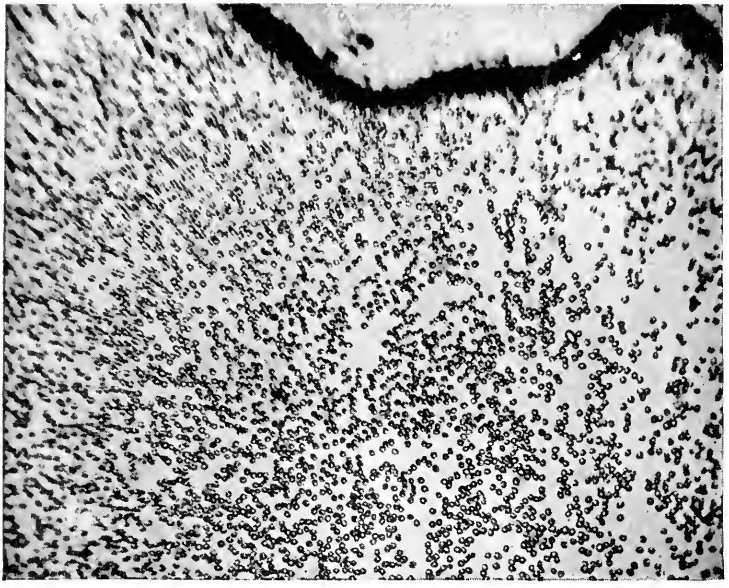
Florists suffer considerably in damp, sultry weather, when there is no sunlight, from injury done to their plants by fungi. Seedlings "damp off," which means that fungi appear upon their leaves, check their growth, and ultimately kill them. The camellia japonica is especially liable to this. In like manner newly-cut oats that become wet before harvesting are surely affected in the same way, and unless promptly attended to they speedily rot.

Vinegar is the result of a fermentative process brought about by the action of a microbe, but a warm temperature is necessary. The preparation of bread with yeast is again a fermentation, the active agent being a vegetable formation known popularly as the yeast-plant. By its growth and increase in the bulk of the material, carbonic-acid gas is

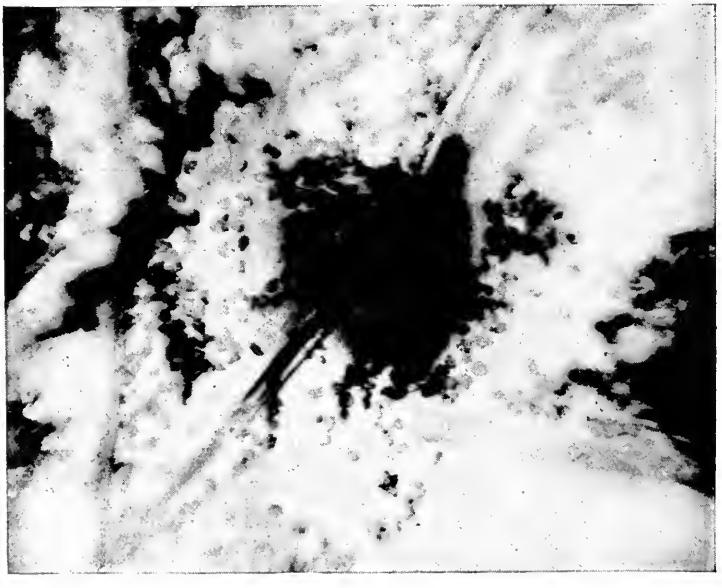
formed, which mechanically "raises" the dough. Many years ago it was suggested that the gas might be produced by chemical means, and so the use of yeast would be rendered unnecessary. This was done at first by dividing the dough into two portions, adding dilute nitric acid to one and carbonate of soda to the other, then mixing them thoroughly. A chemical decomposition took place, the gas caused the dough to rise, and a very excellent bread resulted. This, which at the time was merely a laboratory experiment, led, at no distant day, to the introduction of baking powders, but it is noteworthy that bread produced by the use of yeast is still the most satisfactory and the most wholesome, the action of the yeast-plant being more gradual and leaving no chemical salt behind.

Meat spoils more readily in a warm and close room than when exposed to the air or to cold. In those parts of Europe where the winters are cold without severe frost, as, for example, in England, it is not unusual to hang meat in places where a free current of air can be obtained at all times, and it remains in that position for perhaps five or six weeks, according to the weather. It is not "spoiled." On the contrary, it becomes tender and acquires a flavor which epicures admire. This cannot be done where the meat freezes, and in a warm unventilated place it would become unfit for food in a very few hours. The cause of this is the formation of a micro-organism the result of fermentation or decomposition. Of course I exclude reference to the injury that may be done by insects, the effect referred to implying no other influence than such as is derived from contact with the atmosphere, and the germs contained in it.

Watch Nature, observe her operations, pause and think over them, and many useful lessons will be learned, many old prejudices swept away, and numberless errors will be corrected. Mere book-readers are theorists; Nature's readers are practical. The former are apt to take for granted what others tell them; the latter judge for themselves. Theorists work blindly; they cannot see what they may, and will not



SPORES AND FUNGI ON BREAD.



FUNGUS ON A RIPE STRAWBERRY.

see what they should. They may stumble over things, but they refuse to accept truths which Nature constantly holds up before them, and it is in this way that processes that are recognized in some things are ignored in others, because they seem to be at variance with theory. The full importance of fermentation, its general recurrence in various processes of Nature, and the import of micro-organisms and microbes in the causation of natural phenomena, among which the production of diseased conditions is not the least important, have never been hitherto adequately acknowledged; and it is because observation has been too little made and theory has occupied men's minds. I have sufficiently outlined the true cause of disease. The instances I have given should suffice to satisfy any one who is free from prejudice and from the cobwebs of the old school of teachers. They are not beyond the reach of ordinary intelligences. Nature, in her operations, abhors complicated processes. She works by simple methods, and her laws are as wide-reaching as they are simple. She does not devise some complicated plan for producing one particular disease, and then set to work to arrange another cause for a second form of sickness. On the contrary, she lays down certain broad rules upon which all operations are conducted. These rules apply to both kingdoms of organic life with results that are only modified by circumstances of each. If they are not respected, trouble ensues. Resistance brings about catastrophe, and even neglect of their operation has its perils. But when we know what we have to accomplish, a great part of our difficulty is cleared away. Directly we are informed as to the cause of a disease, the chief obstacle to finding a remedy is removed. But if we enter upon the investigation blinded with tradition and with book-reading only, it stands to reason that the greatest difficulties in the way of discovering a remedy are presented.

CHAPTER VI.

FAILURE OF MEDICAL SCIENCE.

WHY medicine fails to cure disease is a proposition that we have all, at some time or other, probably asked ourselves. It is an important problem, and one that should be solved. But, at the outset, I am reminded of a question which, it is said, was once proposed to the Roman senators: "Why does a pail of water with a fish swimming in it weigh no more than the same pail of water without the fish?" It is said that a long discussion took place over this, and that various explanations were suggested, until some one fell back on experiment, and then it was discovered that the water with the fish in it did weigh more.

So, in the question, why does medicine fail to cure disease? I may be required to show first that it does fail. I have no objection to this; on the contrary, it is a logical and a proper way to proceed, clearing as we go. At the same time, the too frequent failure of medicine as a science must be evident to every observer. We have no right to ask that the doctors shall cure under all circumstances and all conditions. If they did that, life would be perpetual and death impossible, and that would be a subversion of Nature's laws. But we all know quite well that medicine fails when we are justified in looking for success. Physicians themselves are aware that, while their best talent and abilities may be given to a patient, he nevertheless dies, and often they live to look back upon the case with regrets that, with increased knowledge, a different result might have been attained.

It is acknowledged by its disciples that medical science has made great progress during the past half-century, and that it is still advancing year by year. This shows at least that is is not an exact science—that is, not perfect, but that new discoveries can be made, changes can be effected, and, possibly, what is now considered excellent may erelong be discarded in practice for something that is at present unknown, or at any rate unaccepted. It follows, therefore, that, if the door for improvement be open, nobody should be precluded from entering because only he happens to be not one of the elect.

No day passes but illustrations occur everywhere of the fact that medicine fails to cure, and that too, where failure should be impossible. The reason of this is what I propose to elucidate, and, in order to do it, it is of little use to theorize. We must discover facts; we must look at the matter in a practical way, and endeavor to deal with it so that it can be readily understood by any one who wants something more than a string of technicalities.

The reader has probably indulged in the perusal of medical books which tell him how to cure himself, or he has consulted his doctor and received information from him, or he may have read something about family medicines. Most of the books which attempt to popularize these subjects are pernicious. They give symptoms and remedies. They draw the usual differences between ailments, and define particular remedies for each. They treat disease with hard and fast lines, ignoring the power of the physician's discernment and the subtle evidences which only an accomplished doctor can detect. People who read them are prone to imagine themselves afflicted with symptoms that they see described, and many get up from their perusal convinced that they have cancer, or Bright's disease, or consumption, or heart trouble, when, in truth, they have nothing whatever the matter with them, or, at most, a disordered stomach.

From my point of view they are yet more pernicious, being bad not only in their consequences, but in their prin-

ciples. For the position I take is entirely at variance with that which the advice of the usual family physician supports. My discovery, as may be gleaned from what I have already said, is entirely different from any thing that has ever been introduced from the beginning to the present day for the purpose of curing disease. My proposition is simple, but it comes from study and observation of Nature. I have found that all disease may be concentrated under one head. It may assume different forms in different persons. It may be known, for instance, as fever in one, pneumonia in another, diphtheria in a third, cholera or diarrhœa in a fourth, and so on. But the differences which give rise to the necessity for using such names are merely details. There is, in truth, but one disease. It develops in various ways. It produces different symptoms, all of which are dependent on conditions, some of which may readily be defined. But, in the first instance, disease is uniform. And just as there is actually but one disease, so there is but one cause of disease, and that may be limited in the common acceptation of the one word "decay." But what is decay? The visible result of fermentation. And what is fermentation? The phenomena produced in organic matter by the action of microbes.

In this consideration, and for all practical purposes, it is quite immaterial to know the peculiarity of the microbe that we find in any particular instance. It may be interesting to the close observer to watch the forms and mode of evolution of these little creatures, and it may be satisfactory so to differentiate their forms and habits as to be able to classify and to name them. But this does not affect the mode of cure. A microbe is a microbe. The same treatment affects them, the same curative agent kills them, whatever their form or whatever be the effects which they produce. The only difference that we notice is in regard to time. some ailments being more readily reached than others.

It is not of so much consequence to the farmer to know what weeds are in his cornfield, as it is to learn the best means of cutting them down and keeping them out of his

crops. He need not be a botanist. He does not require to know the natural order and the generic and specific names of a plant before he puts the hoe to it; nor does he pause to learn the construction of its fibres and the character of its cells. He merely recognizes it as a noxious plant, and he destroys it. Neither is it of much consequence to him to know that weeds are not all alike. It is enough to be sure that they are weeds, and he applies the same remedy to get them out of the way. If his crops look yellow, or show evidences of rust and disease, he does not go to his study, to his microscope and his books in order to satisfy himself what sort of microbe or fungus it is that is endangering his property, but he goes to work in a practical manner to cure the disease and to rid himself of the pest. It is not necessary to learn the particular character of the fungi that he sees on his plants, his fences, his timber, or his house; all he wants is to be convinced that they are there, and that they are injurious, and he immediately tries to find out and to apply the remedy for their destruction.

Let me not be misunderstood. I have not a word against scientific investigation. I understand too well its value. I would not disparage the spirit which leads to a close examination of the minutest of Nature's works. On the contrary, I am interested in their description. I prize the work which shows me their distinctive peculiarities of structure, form, size, properties, mode of existence and development; and I appreciate the patience and the skill of those who pursue such a course of investigation, and are capable of arranging for scientific purposes these most wonderful organisms. I make frequent use of that knowledge in these pages, and fully acknowledge its abounding interest. But, at the same time, I hold that, for purposes of curing only the diseases to which the human body is subject, it is not necessary that we should know the form, size, development and classification of the microbes that produce disease. There may be one or a dozen, each producing its own symptoms, or affecting different parts. You do not stop to examine them, and give

them their place in the lists of science; you only ask how to get rid of them, how to restore the health and preserve the body from their depredations. To delay for the sake of diagnosis is simply to waste valuable time. It is one of the errors of so-called scientific medicine, and should have nothing to do with the cure. The thing of all importance is the remedy. I am acquainted with a large number of various forms of disease in plants, but I do not know all, and I could never learn to know them, because the micro-organisms hybridize and produce new forms, and, of course, each one exhibits some different characteristics in habit and results, while they have their special pabulum, some being found in large plants or large animals and others in small ones. This I purpose to demonstrate by practical evidence derived from observation of Nature, and I shall certainly be able to sustain the truth of my position. So much has been written which cannot be proved, so many promises are made which cannot be kept, and in various ways the people are held so much in ignorance of things which they ought to know, that their confidence is weakened in all. They have been blindfolded and led astray so often that they distrust everybody who offers to enlighten and lead them, however much he knows himself to be in the right. But facts should convince, and I think I can in every instance produce facts to prove all that I claim.

I wish this to be distinctly understood. I set no value on theory. My studies have been practical. The groundwork of my discoveries is in observation. I take nothing which I cannot prove, nothing which is not appreciable to the senses. I rely entirely upon facts to sustain the value of what I have done. I do not claim that the field I have wrought in is untrodden. Thousands of investigators and of the brightest intellects in the world are at work in it. The problem of how to stop fermentation, to destroy fungi, and to prevent the appearance and neutralize the development and operation of microbes is being well handled, but the solution is here.

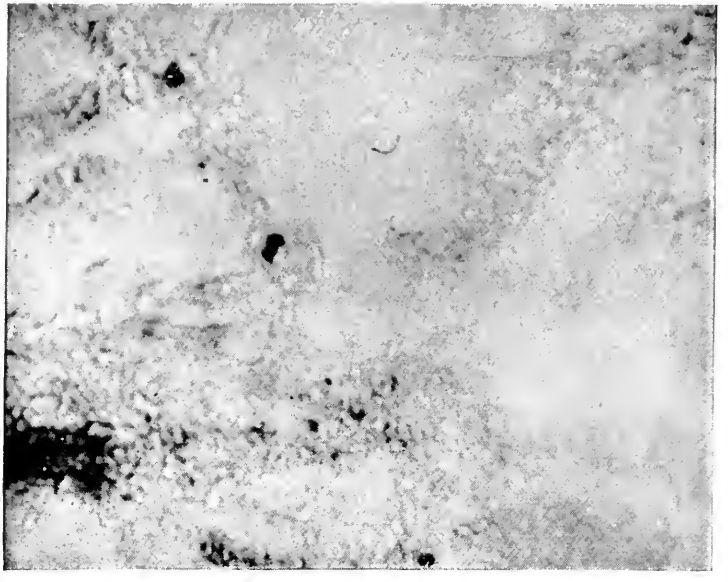
We paint our houses not only because they look better painted, but because the process preserves them from decay. The paint checks or stops the development of micro-organisms, which find their favorite resting-place in wood, brick, or stone, and the best material of that kind is the one which most certainly produces such result. The painter or builder does not stop to inquire the nature of the fungus that threatens him. He does not trouble himself about a scientific investigation. He knows that there is a danger to be met; he knows how to meet it; he understands the remedy to be applied, and he applies it. He is also well aware that the oftener he applies it, and the more effective he makes the application, the better will he preserve his property. One coat of paint is useful, but several are necessary. The matter requires constant attention. The steady repetition of the remedy alone secures all the advantage and makes the protection perfect.

In this direction there are several resources at our command, discovered, not by medical science, but by practical experimenters, and people of common-sense and practical inclinations. For example, the desirability of protecting railroad ties from decay has been answered by applications of hot tar, creosote, and allied substances. Soluble silica has been driven into their substances by atmospheric or hydraulic pressure for the same purpose. In India it is hardly possible to preserve telegraph poles and railroad ties from destruction, and iron has, in most instances, been substituted. Fences are also made of iron in that country. There is one observation, however, which it is worth while to mention. It has been found that the wooden ties on a road where trains are frequent are less subject to injury than those not in use. This is attributed to vibration, and, if the explanation be correct, it opens out a field for inquiry.

On the same principle upon which tar and creosote are applied to timber do we submit meat to the effects of wood smoke. This permeates the substance, kills microbes, and of course prevents their development. It would indeed be

easy to cite thousands of cases where applications of a more or less poisonous character are used, which would kill not only microbes but every living thing, whether animal or vegetable. The embalming of bodies, now so fashionable, is nothing more than a use of poisonous solutions calculated to prevent the process of decomposition or fermentation, and many of the so-called remedies used by physicians to treat disease are likewise of a highly poisonous character. Sometimes what seem to be simple and harmless remedies are not so. An Italian physician has recently suggested the use of sulphur in the treatment of typhoid fever, but in enormous doses frequently repeated. He would also cover the patient and the bedclothes with sulphur, and, to the ordinary reader, this may seem a very innocent remedy. But chemical changes take place, and the well-known yellow powder is converted into very energetic compounds, and it then becomes a question whether the microbes or the patient will die first. That is all. Again, many of the compounds advertised for popular application are extremely dangerous, and too much caution cannot be exercised in their use, though people who are wise will leave such things alone altogether, and fall back upon those only which are known not to be injurious.

The pharmacist may look with pride upon his well-filled shelves, where arsenic and corrosive sublimate stand side by side with morphia, carbolic acid, laudanum, nux vomica, chloral, creosote, chloroform, and a host of similar preparations, all of which are used by physicians to kill microbes, or, as they say, to cure disease. And these things do kill microbes, but not until the blood and the tissues are saturated with them, and then the effect is not for a day but for ever. No one denies that we can kill microbes in the human system by soaking the body with poisonous substances, just as the embalmer attains a similar end by similar means, but it is at the cost of the patient's life. The body may be filled throughout—the blood, bones, muscles, nerves, all the tissues, may be filled with a poisonous antiseptic, just as the rail-



SCROFULA PUSTULES.

TUBERCLE. (PARIS.)

road tie may be permeated with creosote or silicic acid, and assuredly the microbes will be killed and their propagation will be rendered impossible, but the body will be killed, too. And, on the other hand, if the railroad tie be not thoroughly soaked, it will not be preserved, while the body, if not effectually saturated with poison, will not be freed from microbes, and, consequently, will not be put out of danger. That is the dilemma in which any person is who places himself at the mercy of medical science as it is practised. The remedy is worse than the disease. If he does not die of the one he does of the other, or, if he gets well, it is because his system was superior to both. The only escape that he has is to find something which, while it effectually destroys microbes and prevents fermentation, does not act injuriously upon the bodily organization. It is useless to take a small quantity of a poison which is insufficient to kill the microbe, and it is fatal to take a larger amount, which, while staying the disease, is itself destructive.

This argument seems clear, and every one's common-sense must tell them that it is sound, yet people go on taking poisonous drugs and compounds, and they will swallow any thing that comes to them with the authority of a medical diploma, or of a person who writes M.D. after his name. Rarely, indeed, do they stop to ask whether those magical letters have any intrinsic value. They forget even that there are doctors and doctors. The druggist on the corner is dubbed a doctor, and the boy who sweeps out the store is known among his acquaintances as doctor. Then there are horse and cattle doctors, tooth doctors, corn doctors, nail doctors, not to mention divinity doctors, bone doctors, philosophy doctors, and a host besides. But, in good sooth, the doctor of medicine need not know any thing. Medical colleges are a multitude. They compete with each other to try which can get the most students. They accept anybody, educated or uneducated, so long as he can pay the fees. They make his work as light as possible, and the requirements for a degree as easy as possible. And when they have

received all the money that their scheme requires they make the lad a Doctor of Medicine full-fledged, and send him out into the world with a license to kill, which is all that he can do with any certainty. The bills of mortality testify to the wickedness of such a system, and show only too plainly that persons who are entitled by law to call themselves physicians do fail.

It is doubly unfortunate that many of these persons have no such right, so careless is the law-making power in this country, for in Europe medical education is something very real, and a physician or a surgeon in Germany, England, or France is bound to be a man of considerable degree of scientific attainment. For years past a profitable business has been done here in the manufacture and sale of bogus medical degrees, of which Vermont has been the centre. These vary in price from five to a hundred dollars, but no reasonable offer is refused. The applicant need have no knowledge of medicine. He may be unable to distinguish arsenic from chalk, or strychnine from either. He wants only the amount of money necessary to pay for the parchment, and he can be dubbed a doctor of medicine on short notice.

A foreign physician travelling through the Northern States visited Montpelier, Vermont. There a young doctor, to whom he had been introduced, requested him to visit with himself a case of "canker rash." The request was willingly complied with, for, to the foreigner, "canker rash" was a new disease—he had never heard of it,—and his curiosity was aroused. It was a case of ordinary scarlet-fever. Some time after, when the acquaintanceship between the two physicians had developed, the question was asked why scarlet-fever was called "canker rash." "Oh," said the young Green-Mountain doctor, "when we don't know whether a case is one of scarlet-fever or measles, we call it canker rash." The same man boasted that his degree of M.D., which he had procured from Vermont College, had cost him only three hundred dollars and nine months in time, during

which he earned his living by working as a carpenter! Is there much room for wonder that "physicians" do not cure disease?

Under the American system of medical education very few physicians can write a prescription correctly. Druggists' books tell strange tales, and the public little know how much they are indebted to intelligent pharmacists for correcting the errors and making good the shortcomings of the family doctor.

The fault for this rests as much with the people as with the profession. The law prescribes no standard for the physician's education. It provides no means whereby his competency may be tested. He goes for examination before the men who have been his teachers, and whose interests are to pass him and grant him his diploma. They have no inducement whatever to regard the public welfare, and many young men go out from American medical schools with no more medical knowledge than they had of general education when they attended their first lecture. The three essentials for a competent physican and surgeon, to wit: a sound general and classical education, the training and feelings of a gentleman, and thorough practical and theoretical knowledge of all science and art that can alone justify a man in holding the lives of others in his hands, are not insisted upon in any medical college in the country. If they were universal, as they ought to be, such a display of ignorance as will be found in the appendix, quoted from an examination in Virginia, would not be possible.

The doctors themselves understand all this, and they are careful to keep people in ignorance as far as possible of the laws and operations of Nature. Directly a man learns how to cure himself he has no need for a doctor, but, so long as he is kept in the dark as to the nature of disease and the means by which he could relieve himself of it, he is at the mercy of the physician. Sickness is something incomprehensible to him, and he goes for help because he knows no better. In many instances the doctor is as ignorant as his

patient, and knows no more of the real nature of the disease than if he had never had a college diploma. He works, then, absolutely in the dark. He is as likely to use medicines that do harm as he is to fall upon such as might prove useful. He is certain of nothing. If the patient recovers, he claims the credit and his bill. If the patient dies, he writes a certificate for the Board of Health, demands his pay, and goes to work again on somebody else.

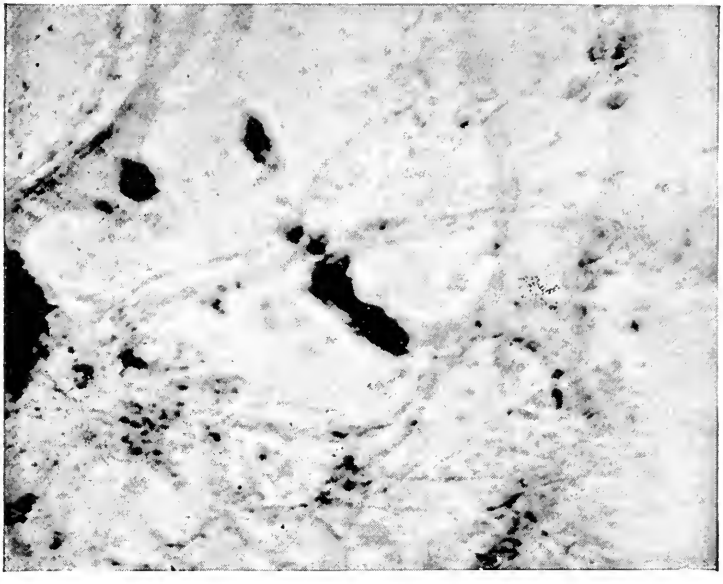
But, under the standard of humanity, this glorious profession has united into an organization which demands that all who desire to share its privileges shall declare not to depart from orthodox teachings, but to follow in certain tracks, and adhere to specific principles, which are already laid down. If other persons interfere, or attempt to open the eyes of the people to a true knowledge of things, they insist that their rights are interfered with, that the public interests are being endangered, and the safety of the people imperilled, and forthwith they ask for laws to protect themselves—and they get them. They become a corporation barricaded by the courts and the Legislature, forbidding the education of the people in natural things that concern them intimately, dictating what shall be done in questions of life and death, laying down routine methods, and guarding themselves against all responsibility when their dictatorial system fails to render the benefit that everybody has a right to look for. This is done in the cause of medical science, as it is called; it is done with the excuse that the people need to be protected against ignorance, and that the public health is something too sacred to be left in charge of unauthorized practitioners. Yet this same corporation permits young men to go forth every year, with authority given on a piece of parchment to compound drugs, to administer powerful poisons, to hold the lives of the people in their hands, while they are themselves absolutely unqualified for any responsibility whatever of the kind. They have no experience, no knowledge; they have merely paid certain fees, and had explained to them what are called the ethics of professional

life. They go forth to trade upon the ignorance of the people, to work upon their fears, to play a part of mystery and deception, and to send thousands to their graves who, under a more liberal system, would be restored from disease to health, and to their families and their occupations.

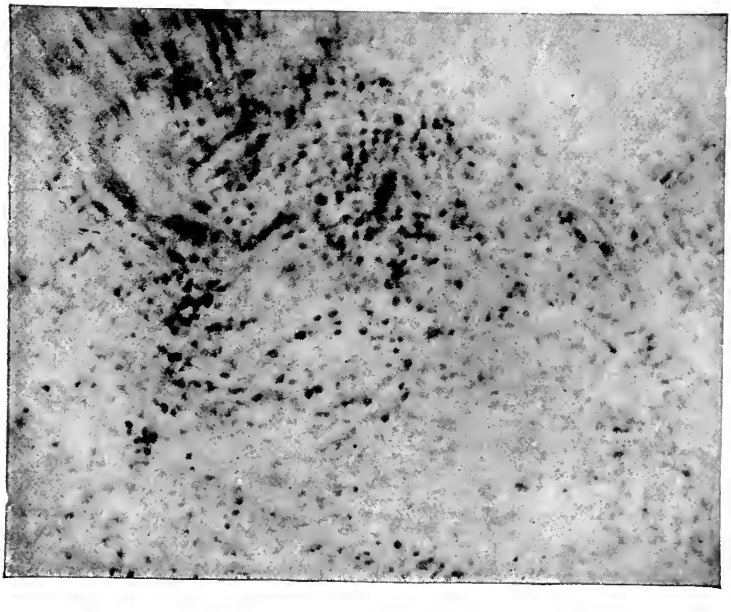
Books and papers published by the profession are not intended to enlighten the public, but to strengthen the doctors within their own fortress, to monopolize the power which they have secured to themselves by the law and by a force of rigid organization. True, there are books sometimes published by members of the profession ostensibly for public use, but they are of no value. Pretending to convey popular instruction, they stop just at the place where knowledge is most needed, and they leave the reader still at the mercy of the consulting physician. Moreover, they are prepared by men who still follow the routine and use the same agencies of the incorporated body to which they belong, and, where they are not absolutely misleading, the inquirer finds them to be far from instructive in any practical manner. Then, again, there are men who also hold the paper which authorizes them to dub themselves doctors of medicine who publish books to prey upon the fears as well as upon the ignorance of those who read them. These adventurers use the mails for disseminating disgusting circulars wherewith to entrap their victims. They offer remedies which they do not possess. They draw large sums of money every year from their victims, and, for some mysterious reason, the law does not interfere with them in their nefarious business. These people pretend to cure disease, knowing that their pretence is fraudulent. They claim to diagnose a case, and they send the same type-written diagnosis to everybody who is foolish enough to go to them. They secure money for purposes which they have no intention to carry out, and thus place themselves on a level with the "green-goods man," who promises to send counterfeit bills, and forwards instead a box of sawdust. Yet the doctors who do these things are still allowed to remain within the

organization of the profession, and to kill and defraud under the protection of a diploma.

I have no fear that the many able, learned, and progressive men that the medical profession numbers among its members will read these strictures as applying to them. I have no contention with physicians, many of whom are my most favorable critics; but I war against bad methods and false principles. The newspaper reporter who, for notoriety and pay, states a subjective case to different physicians, and then publishes their confidential opinions (*vide* appendix), deserves but little credit. If her object be to ridicule the doctors, she fails; if it be to accentuate the modern craze for sensationalism, and to show that it must be fed even at the cost of impertinence and to the discredit of journalism, she succeeds. The profession is itself to blame for any lack of confidence that the public may have, because it admits so much incompetency to its ranks, and so often shows itself as preying upon ignorance, which it encourages, and in an illiberal treatment of outside persons, whom it affects to ignore.



CANCER—FROM THE PANCREAS.



CANCER OF THE BREAST. (PARIS.)

CHAPTER VII.

PERSONAL EXPERIENCES.

THE diseases enumerated by physicians would probably run into thousands, and, to cure all these various forms, there are drugs which would also run into thousands. No ordinary person can understand all these. It requires one to be specially instructed, and to have devoted his life to the study, and then he only knows how to diagnose an ailment, that is, how to classify it in the list which has been artificially made and put before him. He does not cure When a cure is effected, it is due to other causes, not certainly to the poisonous drugs that have been administered. And when one of these physicians, eminent in his way and among his fellows, becomes ill, say with cancer, or consumption, or dropsy, his faculty fails him; he dies, and the disease of which he died is called incurable. Take the cases of General Grant, of John Roach, of the Emperor of Germany. They were in the hands of the most reputable physicians within reach. No gold could save them; and so it is, the rich and the poor run the same risk, under the system of medical organization and "eminent doctors." And all this is a logical, a necessary sequence to ignorance of Nature's laws and Natural processes. He who would cure himself and others must study Nature, and examine the processes by which Nature creates and destroys. It is useless to work upon artificial methods. Disease is a reality. It cannot be got rid of by any theoretical processes. It does not call for complicated devices. But it must be dealt with in a practi-

cal manner. We are bringing ourselves face to face with Nature when we seek to cure disease. Hence, we must learn her ways, and be guided by the knowledge so attained. It is of no use to go aside to form fancies of our own. They are useless. Nature teaches us what to do, and to contend against her is only to defeat our own purpose.

Although, as I have said, constant change is one of the laws of the universe, yet we must acknowledge that very much of the disease and many of the ailments that trouble and vex us are due to man himself. They are not a part of the original plan of the world. The mind at once suggests to itself many which are well known to be the result of man's irregularities, excesses, or neglect, and physicians, with their wider experience, can add greatly to the number. As a general rule, Nature starts in all her works from a healthy basis. This does not mean that all created organisms are, in the first instance, pathologically perfect, but it does mean that disease in any and every form is an abnormal condition. It is a diversion from the direct principle of Nature. Vegetation produced from healthful seeds is itself healthy, and the same rule applies to animals, of which man is only one. Native races that live in a primitive condition suffer far less from disease than do the luxurious and pampered children of a high civilization. The aborigine of this country, who is erroneously spoken of as an "Indian," is afflicted with diseases, through contact with the white man, which he did not know of when he exercised his rightful ownership of the country unmolested. The native who roams without shelter or clothing over the vast domain of Australia, enjoys the most vigorous health that his slender living will allow. The laws compel him, when he visits a town or village, to wear a blanket, and, in due time, the changes of covering himself to-day and going nude to-morrow, result, in most instances, in speedy death by pneumonia or consumption. The introduction of spirituous liquors among aboriginal tribes is not the only, or even the principal, factor in their disappearance. There are very few sections

of the human family where fermented drinks were not in use long before the intrusion of white men. Where wise policy has prevailed, as among the Maoris under British rule, the native race has taken its place and held its own, not only in the circles of labor and commerce, but in legislation, and very much of its native vigor is maintained by the customs of healthy out-door exercise and the use of plain food. It seems anomalous, yet it is true, that the farther we reach into the influence of civilization, the farther we depart from Nature, and the greater becomes the tendency to debility and disease. Luxury breeds effeminacy, but it also predisposes to sickness, and many of the most troublesome ailments are due to it, even as they are absolutely unknown to the denizen of the primeval forest, or to his unpolished descendant in the wilds of the earth.

Nor does it seem that the human frame accustoms itself to this artificial life. Although continuing for generations, and even for centuries, under the same influence, it never resumes its pristine invulnerability to the attacks of physical ailments. Susceptibility to disease remains; instead of subsiding it becomes hereditary, and so luxury and culture levy their tax upon the body. The farm laborer of England, the peasant of Germany or France, with his healthful life, peaceful surroundings and contentment, plain living, and freedom from care, enjoys a freedom from disease and a hardy power of resistance to its causes which the pampered victim of wealth and social necessities never knows.

I will now proceed to sketch my own experiences, from early life till the present, and the reader who will patiently follow me throughout will have no difficulty in realizing that the discovery I have made cannot fail to effect a revolution in the treatment and cure of disease. The causes of disease in plants and animals have been already described; I propose now to detail my methods for curing plants, and then give evidence concerning the means I have used for effecting cures in myself and others.

While engaged in business with my nursery in Austin,

Texas, I suffered from an attack of malaria, or intermittent fever, and I had recourse to several doctors, who, in the usual way, prescribed for me various drugs. I swallowed the contents of bottle after bottle, until their number became too great for calculation. I took quinine until it failed to have any effect. I lost color and weight, and was afflicted with an incessant cough, that destroyed my rest, wore away my strength, and led me and my friends to the conviction that I was soon to become a victim to consumption. My days seemed numbered. All hope of a cure was abandoned. Every thing that had been done by the doctors had failed. Their efforts seemed to be utterly useless. Instead of getting better, I gradually became worse. I lost energy and the capacity to attend to my affairs. Every resource known to the doctors thus far had been used, and my life seemed to be passing away, so that but a short time only was needed to determine the result. In this emergency I resorted to another doctor, who advised me to try the rarefied air of Colorado, high up in the mountains, where the atmosphere is supposed to be purer and free from the debilitating influences of the plains. This I could not do, nor do I feel sure that I would have done it if I had been able. The demands of my business forbade my leaving home, and then I had never seen any one return from Colorado who had been cured of consumption, which my friends feared for me.

My condition was, nevertheless, desperate. The malarial fever had affected me for seventeen years, during the last two of which it had been complicated with sciatica and articular rheumatism, and I had become literally a physical wreck. It can well be understood that, amid such long suffering, and the total failure of doctors to afford me the necessary relief, I had made myself acquainted with all advertised remedies and proprietary medicines. Still the physicians did not leave me. They were my constant visitors, prescribing one thing to-day and another to-morrow, only to discover that every new prescription was, like its predecessor, a failure. Two years before I discovered the

microbe-killer, I lost two children—a boy and a girl. They had not been strong. They were brought up by hand, my wife being too weak to nurse them. Microbes affected the milk, which, in turn, carried disease to the stomachs of the infants. They became ill. Their stomachs presently refused food. Paregoric, soothing-syrup, and all the remedies that the doctors could devise from their drug-lists were tried without effect, and the children died. The medicines killed them, and the reasons I shall be prepared to explain.

This loss distracted my attention from my business. Up to that time I had devoted myself closely to my business as a gardener. All books and literature of my occupation I read. I was an earnest subscriber to every floral magazine that came within my knowledge, for I always found in them something that was useful and instructive. I am anxious to give full credit to such publications, for I am much indebted to them, since it was in them that I found the first hints which led me on to experiments, and hence to the discovery of a certain and safe means of killing fungi and microbes. They kept me to the study of Nature. No medical work or magazine would do that. None of them ever directed me to natural sources, but, on the contrary, whenever I took one up it diverted me from the line of my researches, disturbed the tenor of my investigations, and confused my ideas.

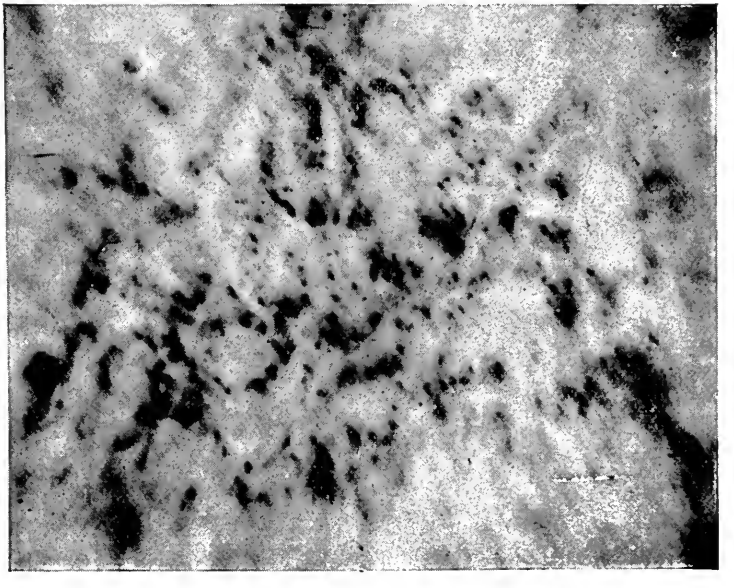
Medical papers would tell me the symptoms of fever or rheumatism or diphtheria. They would describe the microbe of typhoid, compare it with the microbe of other diseases, explain its mode and rapidity of propagation, sketch its appearance under the microscope, classify it, and name it, but they would not tell how to kill it. The symptoms which I saw in print were better understood by me in my body. One who has had itching piles can certainly comprehend the evidences and feelings better than one who merely writes or reads about them. When I arose in the morning I knew that I had no energy, that I felt more tired than when I went to bed. When I walked I knew that I felt as though

there were twenty pounds of lead tied to my feet. When I drove to my seed-store I knew that I could sit only on the edge of my buggy, because the microbes would not let me sit any other way, and when I stepped to the ground I knew that it took me several minutes before I could move, the microbes that produced sciatica and rheumatism objecting to being disturbed, and so preventing me. Every attempt to move had to be slow and deliberate, until they should get accustomed to the change. I was a living barometer. Whenever the weather altered, and especially if it became cooler, my collection of microbes could anticipate it two or three days, and, when the storm came, they would freeze, and force me to take refuge by a red-hot stove to get them quieted.

The inevitable result of all this was clear. I had no particular wish to leave the world. It is a pleasant enough place to be in, provided a man has health and some little necessaries. It is possible to imagine that there may be worse. What I had seen of it had been satisfactory enough in some respects, and I determined to stay a little longer, if I could. At the same time, I knew that there must be a change, that things could not go on as they were for long, or that, if they did, I must make up my mind to follow my children, whither we must all go sooner or later. I had taken all the remedies that were presented to me; I had seen my children pass away; I had observed death around me striking down the young and the old, and I myself was far on my way to the same fate; what wonder should there be, then, if I realized the momentous fact that physicians cannot cure disease—in other words, that medicine does not destroy microbes.

Good friends were generous with their advice. I was told to try first one thing then another, but I had become wearied with what I had come to believe was so much humbug, and I determined to swallow no more medicine. I again studied advertisements. There I saw commended electric belts, porous plasters, liniments, lotions, and salves,

WM. RADAM BEFORE TREATMENT.



GASTRITIS.

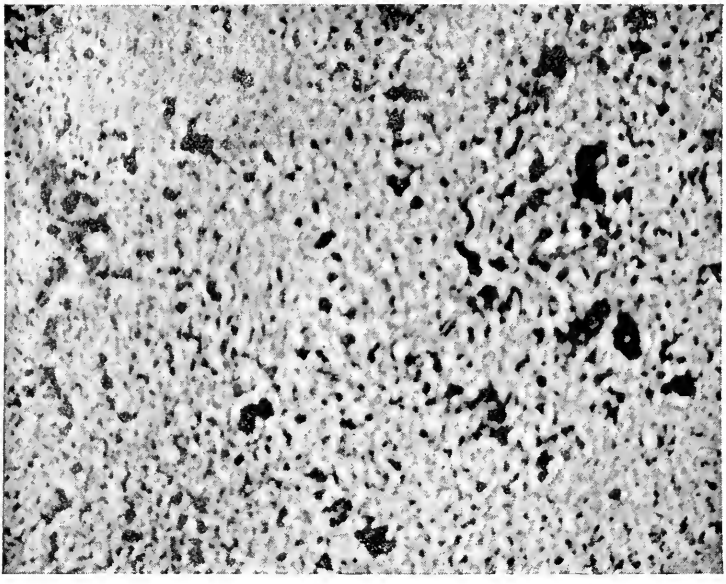
and all sorts of external applications that would cure every thing, purify the blood, strengthen the nerves, stimulate the functions of all the organs, kill the microbes, and rejuvenate the individual in mind and body. Well, this was something. Whatever such things would or would not do, there was no medicine in them—nothing to swallow, no poison,—so, if they did no good, I could not see that they would do harm. The end of my thinking was that I sent off ten dollars to Chicago for an electric belt. Some of the advertising firms fail to respond, as they promise, to money remittances, but my belt came, and I lost no time in fixing it on. It reminded me of former days when I was a soldier, with belt and sabre, in the German army. Then I jumped ditches eight feet wide, and sang and laughed when others fell into the water, but now things were changed. Then I had health and youth, now I was far older in health than in years, but I concluded that, being but forty-three, if the belt did all that was promised for it, there should be no reason why I might not live forty years or more yet. So I gave the belt a good chance. I wore it faithfully for three months, and tried to help it by covering myself in every likely spot with porous plasters. In that condition I went about my business, clad in a kind of coat armor to fight microbes. I tried to persuade myself that I was doing exactly the right thing, and set to work to find enjoyment among my roses, and to forget my troubles.

But it was of no use. My limbs did not consider that much enjoyment. The microbes were unhappy, and would not be appeased. They gave me no rest. They tortured me unceasingly, and finally they drove me back in despair and desperation to my bed. I tried strong vinegar; friends recommended mustard plasters, so mustard plasters were tried. I covered every painful spot with them, and suffered tortures, with no relief. I am ashamed of myself when I think that I ever listened to such advice, and descended to such folly. So now all had failed. Medicines had reduced me to the lowest condition of weakness and disease. I had

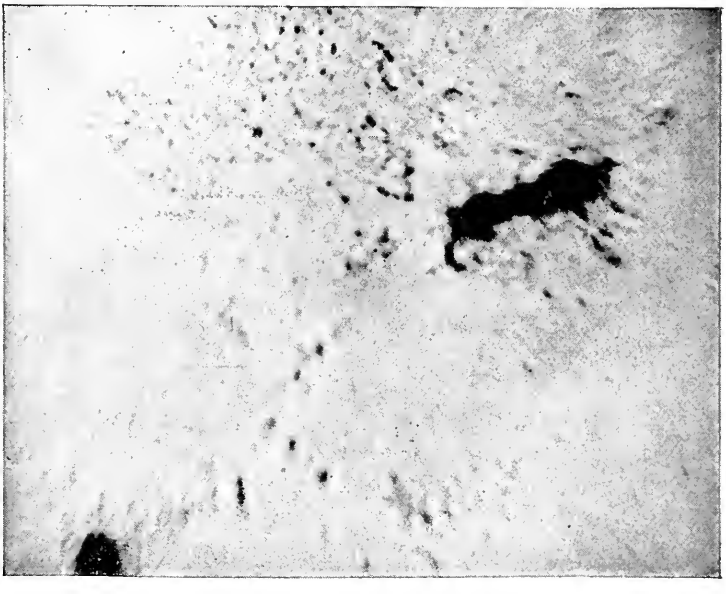
swallowed poisons till they had no longer any effect upon me. Electric belts, lotions, plasters, blisters, every thing, internal and external, had proved useless. I was worse than ever, with no resource untried, and no longer a particle of faith in any thing that doctors, proprietary-medicine makers, or advertisers could offer me, and I refused further advice.

But this refusal lasted only for a time. A drowning man will catch at a straw. A friend came along who suggested a massage operator. He told me that one of these rubbing doctors had cured him of rheumatism, so my determination failed me, and my hopes were renewed. I thought the suggestion over philosophically. I had tried medicines internally and externally to no purpose, but here was something different. It was not medicine of any kind, there were no poisons nor plasters, and I convinced myself that I should try it. Well, I went to the man's office, and he lost no time in getting to work. He rubbed and pounded and drove his thumbs into my flesh till I roared with pain, and cried to heaven that he would not kill me. He told me to bear it, that he would rid of me all my pains if only I would endure the inconvenience for a time. So I clinched my teeth together, and told him to go on. He went on, and he continued his practice on me for about five minutes, poking and pounding and straining my joints, until I could bear it no longer. I jumped out of bed, gave him five dollars, and hastened home, content to die, and solemnly swearing to myself that I would never again submit to such cruel and barbarous treatment.

The frame of mind to which I was then reduced is not easy to describe, and, except by those who have been similarly placed, it cannot be imagined. I was depressed and ill. I again thought over the fate of my children, and how they had been sacrificed to ignorance and incompetency. I saw before me no better or different prospect for myself. I had given up all hope. There seemed nothing further to be done. All the usual resources of sick persons had been tried, and they had failed. I was steadily getting worse, growing weaker, and suffering more. I had tried every thing



CONGESTION OF MUCOUS MEMBRANE OF STOMACH.



MICROBES FROM THE STOMACH.

that medical science offered, and I became so thoroughly discouraged that, in my despondency, I began to look upon it as nothing better than a fraud and a humbug. I saw healthy children fall sick and die, while medicine was powerless to relieve them, and, with my own condition ever fixed upon my mind, I began to think over past experiences in my business.

I recalled much of the work that I had been called upon to do throughout my career, and in my management of flowers. I recalled the various drugs that I had been in the habit of using to destroy worms and fungi in plants. I thought over all that I had read of the experiences of nurserymen in dealing with blight in pear-trees and of the remedies that had been suggested; I recalled to mind the sums of money I had thrown away in Texas only for the purchase of pest poisons to kill insects in cabbages alone. I had experimented in and tried all the remedies that had been recommended to kill fungi and destroy dry rot, mildew, and other diseases in grape-vines. I bethought me again how I had offered a reward of one thousand dollars for something that would destroy cabbage blight without injuring the cabbage, when soon General Ruggels and Captain Warner appeared at my grounds ready, as they said, to earn the prize. Their plan was not new, and if they had had as much knowledge about what they were doing as the veriest tyro in chemistry would have had, they would have known how absurd their proposition was. However, I gave them a chance to test their alleged discovery. A cabbage was selected which was covered with blight, and an old kerosene can was placed over it. One spoonful of sulphur was then put underneath in a small saucer and ignited, the fumes being allowed to fill the can. Five minutes later we examined the plant, and, sure enough, every insect, every portion of the blight was effectually killed, but the cabbage, too, was as dead as a door-nail.

When that little experiment came back to my mind, it occurred to me that it was an excellent illustration of the effect of medicine, which, while it destroys the microbes,

kills the patient too, the patient being usually the first to succumb. It led me again to think over my own garden experiences, and the conviction became deeply impressed on my mind that, if I could discover any thing that would kill blight, fungi, and microbes on plants without injuring them, I should also be in possession of something that would cure me. I felt that I had had large experience, that I had been a careful and close observer of Nature and her operations, and was positively assured of the causes, to some extent, that led to the production of plant diseases. I knew that all the various kinds of fungus, or micro-organism, which produce rot, mildew, etc., appear more frequently at changes of the weather, and that whenever we had rain in spring after a bright sunshine, disease would make its appearance on the grape-vines within twenty-four hours.

The effect thus so quickly apparent was as if some one had sprinkled the leaves with some kind of poison. At first, little red spots became visible. These gradually, yet rapidly, grew larger, and spread until they covered the leaves and extended to the fruit, and in about three weeks it was possible to determine how the crop would be affected. Having used so many medicines and drugs on myself, there were almost the contents of a drug-store accumulated in my laboratory, and so, with the help of my garden books and a small microscope, I set to work to investigate the matter more closely. First of all, I examined about forty varieties of grapes that were at my disposal. Some of them were more infested than others. Several were not attacked at all, and others very slightly, so that they soon recovered and lost all evidence of disease. Among those least diseased were the Delawares, Concords, and a few others, and these I could always depend upon, but the Black Spanish, Tokay, and all the California varieties were easy victims to the fungus. There was abundant material upon which to experiment, and I began with all the remedies that had been suggested by the Agricultural Department at Washington in the articles published from that office on the diseases of

the vine, but with little or no effect. If I used the drugs sparingly they failed to destroy the fungus, and if I used them more liberally they killed the vine, or, at the best, they destroyed the fruit and the leaves. I found prevention to be better than cure, and that the disease was kept away either by putting a roof over the vine or covering the grapes with a paper bag, thus warding off rain and dew. Noting the temperature and condition of the atmosphere, and the effects of sudden changes of the weather on my vines, I observed that, when these were greatest, there was also more coughing and more sickness among the people. Common-sense, and no great exercise of reason, led me to see that the same causes had operated in both cases, and that the human race suffered from the same influences as those which brought disease to the plants and to the vegetable world. All organic life is, in fact, affected in the same way, and although it has frequently been observed that in what are called unhealthy seasons the crops of fruit and cereals are likely to be inferior, yet the observation has never before been given its full practical import.

From the grape-vines I turned my attention to strawberries, and there I found similar enemies. Worms, large and small, were on them, destroying alike fruit, leaves, and roots, besides large quantities of bacteria and fungi that were no less injurious. A group of geraniums might be apparently in perfect health, and in twenty-four hours the enemy would come in upon them like yellow-fever upon the people. I could go through a garden of flowers and not only demonstrate all this readily, but prove, without much difficulty, that each variety has a host of enemies that destroys it.

In the open air there is great difficulty in contending against these enemies. It is not so easy to bring plants under the immediate influence of the remedies, and exposure to the atmosphere makes them, of course, more liable to any deleterious effects; but in the greenhouse very much can be done if the plants are attended to in time.

Flowers go through the same processes and functions as man. They take nourishment, and die as he does. They need air, food, and water; they suffer from disease, go through various phases of health, and are subject to similar disturbances as those which afflict men and animals. Respiration is as essential to them as to us. Changes are constantly going on in their tissues, and fluids circulate through them in constant directions, and even with considerable force. In some of the lower forms of vegetable life there is a still stronger resemblance to animal forms. The so-called thread-plants, which comprise many fungi and lichens, are often nothing more than a series of cells, sometimes interwoven, sometimes in lines; but their mode of receiving nourishment is instructive and very interesting in this consideration. All the higher orders of plants live for the most part on inorganic matter. They require for their sustenance water, ammonia or nitrogen, and carbonic acid, and in absorbing the latter they decompose it and give out oxygen. But the fungi take nourishment very differently. They require organic food. They cannot form their tissues out of the elements that are necessary or sufficient for the higher plants. They take into their systems carbon compounds already formed. In other words, they live upon the plants or animals to which they attach themselves, and they absorb oxygen from the atmosphere and give out carbonic acid as animals do.

The older botanists held that one of the distinctions between plants and animals was the power to form starch, which exists in the former and not in the latter, but fungi never form starch, and in that respect again they more nearly resemble animal life. Neither do they form the peculiar coloring matter which we find in the leaves of higher organizations, so that in many respects they justify us in regarding them as something very different from ordinary vegetable growths. This enables us to appreciate more fully the evil that they are capable of when they attach themselves to other bodies.

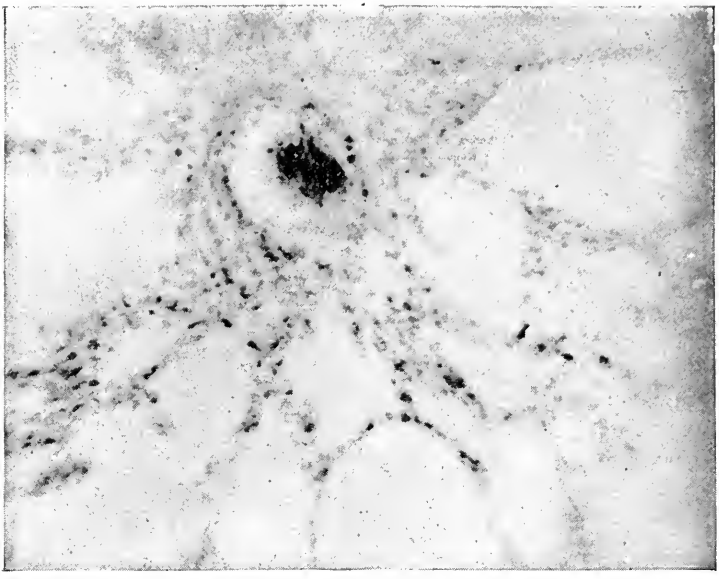
I may emphasize this still further. Recent investigations have shown that even lichens are not simple or individual growths, but that each one consists of two parts, the one being a low form of alga, and the other a parasitic fungus. The algæ constitute that form of vegetable life which is found in the rocks of the earliest formations, and they were probably for many centuries of ages the chief, if not the only, organic bodies on the earth, except similar forms that would be contained in the waters. They vary in size from a minute species far smaller than a blood-corpuscle to others that are several hundred feet in length, and it is generally accepted that they form a very large proportion of the coal-beds.

Those persons who, crossing the North Atlantic in its southern part, have had the good-fortune to traverse the Sargosso Sea, know what these forms of vegetable life may become when fully developed and massed in large fields. Residents on the sea-shore are familiar with them in the sea-weed that is ever being washed up from the ocean, and people whose homes are in the interior know of them as the green slime that forms on stagnant pools or ditches, or the slimy matter that may be found on wood in damp places, or the fine thread-like bodies that occur in ponds and rivers of fresh water everywhere. All varieties of algæ originated from a single cell, and, however large, they are of the simplest construction. Sometimes they are extremely beautiful, and of colors varying from purple and bright-scarlet to sombre brown.

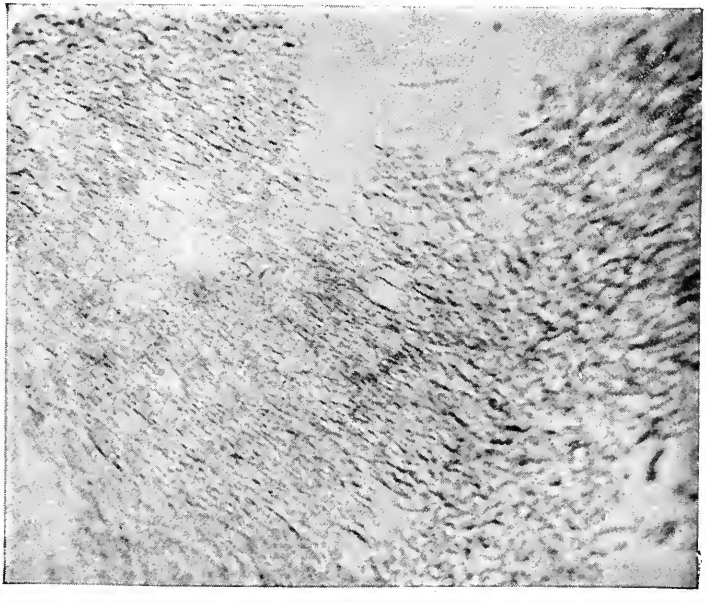
Everybody who has ever given particular attention to the various lichens to be found in the woods is acquainted with the beauties which they present, but in that respect the salt-water algæ far surpass them. The latter are, however, of a higher class, the one constituent of the lichen being a low form of the primitive organization. The other constituent of the lichen is, as I have said, a fungus. It is a parasite, and obtains its nourishment, not from inorganic matter, but from the alga. Look at any well-developed lichen, such as

may be found on old wood or on unhealthy trees anywhere in the country. There will generally be seen two distinct portions, one green, brown, yellow, black, or at any rate colored; the other, white or more or less colorless. The former belongs to the alga, the latter to the fungus, yet the two are intimately connected and interwoven, and were once supposed to be but a single organization. The value of these bodies in nature is very great. They form on the driest and most desolate spots. The lava in volcanic regions becomes covered with them. The alga derives its nourishment from moisture and the air, the fungus appropriates nourishment from the body to which it is attached. The growth of the lichen tends to disintegrate the rock, and by death and decay to constitute the first beginning of a soil in which in future times plants of a higher organization may grow and flourish.

Thus the relations between animals and plants are very intimate, and if we would know how to treat disease in the former, we must study it in the latter. If we would cure members of the human family, let us see how disease affects the vegetable world, and ascertain if we can what remedial agents are necessary and safe there. If in our experiments we kill a few plants, the loss is not very great, but if in the same way human life be sacrificed, the process becomes a serious one. Human lives and human health are sacrificed in this way by doctors to build up medical science. When a new drug is introduced, its value, or rather its properties, are unknown. Experiments on animals are first undertaken, but these are only tentative, they are necessarily not conclusive, and then experiments are begun upon the human body. These may be conducted in hospitals where the patients are poor and it is not deemed of much importance whether they live or die, but physicians often practise them upon private patients. How many people have fallen victims to chloroform, morphine, antipyrine, cocaine, aconitine, and other powerful and dangerous agents before their properties were fully known! Even when they are supposed to be known,



BACILLUS ANTHRACIS IN LUNG. (PARIS.)



BACILLUS ANTHRACIS, CULT'D. (BERLIN.)

the action of them and other drugs is so excessive that lives are frequently sacrificed inadvertently. But the law protects the doctors in these proceedings, and when death occurs it is regarded only as a tribute to science. Just as we have instances where autopsies are held and people are cut to pieces before it is certain that they are dead, as in the case of Mr. Bishop, and all to serve the cause of medical science.

In experimenting on plants there is no such risk, and when we shall have found something which will destroy microbes without injury to the plant we may safely test it on the human body. I have mentioned the proposal that was made to win the one thousand dollars that I offered as a reward for something that would kill the cabbage bugs; and it ruined the cabbage. If that same experiment had been tried with a child, it would most certainly have killed the child. The product obtained by burning sulphur in air is sulphurous acid. This has bleaching properties and disinfecting power, and no animal life can exist in it. Its use as a disinfectant depends on that property. It is in truth a deadly poison when taken in full strength into the lungs. To use it therefore on mankind in that way would be simply criminal, whereas an experiment with a plant is justifiable and useful. It may be inferred with tolerable certainty that if any agent that is offered to us has no deleterious effects on vegetable life, it will not be very hazardous to test it on the human body.

All my early life was passed amid flowers. I was engaged in their cultivation; I learned their habits and their needs; I watched their lives; I studied them in health and noted careful observations about their diseases; I experimented, and it will be well if I give some of my experiences and how I went to work to try and cure fungi.

If plants are kept as nearly as possible in their native condition, with good soil from which to obtain their nourishment and in a pure atmosphere and an equable and proper temperature; if, too, they are raised from healthy stock, they are not subject to disease. Fungi cannot readily

get a foothold on them. So a child, the offspring of healthy parents and a sturdy ancestry, properly fed, kept in wholesome surroundings, sheltered from extremes of heat and cold in a climate that is neither too hot nor too dry, and protected from contact with disease of others, is not very likely to grow up unhealthy or to be subject to any serious illness. But if plants are chilled or kept too warm; if the soil be allowed to parch or to become too wet; if no sunlight be permitted to have access to them, or if they be propagated from sickly stock, they will soon become the resting-place of microbes, which will accumulate upon them in masses and very soon render the sickly flower a seat of the most fatal disease. Take a plant so circumstanced and let a doctor try the effect of his drugs and chemicals, if he succeed in killing the fungi he will also assuredly destroy the life of the plant; but the chances are that he cannot kill the micro-organisms, and if he cannot destroy them in a flower, be sure that he cannot do any better when they are in the human system. He cannot cure disease then, which is the same thing.

I have applied drugs, both directly and indirectly, to the fungus, and in my selection I was at first guided by a knowledge of what physicians use for destroying microbes in their patients. Dusting them over the affected parts of the plants I found the following to be worthless: Sulphur, borax, boracic acid, salicylic acid, camphor, tannic acid, acetic acid, tartaric acid, alum, bluestone, Paris green, white hellebore, calomel, saltpetre, Epsom salts, lime, and various salts of potassium and sodium. Many of these, if not all, are employed by doctors in the treatment of diseases which the doctors themselves attribute to the presence of micro-organisms, yet they will not kill those same bodies on a plant; how, then, can they destroy them in the body?

But fungi on plants may be killed. They yield to the direct application of nitric, carbolic, and sulphuric acids, ammonia, copperas or sulphate of iron, muriatic and chromic acids, phosphorous and sulphurous acids, and some of their

compounds. Oil of turpentine and mustard, benzoine, kerosine, and bisulphide of carbon also destroy them,—and the plants also.

Now every one of these things is used by physicians, and it cannot be doubted that they are highly dangerous. In fact they kill more than they cure; possibly they do not cure any, although they have the credit for it, and physicians use them ignorantly.

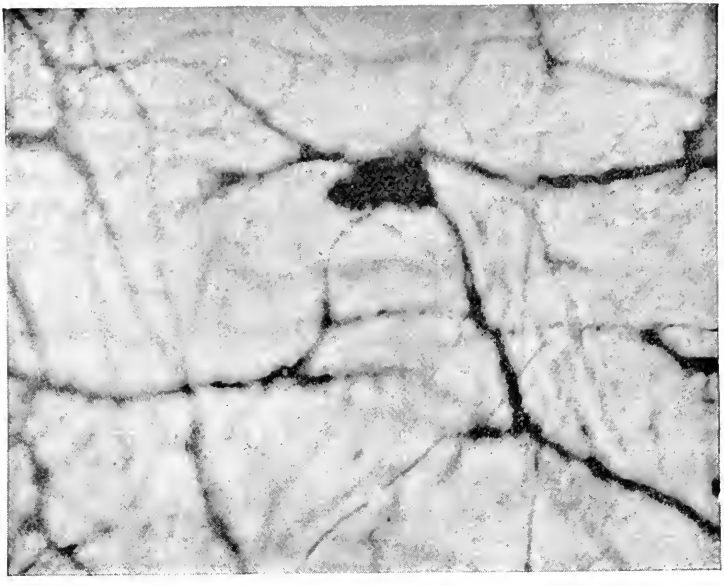
I once obtained some eminently practical results, which led me to further experiments, whereby fungi were checked in their reproduction by putting some of those poisonous drugs into bottles and so arranging them that only gaseous matter could intermingle with the air. But I felt the poisonous effects in my lungs, and I found that under this influence some of the tender leaves of the plants turned black, and I was very glad to give up those experiments. Even a very dense tobacco smoke will sometimes be injurious to tender flowers. When the air was warm and moist I found that fungoid growths appeared everywhere, and multiplied with astonishing rapidity. Under the same conditions milk turns sour very rapidly, meat shows evidence of fermentation, strawberries and other fruits become rapidly covered with micro-organisms, which spoil them quickly, and the microbes in my own body at the same time became lively so that I would have to lie down and protect myself from the changes. Then at other times, especially after thunder-storms, no fungi were formed, and I too felt better, breathing more easily and being more free from pain. At the same time, too, meat and milk would keep longer, and many forms of fungus disappeared, while my plants always looked better, and were more full of life.

This observation opened my eyes. My reason told me that I must look for that something which purified the air and removed the germs of fungi and disease, acting so powerfully and yet so harmlessly to the higher organs of life, for its action was far more powerful than that of all the poisonous drugs I had before used. I felt certain that here-

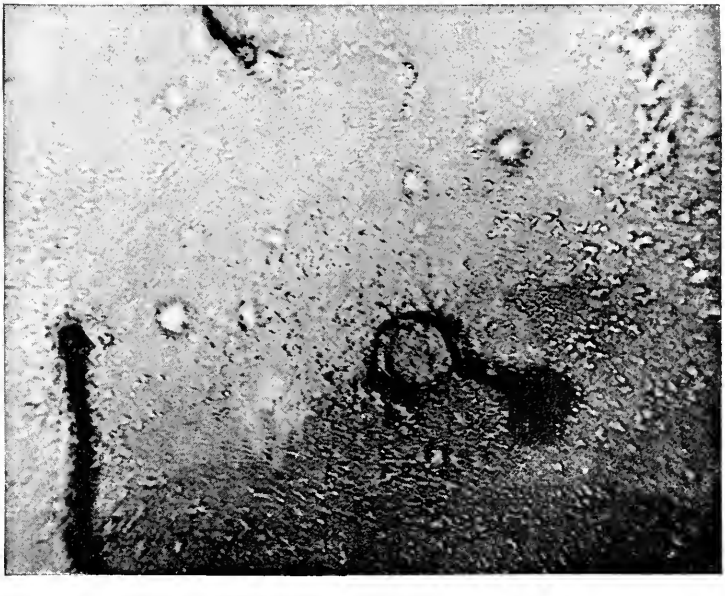
in lay the key to my remedy. But to identify it absolutely, to make it artificially, and then to apply it correctly, were problems that occupied my attention for more than a year after. My former experiments had shown me that powerful drugs had little or no effect if applied externally to plants or trees, or if dusted on fruits. I found also that sprinkling and washing pear-trees which had blight were very little good, and that even pruning and cutting off diseased parts gave at best but temporary relief, because no sooner was it done than other parts became diseased, and by pruning away all the dead matter there was soon nothing but the stump left, and then that too died.

This very much resembles what happens in the exercise of "scientific surgery," where limbs or diseased portions are cut away and the disease breaks out again, so that the patient dies from constant operations unless the microbes are left undisturbed to fulfil their mission. Of course we all know that surgical operations are often successful, but those are mostly cases of severe injury where it is necessary to remove the injured portion. It is very different when the operation is undertaken to remove parts that are diseased from the presence of micro-organisms, or fungi, or microbes, as, for example, cancer. To cure a tree of tendency to blight it is necessary to go to the roots. Most persons know that flowers which grow luxuriantly are less subject to blight than others whose growth is slower and whose appearance is sickly. We must then furnish the tree with better food and drink, that will enter into the sap, pass through the tissues and produce a condition where bacteria will not live. As soon as I did this to my trees their green color returned, they threw out fresh shoots, put on a more vigorous growth, and presented no further necessity for cutting off the limbs.

The organs of the body are similar in functions to portions of the tree. In plants every cell is a stomach. Nourishment is taken up by the roots. It passes upwards through certain portions of the stem to the leaves. There it is assimilated, and thence it passes downwards, forming depos-



FROM A TUMOR. (CANCER?)



MICROBES IN TUMOR.

its of new cells over the old wood underneath the bark. While therefore the plant breathes through its leaves, yet if we would reach them internally we must go first to the roots. We cannot improve and enrich the sap in any other way. So in man we supply food and nourishment through the stomach, and fresh air through the lungs, if we would send a color to the cheeks and promote the health of the person. It is the stomach that we purify and strengthen first of all, and the nerves, blood-vessels, muscles, and all other tissues derive the benefit.

CHAPTER VIII.

DEVELOPMENT OF THE MICROBE KILLER—MY FIRST PATIENTS.

FURTHER reference to the subject-matter of the preceding pages must be made when I come to an explanation of the principle by which I would cure disease without drugs. All medicines that are employed to-day, whether inorganic or organic, should be antiseptics—that is, agents capable of preventing fermentation. Now there are many such in use by the medical profession, and in order that there shall be no misunderstanding I will advert to one or two of the most characteristic. First of all is bichloride of mercury, an agent so powerful that it can only be administered internally in minute doses, and which even then, and with the closest watching, produces poisonous effects.

It is, as its name indicates, a corrosive poison, destroying the lining membrane of the stomach, producing a sense of heat with much pain in the throat, and a strong metallic taste in the mouth, accompanied by severe vomiting and a feeling of constriction wherever it has acted on the mucous membrane. If death be not induced, in a few hours salivation follows, and sometimes the functions of the kidneys are stopped.

Salicylic acid is also an antiseptic, but serious consequences have sometimes followed its use. The poisonous qualities of carbolic acid are well known. It is one of the most powerful corrosive poisons known, and yet druggists distribute it freely and will sell it to anybody who asks for

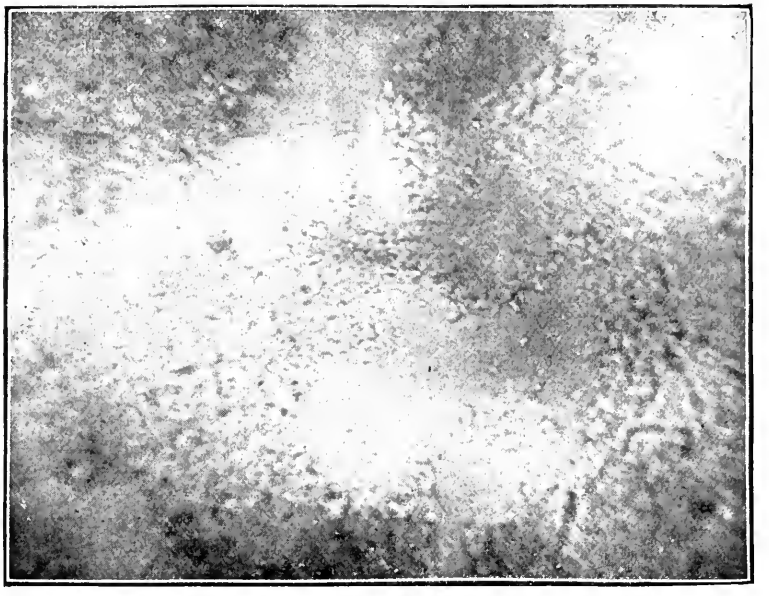
it. A case is recorded by Dr. Billroth, of Vienna, where a patient lost four fingers by gangrene produced through the application of carbolic acid to a trifling wound. Its effects are very rapid. A marine hospital steward swallowed a small quantity by mistake, and was dead within three minutes, and a case is mentioned in Philadelphia where a man entered a drug store, purchased a very small quantity of the strong acid, drank it, and was dead before he could leave the store. Moreover, carbolic acid is not as powerful a germicide as some other things in use by the profession.

Permanganate of potash is so active that one grain in twenty-four hours is a full dose. Iodoform, nitrate of silver (common caustic), are also in use, and arsenic is a favorite antiseptic. Two grains of arsenious acid have proved fatal, and a fourth of a grain may produce poisonous symptoms. Arsenic is the basis of many quack preparations and forms the active agent in complexion wafers, cancer plasters and ointments, and of many compounds that are sold in unlimted quantities in the stores and by advertising adventurers. It is an accumulative poison. Its effects may not be injuriously apparent until it has been used for some time, and they then appear in full severity, producing symptoms not unlike Asiatic cholera, only with more pain. Thirst is intense, consciousness usually remains to the last, but not always, and convulsions, tetanus, and severe vomiting often precede a state of collapse and death.

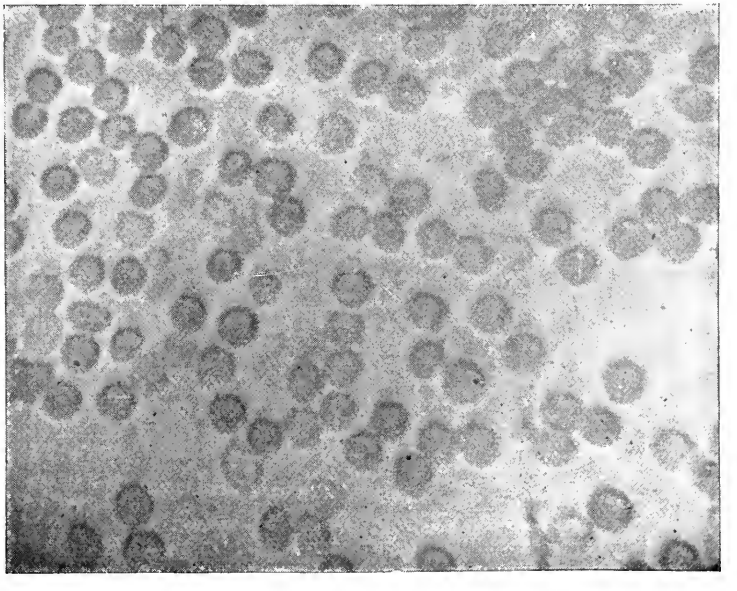
Besides the injurious effects produced upon the tissues and the system generally, even where no seriously poisonous results follow, many of these poisons are injurious to the teeth and to the appearance of the skin ; another fact which should militate against their use. All are antiseptics of more or less power, but what is wanted is an antiseptic that can do no injury to the patient, but which shall at the same time be effectual and of such a nature that it may be taken in large quantities, so as to thoroughly saturate the tissues. It must be capable of absorption, so that it will enter the blood. It must be adapted to check, for instance, such damage on the

blood corpuscles as I previously explained to have been observed in malaria, where the parasitic microbe acts directly upon the vital fluid and destroys the corpuscles by attaching itself to them and absorbing them as it were into itself. It must be fitted to take part in the circulation without poisonous effects, and yet to be so destructive of microbe life that it will at once destroy it, and in that way free the system of all germs of disease.

My experience, coupled with all the inquiries I have been able to make, convinces me that physicians have never yet discovered any drug that is as harmless as water and yet as powerful in the right way as any of those agents I have mentioned from among the list of poisons. They can have no such medicine, for if they had they could cure disease, and that they certainly cannot do, for persons die long before they get old, and they should not do that if the diseases to which they are subject are curable. I have tested most of the drugs in general use with a view to ascertain whether they have any real power over the existence of micro-organisms independently of other properties, because a drug may be a very powerful poison and still not be an antiseptic; and I have found that not one half the agents mentioned in medical works, or of the formulas recommended from time to time in medical periodicals, have any antiseptic properties at all. In a large number of instances the whiskey or alcohol used in the manufacture of tinctures and other preparations plays the most important part, and it is used, in fact, itself as an antiseptic to preserve the drug from fermentation—in other words, to destroy or keep away fungi and microbes. This is of the utmost importance, since a drug that is in the process of fermentation is no medicine. It has no curative properties. The more of it that passes into the stomach the more fermentation goes on in the system, and disease is rather increased than diminished. But if you can find a preparation that does not ferment even if your sickness increases, and which you can take into the stomach in large quantities and continuously for weeks and months,



MICROBES IN SOUR MILK.



HUMAN BLOOD CORPUSCLES.

so that the blood and the whole system become saturated with it, then you have a good medicine and one in which you may place full confidence. But, as I said before, you may go over the whole Pharmacopœia, and examine the catalogues of drugs that are in use or for sale, and you will not find one that fills these requirements.

My inquiries into Nature's processes and into the remedies in use for treatment of disease in both plants and animals have not been superficial. I have gone into them deeply. My studies have not been restricted and I have exercised my thoughts carefully, so that I feel that I can enter into Nature's mysteries understandingly and to some practical purpose.

Knowing that fermentation goes on in the stomach, I felt the value of discovering something that would stop that process. I placed some of the contents of my own stomach into a bottle, and I found that the process of fermentation continued, and that microbes were multiplied and propagated, and flourished exceedingly. This showed to me as plainly as is the sun at noonday that the same process goes on in the stomach. I, from time to time, added different medicines to the same, and still the fermentation was not checked. The microbes grew in spite of the medicine, telling me that this was useless as a curative agent. Under such circumstances it became no longer any source of wonder to me that I did not get well, or that instead of improving I steadily became worse. When people are sick, it is not money that they care for. The cost of drugs and the doctor's fees are a secondary consideration, but when disease is not stopped they become discouraged. Their pain and suffering continue, and money is of little consequence to one who feels that if he cannot get help death is before him. I write this book for the benefit of the public and their welfare, feeling that the world is my country, mankind my brethren, and to do good is my religion.

In this spirit I have advanced thus far, and in the same I shall proceed to tell what I know. Possibly some persons

may be offended; perhaps I may be the means of injuring the business of some. If so I cannot help it; let them follow some other occupation, for there is much to do in the world, and bread for all who will do it. My purpose is to give the truth of my own experience and knowledge regardless of consequences to all who are not pursuing an equally open and straightforward course.

I have often felt pain in the stomach, either from overeating or from drinking too much water, and then I almost always get relief with whiskey. This shows that good whiskey or alcohol will stand the test; but if whiskey or alcohol be mixed with water, fermentation is not stopped. Drugs are now generally preserved in alcohol or whiskey, these in a pure state being the most harmless of antiseptics. But give a patient a pint of alcohol in twelve hours and you not only intoxicate him, you kill him. It is not desirable to give it as an antiseptic, and I regret to have to place it in the list with them, because it creates a taste for spirits, which is not desirable, and people are too much addicted to them already. But common-sense will tell most people that even alcohol is less harmful than morphia, chloroform, or the ordinary poisons and antiseptics known to physicians. If they doubt this let them go into some of the Prohibition States, where morphia and opium are taking the place of whiskey, which the law forbids, and a worse state of things is fast growing up than that which existed under the old law. Morphia and chloroform are excellent microbe killers. If we could use them freely as water no other medicine would be needed.

Finding, then, that alcohol was a powerful antiseptic, and knowing that it is derived from the vegetable kingdom, from fruit, grain, rice, potatoes, and any thing that contains starch or sugar, I made raids upon my garden and the prairies. I gathered up every kind of plant that had any aromatic properties, and extracted the oil. I took a similar extract by grinding up onions, sage, thyme, tomatoes, and various other fruits and vegetables as well as

leaves. In fact, I refused nothing that offered me any kind of juice, oil, or extract which would not ferment when mixed with a sufficient quantity of water to be rendered harmless in the stomach when taken in large doses. But I was not successful. I did not find any thing that would answer my purpose. The more I worked, the more I experimented, the more convinced I became that there was no medicine to be found in that way which would kill the microbe and stop fermentation without killing the patient; and that is what the doctors told me when I first introduced the microbe killer to public notice.

However, I was now thoroughly disheartened. All my efforts had failed; all my experiments had proved fruitless, except to give me negative results and to tell me I had undertaken something that could not be accomplished. I lay down to die. I felt that there was no cure for me, no hope that I could get better. I had tried every thing that friends or physicians or my own reason could suggest, and all to no purpose. My weight had fallen from one hundred and ninety pounds to one hundred and forty-four. My energies were exhausted and my spirits were depressed. But the subject still occupied my mind, and my rest seemed to stimulate my brain. I thought over the matter incessantly, until at last something happened which had not previously occurred to me. Nature had so often told me how she purifies the air, what the effects of a thunder-storm are, that it was nothing for me to go to her once more for instruction and advice. I asked myself the question: What is air? Is it nothing more than oxygen, nitrogen, carbonic acid, ammonia, and water, with electricity pervading all? And if there be any thing more, what is it? and how can we make it? I turned these questions over in my mind constantly. I knew that there was pure air up in the mountains. I heard of oxygen treatment, hydropathy, water cure, electricity, and I read of doctors, or professed doctors, who practised them, so I concluded that there must be something in the suggestion. On this I set to work once more. I examined each

theory separately, and prepared several forms of apparatus before I arrived at that which we now use. My success did not come all at once. I abandoned my plans three times, as each combination failed, but I felt that it was a case of life or death, that I must either succeed or die, so I put all my energies into it, and persevered, with the result that at last I had in my possession the means of killing microbes that had all the requirements I had specified. I found a combination which was perfectly harmless to the person taking it, and which kills microbes with certainty; also one which is quite different from any thing hitherto numbered among curative agents. I tested it fully, and assured myself of its properties and powers.

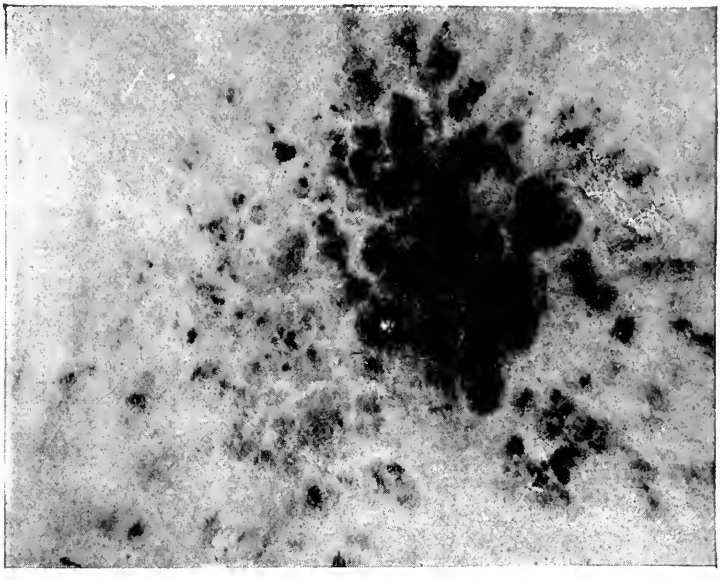
I tried it upon myself, and the effects became apparent almost immediately. I increased the dose gradually until I found how much best suited me; then I persevered, and the effects showed themselves promptly. Peculiar sensations were felt all over me, but especially in the most afflicted regions, as though the microbes were shifting about my body, but there were no bad effects whatever. My stomach became clean. Fermentation ceased. My appetite improved, and digestion was good. I increased the dose from three to six wineglassfuls a day, and grew weaker. My energies failed me, and I became depressed. Consequently I stopped taking the microbe killer for a few days till my stomach recovered itself, and then I renewed the treatment, but regulated the doses by my feelings. For a long time I felt very ill, some days being worse than others, but this was readily accounted for by the low and weak condition to which I had been reduced, and my state of nervous depression was extreme. The microbes that were in my body probably did not like the treatment, and they seemed to be constantly moving about, but I knew that I had something which could not hurt me, and I persevered steadily. I knew from my garden experience how difficult it is to get rid of weeds and to cure blight and fungi from the plants, especially when they have been allowed to get ahead and to increase and flourish undisturbed.

My blood must have been teeming with microbes which had been propagating and increasing for years, and it would have been folly for me to expect to get rid of them in less than twelve months. My disease had become chronic. It had remained so long that it had almost grown to be a part of my system, a part of my constitution, and it is always difficult to eradicate any disease in that condition. But I had hope, and my hope had grown into confidence. All my experiments came back to me now and assured me that I was in the way to get well, if such a way existed. So I went on, and so favorable was my progress that at the end of three months I felt almost a new man. I was considerably better. I had no longer any attacks of rheumatism, and the fever had abated so much that I felt only the slightest symptoms of its approach. Sometimes I laughed to myself at the extraordinary cure, and at the thought that a disease that had defied all physicians, all drugs and remedies that could be suggested, all the advice of friends and the rubbings of massage-doctors, should be got rid of by drinking water. My appetite became so ravenous, and my digestive powers so strong, that I could eat several pounds of meat daily, and it increased my strength rapidly. My nervous prostration ceased, my energies returned, no pains annoyed me, I slept well, my mind became more acute, and there was every evidence of an improved condition and much enrichment of the blood. Of course my friends could not fail to observe the change, but for a time they were puzzled to think what was the matter with me. I kept the matter secret for a long time, for I did not wish to offend my friends or disturb the equanimity of the good doctors who had so long and so faithfully administered to the welfare of my microbes. Six months after I had taken the first dose of microbe killer I felt myself entirely cured of the rheumatism. There were no more pains whatever of any kind. The fever had also entirely gone, and the piles were gradually disappearing and were almost well. I then weighed 144 pounds, and had the appearance presented in the picture from a photograph on the opposite page. My weight now is 205

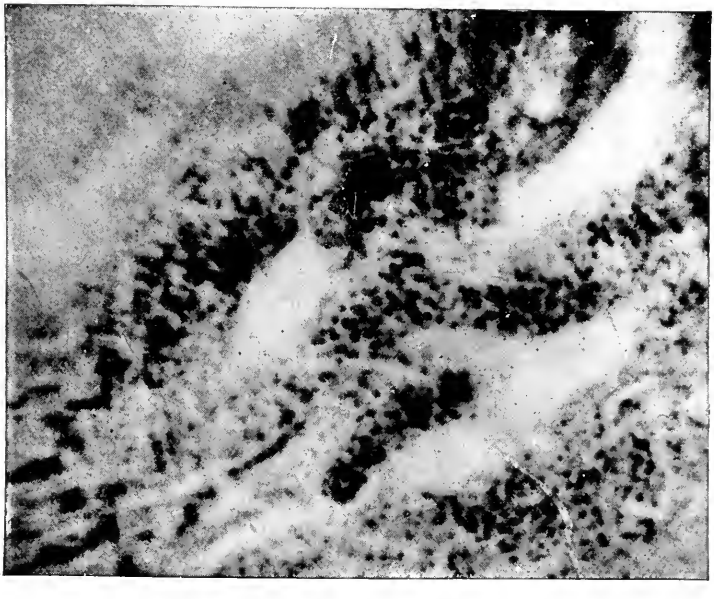
pounds. I felt weak throughout the first year, especially at times, but this was to be expected after the length of time that I had been ill. My blood had become thin and was reduced to a very bad condition, so it required a long while to be restored, and the system did not seem capable of restoring it as fast as the medicine removed the microbes.

When I first experienced an improvement I was curious to know how the microbe killer would act in other diseases, but I had some fears. I thought: "Suppose I give my remedy to some patient who is under the care of a doctor, and suppose he should die from the poisons that that physician would be giving him; the blame might be charged to my bottle, and I might get indicted for manslaughter."

I knew such cases had happened, and I was well aware that the doctors or their organization would be but too glad to get hold of me, and to put me in just such a position. They do not tolerate any interference from outside their own body, and although they themselves may kill, they do not allow other people even to cure if they can help it. However, I determined to manufacture and sell my medicine, and to make a business of it, feeling sure that it would be profitable; but still, and the more on this account, I did not feel disposed to get myself into any trouble. I thought so much of my discovery that I dreamed of it, and one night it seemed to me that the people must have it. After that I could not resist asking my workmen if they knew of any sick persons around the neighborhood. "Yes," said a negro; "I know a man, George P———, who has consumption pretty bad. His sister will probably die of it soon, for his whole family have died of it." "Well," I thought, "if that man dies nobody can blame me," so I determined to take the risk, and I gave orders to have the man brought to me. He came, and I saw a mere skeleton. The man had wasted away almost to the bones. He was pale and bloodless, with sunken eyes, and the hectic flush peculiar to phthisis. He was worn out with a cough, and reduced to a terrible degree of weakness. Death was staring him in the face, and he well



CAVITIES IN LUNG.



TUBERCLE--CAVITY IN LUNG. (PARIS.)

understood that the doctors held out no hope for him. I talked to him, and told him that I would give him something to cure him. I explained that it had cured me, and I was in a condition little better than his own. I advised him how to use the water, and requested him to come around again soon and let me know how it worked.

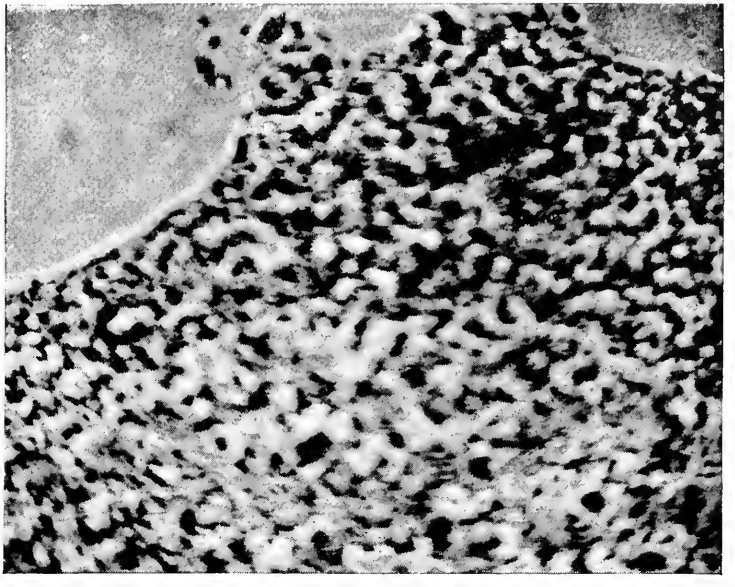
Another of my men told me of a woman who for six months had been under a doctor's care, suffering from a large growth and much pain in one of her breasts, and she wished also to try the preparation. But I explained to the man that I could not give it for any such purpose, because if the woman should die I should incur an awful legal responsibility. At the same time if he wanted to take a gallon there was one in the adjoining room. The gallon soon disappeared, and I consoled myself with the thought that if the woman died I could conscientiously swear that I did not give her the water, as the old man took it. Well, at the end of three weeks George P—— made his appearance again at my house with an empty jug, and he wanted it filled again. He complained of pains shifting around in the neighborhood of his waist, but said that otherwise he felt generally much better. I let him understand that such a disease as his could not be got rid of all at once, and that he must bear patiently all that came, for he had given up all thought of being cured and had reconciled himself to the belief that he must die. At the same time I pointed out to him that I had also abandoned all hope of being cured, and thought a speedy death was inevitable, but I had been cured by means of this same preparation, and I could see no reason why his chances were not at least as good as mine. He went away encouraged and continued the treatment. Soon after a messenger came from the woman for more medicine, and assured me that the fearful pains she formerly suffered had almost subsided. This gave me courage. I became now quite fearless and gave her a second bottle, which in due time sufficed to cure her. The man improved steadily, but his sister under the doctor's

care died. In a short time I had twenty female patients in Austin, Texas, one with a cancer on the tongue, which disappeared after she had used three gallons. Three of these ladies had been given up by the doctors, who saw no possibility of lengthening their lives except by an operation. Certificates from these patients have been published in the Austin papers, and some equally valuable appear in my pamphlet, "History of the Microbe Killer," which is given away by all my agents.

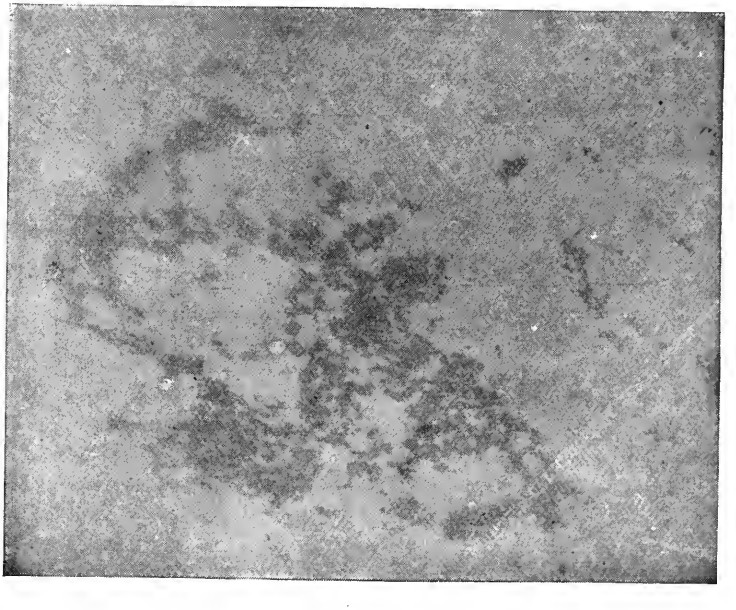
My plan was this: I used persuasion and advocated perseverance. No matter how low the patient might be, I induced him not to give up taking the remedy. I merely required them to discharge their doctor and not to use any other medicine, but to faithfully take the water, to let me know what progress they made from time to time, and on these conditions I undertook to supply all the medicine that was necessary. All, without a single exception, were cured, provided they came to me in good time. If the doctors abandoned them, and they died, no blame could attach to me, so I had nothing to fear from the medical profession. The cases that came to me were all different. Some had local diseases, others described their ailments as being general all over the body. They told me all they had done, the quantity of medicine they had taken without any effect, and the trouble and misery they had gone through. Some told me pitiful tales how all their money had been spent in doctors' bills and drugs until they were reduced to the last stage of poverty as well as disease.

But notwithstanding my astonishing success in the treatment of all forms of disease that came to me, I was very reluctant to jump into the medicine business and to abandon my flowers, amid which I felt like a father among his children.

During a stay of eighteen years in Texas I had improved thirty acres, and got a fine place and a comfortable home around me, such an one as is not often seen west of the Mississippi. I was fond of country life, gloried in my



CONSUMPTION.—MICROBES IN VOMITED MATTER.



CONSUMPTION.

flowers, fruits, and trees, loved to be among the birds and the fish, and felt all the enjoyment that belongs to the sportsman. There are health and pleasure in a life amid Nature's works which the city resident never enjoys, and I am happiest with them. There are anxieties and cares everywhere, but more independence in the cultivation of the soil than in any mercantile pursuit that can be followed; and I was loath to give all this up for the toil, vexation, and trouble of such a career as would be before me if I entered upon the business that my successful discovery opened out before me. Moreover there were other inducements to keep me where I was. I had expended many thousands of dollars in improvements, such as are seldom seen in the nursery business.

In addition to flowers I had gone into fish culture. I had five pools well stocked with German carp, and as my health improved I felt myself young again, more anxious than ever before to enjoy the pleasures of the life I had prepared for myself, and more enthusiastic also in my work. A steam pump supplied five hundred gallons of water per minute, and my fountains were filled with goldfish. The rosery contained a beautiful collection of the finest flowers, and thousands of people had come to admire it and to wander in amazement among acres of pear-trees, fruit-trees, and vines of all descriptions, and flowers without number growing in the greatest luxuriance under the warm southern sun.

To a lover of nature the delights of such surroundings are more than it is easy to describe, and they are increased when is added the feeling that they are one's own production, the result of one's own conception and labor. It is no easy matter to tear one's self from such surroundings when they so thoroughly accord with the tastes and sympathies.

I at that time supplied the Austin people with my medicine free of charge, first for fun, perhaps not realizing the value of my discovery. But the news leaked out. People began to talk about my medicine, and some of them came to my garden and begged with tears in their eyes to have

some of the water. The wonders it had done were common gossip, and people were telling each other how this or that lady had been cured. I felt for these people, for my heart beats for my neighbors as brothers, and I had to neglect my garden and my flowers to manufacture the medicine for those around me. Thus the work of eighteen years was thrown away, for I am sorry to say that my garden is gone. I turned over my treasures to people who knew the value of money, and by whom the higher merit of such things is not understood. It was, however, a painful necessity. The continuous demand for my preparation forced me to leave the business that I had learned from my father, and it has led me into so much worry and excitement that I have many times regretted ever having made a business of it. Under my groves of vines and fruit-trees, in the companionship of my flowers, and amid the delightfully congenial surroundings of my Texan home I had enjoyments which nothing since has compensated me for.

My success with the medicine of course satisfies me that I must inflict a lasting injury upon medical science as it now is, and as a consequence thousands of physicians and others will become my enemies. Possibly I may be regarded as a very bad man, not because I have done any evil, but rather I think the reverse, but because I have done something different from others, something that must interfere with their pursuits and prejudices, and with their present means of livelihood. That is the way of the world, and I will yet show the reader something of the kind of people there are about, and of the meannesses of which they will be guilty to put by the devil's help a few dollars into their own pockets.

I know the world well enough to be quite aware that as soon as my discovery was well before the public, and its value known, there would be numberless imitations, numberless thieves ready to steal my ideas, to counterfeit my remedy, and to try to damage my reputation. This last they cannot do, for my character as that of an honorable, hard-working citizen is too well established in the State of

Texas, but they will try to make money out of the endeavor. I have led a quiet life, minding my own business, and not looking after other people's, and contests with the law or in the courts have never disturbed me. The people in Austin had confidence in me, and my publications on horticultural topics made me well known, so that when the nature of my discovery leaked out I found it useless to try and keep it secret, and I published some account, first in the Austin *Statesman* of August 30, 1887.

That was the first announcement made to the world that I had discovered a remedy that would cure disease, and of my theory that there is but one disease and one cause of disease, no matter how varied the symptoms in different cases may be. It was the first time, also, that I laid claim to being the only man that could prove these things, and who had experimental evidence of it gleaned from a study of Nature. I showed at that time that all disease is caused by microbes, and I described their organisms, producing at the same time testimonials from persons who had been cured, but who had been given up as incurable by the doctors. This created an excitement throughout the country, and it particularly stirred up the physicians who heard of it, and all interested in the medical profession. It was at this time that we first began to sell medicine in a business way. I kept up my publications, and almost every week I had printed testimonials and evidences of cure, occasionally, too, of very complicated diseases. I was not interfered with, for I killed nobody, and of course any man may cure another with water if he likes.

There are no laws against curing or even treating another person, but if the person dies, then if the man who treated him be not a physician, protected by a piece of parchment, the case is one of manslaughter, and he is liable to suffer all the pains and penalties of that offence. When a person is sick he may put himself in the care of anybody he pleases, but if he happen to die, his attendant may possibly incur a punishment of lifelong imprisonment. That is the law

here, and it prevails in Europe also. I therefore ran some risk, for although I knew that my medicine was not injurious, yet the people who came to me for treatment were often in the advanced stages of disease, and if any of them had died while taking my medicine, there were plenty of doctors in the neighborhood ready to take advantage and to have me indicted for manslaughter. And it was not the doctors only, for success always creates jealousies, and there were people who, for reasons of their own, did not want me to succeed, and they too would have taken advantage of any opportunity to ruin me.

My life at this period became very exciting, very different from the peaceful times I had had among my flowers. People from all directions wrote to me for information, and sometimes they sent me a description of their ailments. These letters were marvels of composition. A person afflicted with some chronic complaint perhaps must have sat down for half a day's work to describe all his troubles. Possibly he would fill half a dozen sheets of paper, and close his letter without having told any thing that an ordinary physician would have felt it necessary to know. But I knew that his symptoms were of secondary importance. They were interesting to have, but not essential, because all disease is due to the same cause, and requires but one cure.

I could not make my correspondents always understand this. They had been accustomed to have the most minute inquiries made by their doctors, and they could not comprehend how I could go to work and cure people without getting the minutest information and asking them an infinite lot of questions. They seemed to think it impossible that I could put up the right medicine without knowing every particular, and perhaps some of them may have felt a little distrust on that account. But if their confidence failed them it was not to be wondered at. They had been deceived so often that they were naturally suspicious, and when people who wanted all details had failed and I undertook to cure without such minute information their suspicions were not likely to be lessened. I often had great difficulty in explaining

this, and that I had only one remedy and one way of using it, which is all that is necessary since there can be but one cause of disease.

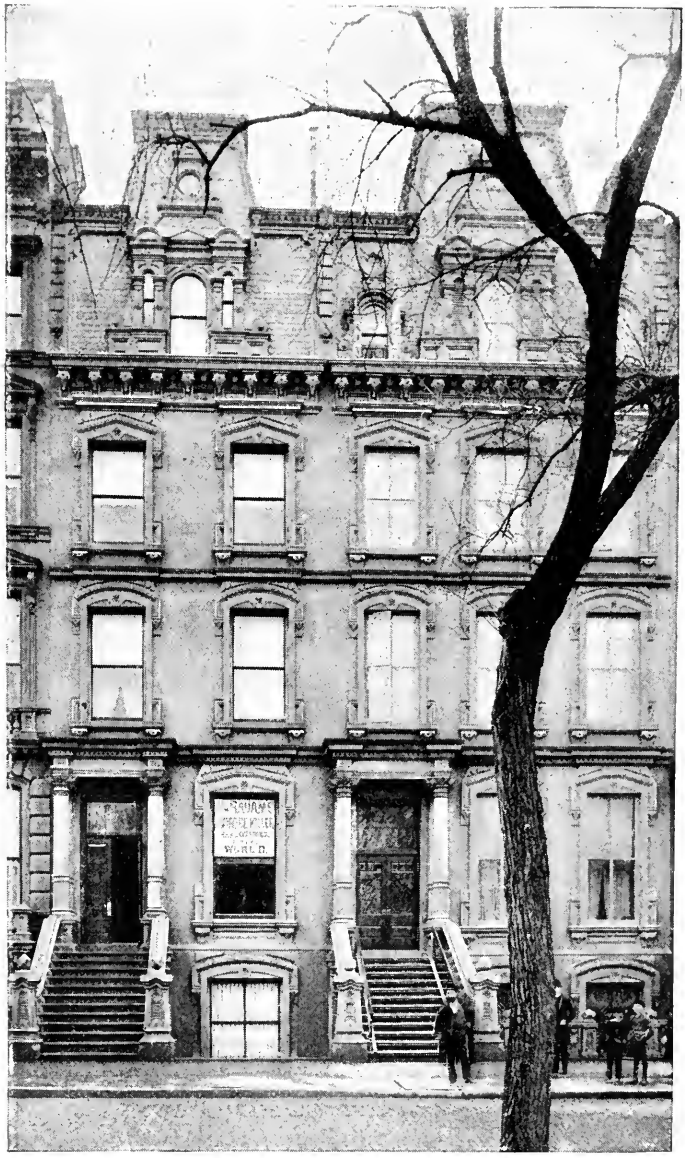
Then again they could hardly believe that I who had myself been so long a victim to disease, and who had been so often deceived,—I, too, a nurseryman and florist, could have discovered a remedy which thousands of physicians and men of science had been looking for in vain. It perhaps seemed strange. There were men engaged in scientific studies, devoting their lives to the treatment of disease, to the examination of remedies, aided with money, power, and protection from the law, with all the resources possible in this world to such kind of research, and they had failed, while I, a plain man, from a so-called backwoods country, without any such advantages, with very little money, and without any protection, had been able to start a discovery of my own which would revolutionize medical science, upturn all old theories, stop the processes of deception practised by doctors, enlighten the people on matters most important to themselves, and all by a simple and efficacious cure. This was done by simply putting natural proofs before the public, so that they could not fail to believe what they saw, in place of going out of my way to describe some evil spirit that I had not seen. I had raised a foundation that no power in the world can break down, and the reader who will follow me to the end will see that I have been able to ward off all kinds of attacks, some of them of the most infamous and malicious character, absolutely untruthful, and based upon ignorance where they were not inspired by the worst motives. I have defeated such attacks invariably, and with the help of the public whom I shall have enlightened I can go on and beat down all opposition whether it comes from a want of knowledge or from evil minds and jealousy. My army of friends, patients, and supporters is growing day by day, and there are hundreds, nay thousands, of physicians assisting me in the exposure of medical science as it is taught in the schools and practised in the hospitals and medical colleges.

It was at Austin, Texas, my own home, that the people

first enabled me to introduce this medicine throughout the broad land of America, and they did so because they saw I cured the people who came to me. Many of them had influential friends elsewhere in the United States, and they sent to them accounts of the fame of my discovery. Frequently they forwarded medicine at the same time to persons whom they knew to be in need of treatment, and often my circulars went with it. The only publication I had at that time was a small four-page print, and it brought me hundreds of people who benefited by the treatment and then themselves advertised the wonderful powers of my discovery. But my business grew so rapidly and so earnest a desire was evinced to know more about my medicine that I soon found it necessary to enlarge my publications, and what was at first but four small pages grew in two years to a large octavo pamphlet of fifty pages. This contains in not the least valuable portion a number of testimonials from persons who have been benefited or cured by my treatment, and they are unimpeachable.

Still the public curiosity was not satisfied. Intense interest was very naturally felt in the discovery, which was recognized as something not only wonderful in its effects but evidently calculated to bring about a sweeping reform in the management of disease and in the methods of medical men. Further than that, I had in self-defence to protect myself against the machinations of unprincipled people, and for that there seemed to be nothing better than to take the public into my confidence as fully as possible. Hence the reason for my preparing this book, which is an emanation simply of my own brain, with a statement of my own thoughts and experiences. It is original. I am not indebted to any other books for ideas or opinions, nor to any hearsay evidence upon the topics touched upon. It is my own property, the result of my own hard work, and I hope that it will be respected as such, and that no one will steal or pilfer its contents.

There is no permission from me to anybody to use my



HEADQUARTERS, 813 FIFTH AVENUE, NEW YORK.

writings. Whoever takes them steals, and when the thief is caught justice and the law shall be meted out to him.

Almost from the first the cures I made with my medicine were reported far and wide. The reputation of my discovery spread rapidly. People found that they could do without doctors. Many who had been under physicians' care took it and found themselves benefited as they never had been before. Others had recourse to it as soon as they felt themselves sick, and they were relieved so readily and satisfactorily that they had no occasion to apply to a doctor at all. It was therefore quite natural and not at all to be wondered at that physicians should begin to take an interest in it. They found their fees becoming fewer, and they wanted to learn something about a discovery which was thus so materially affecting their interests. But before learning any thing they condemned it. Their plan was to hang their man first and try him after. All that they knew about the microbe killer when they first abused it was that it was interfering with their business. It has continued to interfere with their business, and it will interfere yet more, so that they cannot but be a little anxious about it. They began by telling the most wonderful stories about it. They described to their female patients what a terrible thing it was, and that if they took it, it would in a short time burn up the coating of the stomach, producing incurable disease, and ultimately death. But while painting this alarming picture they saw that, like all such things, it would have its day, and then die out. They gave it twelve months in which to disappear and be heard of no more.

I heard all this, and it amused me, the more so because I found that some of the doctors who so energetically condemned it were using it themselves. Life is sweet, and while there is life there is hope. *Ægroto dum anima spes est.* So the sick doctors, when their own medicine failed them, had enough hope left to try mine, and they got well. But they would not give me credit for it. They were afraid, because every sick man cured by me was so much loss to

them. So they went on abusing me, and at the same time seeking my help. How could I avoid laughing at such a scene?

The demand continued to increase. It grew beyond my ability to meet it, and I was forced into making arrangements for meeting the requirements of what had now become a most successful business. Accordingly I tore down my little seed-store and erected a two-story building, 46 feet front by 160 feet deep, of an elegant design, as the illustration shows. This structure is still standing at Austin, and has become the headquarters of the business, from which seventeen other factories controlled by as many companies have sprung into existence within twenty-four months, while the discoverer of the microbe killer has changed his residence into a beautiful mansion on Fifth Avenue, in New York, facing Central Park. There it is that these lines are written, and thence the whole business throughout the world is controlled. This indicates the success that has fallen to me, and the appreciation which the public have bestowed upon my remedy, for people are not slow to determine the merits of something that is what it is represented to be, and there are none of us of sane mind who do not set good health as higher in value than gold.

INTERIOR OF OFFICE OF W. RADAM, 813 FIFTH AVENUE, NEW YORK.

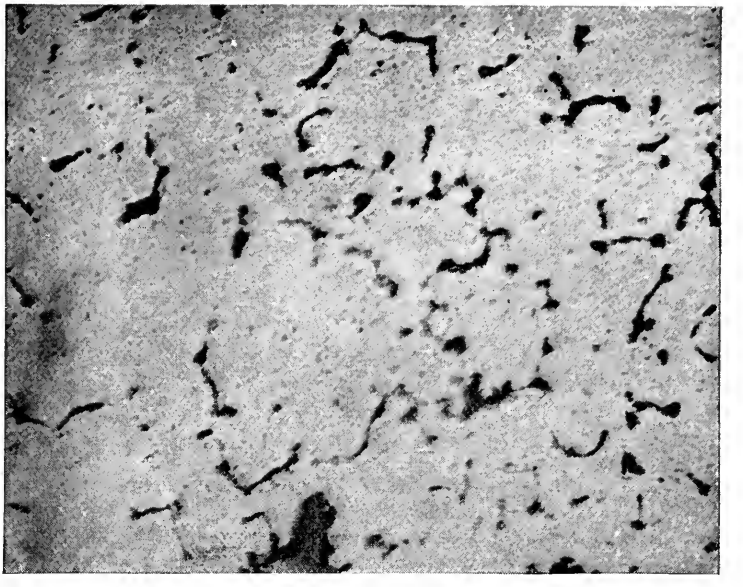
CHAPTER IX.

HISTORY OF MY DISCOVERY.

I WILL now go back to the first few months while my discovery was before the public. This will necessitate the narration of several interesting incidents which have taken place in the interval.

It will readily be understood that my correspondence has been large. For some time I was in direct personal communication with my patients. They would write me full particulars with all details of their complaints as far as they could give them, and all such letters I replied to personally, giving advice as to the best way to use the remedy and all necessary instructions. But people soon acquired confidence. They soon learned what to do. The reputation of the medicine spread, and people ordered it without writing any particulars or asking any information. In this way thousands of people have availed themselves of it, but of whose maladies I know nothing. The information that came to me was surprising, but it is not necessary to detail it here. Where full statements were given I learned the varieties of the disease that doctors described, the effects of climate, the quantity of medicine that had been swallowed, the large sums of money spent in fees and drugs, and then at the end of all, how the doctors had entirely failed to do any good. Very often the symptoms were worse than they had been at the beginning, and sometimes I heard how friends of my correspondents had died under the physician's treatment.

I had letters containing pitiful stories of distress and misery quite unalleviated by the medicines prescribed, and many wrote me, who said that they were bedridden; others, that they were nearly helpless and unable to move, and others again, whose powers to work and earn their living had been terribly interfered with. I was at times amazed at the revelations put before me, and found in all an endorsement of the results of my own experiments and a further proof that the doctors ignore Nature's teachings and work in ignorance and darkness. When a patient came to me, or wrote me for advice, I always explained to him his situation, describing the action of microbes, and how, when thoroughly in control of the human system, they produce a general condition of fermentation and rottenness. I let them always understand that a total renovation was necessary, that the purification of the blood must be complete, that no microbes or causes for fermentation must be left behind. This was an absolute necessity; and then it would have to be seen how much healthy portion remained. The whole treatment was different from any thing they had been accustomed to, and my advice may sometimes have opened their eyes and given them new ideas, but I can conscientiously and truthfully say that in every instance where my counsel was listened to and my instructions were followed, a cure was effected, no matter what name the doctors may have given to the complaint. Where advice was not followed, when the patient went by his own judgment and rejected the rules laid down for him, the treatment was not entirely successful, and I never expected that it would be. Physicians themselves constantly have cases of that kind,—cases where strict instructions are given and the patient either will not or cannot carry them out. The result is rarely satisfactory, and the patient must then be held responsible for any failure. So in the use of my discovery, if advice is followed and the medicine be taken properly, a cure must be expected; if otherwise, the patient has only himself to blame.



PILES.—MICROBES FROM RECTUM.

GANGRENE.

I treated all my patients with the same medicine, just as in my garden I would treat all weeds alike. There are endless varieties of weeds, a very large number of which are familiar to me by name, but that would not cause me to pause about their extermination, or the method of effecting it. What matters it what the scientific name of a weed may be? so long as it is a weed, that suffices. It is swept away. We do not adopt one method of removal for one kind, and another for another. It may be interesting to the botanist to classify his plants, to name them and describe them and to tell us what their properties should be; but that kind of knowledge is of only secondary moment to the practical gardener who wants to see the most vigorous health and growth among things that are his special care.

Suppose a gardener were to see one of his flower-beds overrun with weeds of various descriptions, and were to tell his assistant first to classify those weeds, then to pull up one kind, afterward to cut off another, and so on; by the time the work was accomplished the flowers would be smothered to death, and new weeds would be coming up where the first had been removed.

So it is with disease in the human body. We are not to waste time and endanger the patient's health by trifling about special symptoms. We know the person is sick. We know the cause of his sickness: let us then remove that cause, and the person will be well. If we choose to talk among ourselves about his symptoms, that will not harm anybody, but we have no right to endanger a patient's life or to delay his cure. Did you ever go into a hospital when a leading physician is going around the wards? A new patient may have come in, whose case particularly interests him. He will stop at the bedside of that patient, and although the poor fellow may be too sick to rise or turn, he will spend half an hour pounding and thumping him, listening to his heart and his lungs, and going through a tedious ceremony, simply to try and diagnose some minute points which have nothing whatever to do with the

cure or with the mode of treatment that the disease calls for. It looks scientific. It tends to surround the doctor's calling with a halo of mystery. It deceives the patient and the public. It keeps them in ignorance. It hides from them the true simplicity of medicine and disease, and leads them to suppose that there can be no chance for them in this world or the next if they attempt to cure themselves without a physician's aid. Diagnosing disease is simply blindfolding the public, but physicians dare not acknowledge it, for if they did, their glorious work would be undone, their services would not be needed, and they would have to fall back upon other occupations.

I have ever been a close observer of human nature and of the world and I have seen a great deal of it, but never till my discovery came before the public, was I aware of the numberless tricks and devices that are used to deceive and take advantage of the sick. There seems to be something very heartless in a system which enables any set of men to avail themselves of the time when a person is suffering and perhaps in despair, to prey upon his credulities in order to draw money from his purse. Some doctors do this literally and without compunction. They look upon a patient's misfortune as their opportunity, and they amass money by just such opportunities. Many physicians are more regardful of their own honor and the people's rights, and when they waste time in diagnosis, it is done in ignorance. They believe they are enlightening themselves and serving their patient, not knowing that all the trouble they take is unnecessary.

While expressing this opinion, I cannot be blind to the spirit of charity which abounds in the medical profession, whose members certainly do more for their fellow-men without thought or hope of reward, than any people who depend upon their own efforts for their livelihood. People owe more to the physician than they acknowledge or perhaps realize, nevertheless medical science is imperfect, medical ethics are obstructive, and medical men, even when acting

up to the fullest requirements of their profession, are too often in a rut that leads them to error and militates against the best interests of the sick.

There is much evidence at hand of the value of my discovery. It may not be necessary. I have probably adduced enough already to satisfy my readers, but I wish to make this work as complete and as thorough as possible. I must therefore cover the whole ground, in justice both to myself and to the public. I have already mentioned that some of the doctors foretold how my discovery would go the way of quack medicines, by which they meant that in a few months it would be forgotten. The present state of my business, the facts that there are seventeen factories engaged in making the microbe killer, that it is already established throughout the United States and is being sought after in Europe, in other parts of the great American continent, and in Australia, all go to show what false prophets those doctors were. In place of going the way of worthless quack medicines, the microbe killer has become an essential in thousands of homes, and it has cured thousands of people also whom the doctors had failed to relieve. It has risen so rapidly into public favor that it has been difficult to keep pace with the demand that has been made for it, and our trouble has been not to get it recognized and sold, but to manufacture it fast enough to supply the public needs. Its success has demonstrated its merits and it has shown also that it supplied a want, that people's confidence in medical science was failing, that they were ready to grasp at something that promised to enlighten them and cure them, and at the same time to release them from the bondage in which they were held by their doctors.

Other physicians treated the matter less lightly. Instead of ostensibly regarding it as of no importance and soon to perish for want of support they cautioned their patients against it. Some said boldly that it was dangerous, that it would destroy the tissues and intensify disease instead of mitigating it. In reply to such imaginings people came

forward who had been cured, and others mentioned the names of friends who had likewise been cured. Of course there was no getting over facts like that, so then the doctors took other ground. They acknowledged that possibly it might have some beneficial effects in diseases produced by microbes, but that it would be absolutely worthless and even dangerous in such diseases as are not caused by microbes. When I heard this I offered to give my check for one hundred dollars to any one who would name a disease that is not caused by microbes, and who could prove his position. The offer has not yet been accepted, and it still remains open. Here is a chance for some of the young students at our medical schools and colleges, to any one of whom I shall be most happy to render that amount of pecuniary assistance if he will earn it by complying with the conditions. His discovery would immortalize him. He might carry his piece of parchment out into the world with the fame of having been a successful explorer in a region where others had groped in darkness. He would have made a discovery that never has been made, despite all the knowledge of human ills and all the science of which the medical profession claims to have a monopoly.

Those persons who have followed me through the preceding pages will see readily why the reward has never been called for. Disease is fermentation, and fermentation without microbes is impossible. Therefore disease must be accompanied by microbes. You cannot have an effect without a cause, and where a particular effect can be produced only by one cause, it is at once apparent what that cause must be. Nothing is easier than to talk and to say what is and what is not, but talking is of no value in an assertion without proof, and directly we come down to proof my position is impregnable. The doctors who say that disease can exist without microbes are either ignorant or guilty of wilful deception, and they show their weakness by refusing my offer. If they are ignorant they are not fit to have the responsibility for human life. If they are

capable of wilfully deceiving their patients in direct violation of the dictates of their own better knowledge they are unworthy of any position among honest men, still less of a place in the ranks of a profession that has so much pretension as that of medicine. They are unworthy of public respect or public confidence. They are merely human vultures preying upon the ignorance and credulity and weaknesses and sufferings of their fellow-men.

But all the efforts of the doctors fell harmless,—not from lack of energy, or from any want of repetition. They were poured out with zeal worthy of a better cause and with relentless violence. They came as the efforts of men in a life-and-death struggle, and so in truth they were, for the science of medicine in the form now held up before the people cannot stand against the developments which my discovery will certainly make. But it had no effect. The cures effected by the microbe killer were more convincing evidence than all the prophecies and forebodings of interested persons. A man cured of a disease when the doctors had failed was an advertisement which could not be ignored, and there were thousands of such advertisements all over the country. Cures were effected in such unlikely cases that they could not fail to receive attention, and the wonderful work of my discovery was more than an answer to the dreary talk of the doctors. The evidence startled the profession, and its members saw that if things went on as they were going, ruin would stare them in the face. They discussed the situation. They realized that the law would not help them, for I had infringed nobody else's rights while exercising those which belong to every citizen of this free country. I had done no harm to any of my patients. I had killed nobody. I had only endangered the prospects of men who were less useful, and multitudes bore testimony that in doing so I had rendered good service to suffering humanity. The only practical course that seemed to be left open to my enemies was to devise an imitation of the microbe killer. That they thought would at least counteract the work of my discovery

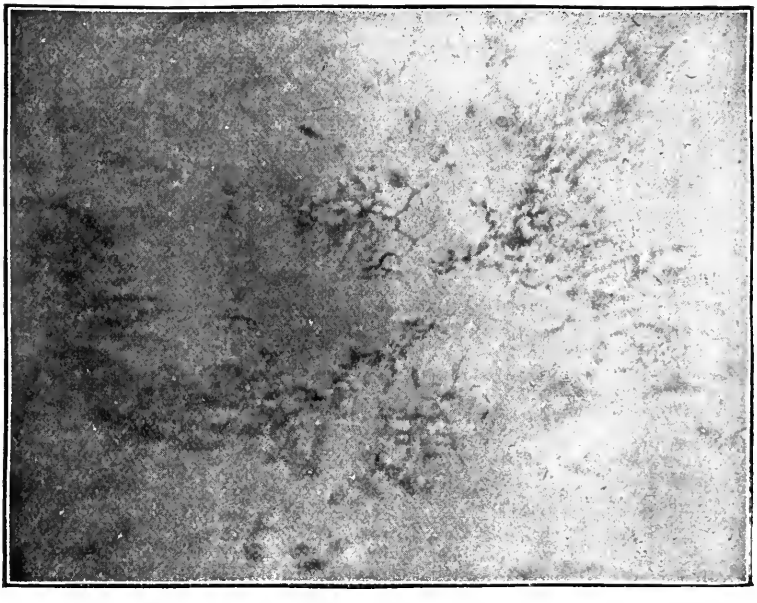
and spoil its reputation, and if any injury should be done by their imitation, they could readily put the blame upon me.

It was a fiendish scheme, but the world is full of adventurers and unscrupulous people, who are ready to steal the product of other people's brains and to prey upon their fellow-men. They cared nothing for the law. They rather sought litigation, knowing that justice costs money, and that if I had not enough wherewith to purchase that to which I was entitled, they knew that they could drive me to the wall. But fortunately I was not without means, although if I had been, if I had not been able to let the people learn the truth, or to fight my cause in the courts, I do not see how I could possibly have made as much progress as I have.

This, however, is always the case. Numberless inventions that would be of the utmost value to humanity are constantly being held back, because the owners are not strong enough to put them before the people, and to protect themselves against the harpies who would destroy them. And very frequently inventions that have wrought much public good, and have been active agents in furthering human progress, have brought no profit whatever to their inventor, although they may have given wealth and influence to people who came after and took advantage of his work. The world is full of such examples, and my enemies doubtless thought that if they were unscrupulous enough, they could force me to enter the same list. But they were wonderfully deceived. I had the power to protect myself, and I used it.

For four months I was undisturbed. But henceforward litigation began, and I had a year of lawsuits. This was something entirely new to me. I had never been a litigant. I had always tried to mind my own business, and to do harm to no man. So when I had, as I did sometimes, to pass a week in and about the courts, I felt an entirely novel sensation. I appeared in different characters, sometimes as plaintiff, at others as defendant. There is no occasion here to mention names and to go into too much detail, the more especially as I have issued a separate pamphlet on the sub-

CARBUNCLE ON THE NECK.



BACILLUS ANTHRACIS—CULT'D. (BERLIN.

ject, which may be had free of charge on application to any of the companies who are manufacturing my microbe killer. In that circular I have told how some eight or ten different imitations of my medicine were introduced, and I have explained the tricks which my opponents descended to, and described the fury of the medical profession at the failure of their efforts to ruin me.

But it is necessary that I should not pass this part of my subject by altogether in silence. I will therefore convey to the reader some idea of the miserable meannesses to which some persons had recourse, people whom I had never injured, but who were actuated by malevolence, simply because my discovery, to which I was fully entitled, chanced to interfere with their medical aspirations, or the sale of drugs.

The first notification that I had of the attack about to be made upon me was in the shape of an advertisement painted on my own fence. It bore the name of a doctor and druggist who sold and extensively advertised some nostrum for curing constipation, and he now added to the usual form the words: "It kills microbes." On another part of the fence he told how his medicine would "cure consumption." I was amused, and smiled at the thing. My neighbors called upon me and smiled too. "You see he is getting mad," said one. "He wants to make the public believe that he, too, kills microbes," says another. So everybody understood the trick, and presently the word "consumption" was obliterated, and the word "constipation" was substituted; which made the thing more ridiculous than before, and passers by seldom failed to laugh at the absurd effort to injure me. What was the consequence? Merely that the sales of my medicine went on faster than before, and the walls of my factory rose higher. Instead of injuring my business the scheme seemed to help it. The fact was it advertised me. People understood it, and they were more disposed to condemn such trickery than to permit themselves to be led away by it. I do not think that true man-

hood will ever come down to the level of maliciously injuring another; neither will it countenance any thing that is manifestly unfair and unjust. I had hosts of friends among my neighbors who stood by me, and who treated with more than contempt the paltry efforts that were being used against me by unprincipled and jealous opponents.

In view, therefore, of the failure to destroy my business, and of the manifest truth that their schemes were only stimulating a demand for my medicine, these people planned a new device, which they thought at least would check my prosperity, if it did not drive me out of the field. They formed a company, and among the incorporators was an old man whom I had cured of asthma. He had been afflicted for twenty years, and had tried every thing that physicians could recommend, but without deriving any benefit. At last he came to me, and, after a due course of treatment, his cough had left him, his breathing became natural, he had no spasms, and, in fact, he acknowledged himself cured; all of which facts I afterwards brought out in open court.

I felt sorry for the old man,—sorry that he had lent himself to be made a tool of by designing people to injure me who had relieved him of a terrible disease, and had so far contributed to the happiness of his remaining years of life. I had lengthened his days also, for he could not have lived long in the condition he was in when he came to me; and this was the way he showed his gratitude. He turned around and forced me into the courts, to annoy me and exhaust my means, and all because the other side, who were themselves gratuitously seeking to close up my business, had paid him to try and ruin his benefactor. Surely if there be a hell it must be the right place for such as he.

I cannot avoid narrating some of my experiences, and it is better I should not, for they illustrate the circumstances under which I put my discovery before the public, and they demonstrate the obstacles which any one may expect to have to overcome who has any thing valuable which nobody

else possesses. One day I received a package containing some newspapers and advertisements; also a jug and a circular, and at the same time I received a letter from one of my agents asking for an explanation. Then the whole scheme became apparent to me. Every thing was prepared in such a way as to lead the public to suppose that it was my medicine. The jug in which my medicine is sold was exactly imitated. The name was the same. The directions were identical. The wrappers, circulars, advertisements,—all corresponded with mine. The only difference was in the price. Trouble soon began. One person wrote me that he had procured the microbe killer of my agent for $2.50, whereas before I had charged him $3. Another wrote me that he had sent a post-office order for $6 a week before and that he had heard nothing about it. On inquiry I found that he addressed it carelessly, although he had had the order made payable to me, and consequently nobody else could collect the money.

Another patient complained that the last medicine sent to him was different from what he had before, and so it went on again. Every thing I used and printed was so closely imitated that people did not know that they were not receiving my medicine. The only difference was in the medicine itself, and there they could not imitate my microbe killer, so the person who was deceived by them may possibly have taken something that was even injurious, and, not knowing the deception imposed upon him, he would be likely to blame me if the medicine proved to be of no effect. That company employed the most worthless characters that they could get together. It did not matter. Their purpose was less to start a business for themselves than to destroy mine. They sent out dodgers with my own reading matter in them. They praised the virtues of their medicine much louder than I ever had occasion to do with mine; and in all their advertising they paid particular attention to those localities where the microbe killer was best known and had been most successful. One of their dodgers read thus:

"A Life Elixir at last. A physician, after life-long study, has discovered the greatest remedy on earth. It cures all microbe diseases, such as Yellow-Fever, Cholera, Consumption, Cancer, Catarrh, and a host of others."

The country is overrun with people who are awaiting an opportunity to benefit themselves at somebody else's expense, and again there are plenty of others always actuated enough by envy to wish to stand in the way of a neighbor's success; but it is not often that one hears of any thing so unscrupulous as the conduct of that company in their resolve to injure me that they might profit by my misfortune. There were only two things to do. I must either consent to let those people ride rough-shod over me and ruin the prospects I had from my discovery, or I must defend my just rights in the courts. There was nothing else—nothing at least that offered any practical and definite protection to me. My trade-mark was registered, and certain processes necessary to the manufacture of the microbe killer were patented. So far I had taken the necessary precautions to place myself in security, but that was not enough. A lawsuit was inevitable, and I soon discovered the joy and delight which lawyers feel when they are engaged in plucking a fat goose. Justice is a costly thing. It is every man's right, but it has to be purchased nevertheless. Theory and practice are very different. All men are equal before the law, says the one. But the other has a very different story, and insists that the almighty dollar shall intervene to stop the poor man even of his rights. There is no justice except what is paid for; and so I found, for impregnable as my situation was, my friends the lawyers took care to profit well by my resolution to defend it.

Some months before my case came up for trial, one of those old whiskey-soaked lawyers whom one meets with in places everywhere, came to me in distress. He was sick, and asked my advice. He followed instructions, bought some bottles of microbe killer, and got cured. He was delighted. "The people will build you a monument, Mr. Radam," he

said to me one day, and he never lost an opportunity to praise my medicine. He had good cause, for he had received more relief from it than he had from all the stuff that the doctors had given him, and he was glad to use it. But when my case got into court, I found him engaged on the other side. He cross-examined me, too, and some of his questions were: Are you a physician? Are you a druggist? Then, if not, how is it possible for you to prepare medicine? I told him that I was neither doctor nor druggist, and that he knew of his own experience that if I had been I could not have cured him or anybody else in the same condition, for those fellows always work for the almighty dollar, and not to cure their patients, if they can make more by keeping them sick, while they represent me as one of the most dangerous and one of the worst men that were ever born. I have often thought that if men like that lawyer and others I have met with should ever get to heaven, I should have no wish to be in their company.

The judge wrote the following finding:

1st. I find that the plaintiff manufactures and sells a medicine of good curative properties and large commercial value.

2d. That this medicine rapidly made a reputation, which gave it large commercial value.

JOHN C. TOWNES,
Judge Twenty-Sixth Judicial District of Texas.

Appended to the above I have the subjoined certificate:

THE STATE OF TEXAS, COUNTY OF TRAVIS.

I, John Dowell, Travis County, Texas, do hereby certify that the above and foregoing are true and correct extracts taken from the findings of the Judge as to facts in case of Wm. Radam *vs.* Capital Microbe Destroyer Co., *et al.*, in District Court of Travis Co., Texas, the original of which is on file in said Court.

Given under my hand and seal of office this 29th day of July, A.D., 1888.

JOHN DOWELL,
Notary Public, Travis Co., Texas.

Well, the trial turned out to my benefit in the end. A little trouble is sometimes useful. It serves to show us who our friends are. It brings out the best and the worst points in a man's character, and often teaches us that there are better people in the world, and worse ones, too, than we are apt to suppose.

The story of my discovery was now known to everybody. The lawsuit was a grand advertisement. All honorable people gathered around me. I found I had a host of friends, and that there were some among my neighbors who were qualified only to be cared for by Mephistopheles. Of the eight or ten imitations of my medicines that appeared within two years the majority belonged to sons of Æsculapius, who found it more profitable to drop their usual calling and to try to earn a living by imitating the work of another man's brains. They went where my microbe killer was best known, and probably they picked up a few dollars by their misrepresentations, for there are always a number of people about who are ready to buy any thing on the faith of misrepresentations that are made to them and without investigation. Sometimes these men went so far as to buy up my jugs from my own patients, refill them with their mixture, and sell as genuine. I doubt if there was ever any thing so much imitated in so short a time as was Radam's Microbe Killer, and for the simple reason that no similar discovery has made so great a reputation in the same time.

At my headquarters I have a collection of all samples of jugs, bottles, and circulars of my imitators, and if imitations increase as fast in the future as they did in the past, I shall have such a museum as cannot be equalled. It will be quite unique, and I can look upon it with satisfaction, because it is evidence that I have done something which is worthy of imitation. I also keep on file all the medical papers which have tried to cry down Radam's Microbe Killer, and to appeal to the public for protection against "quack medicines." Gentlemen, send on your papers as fast as you please, for there is plenty of room in my museum. It never

hurts me to be well-advertised, and every attack upon me is an advertisement. There is a spirit of fair play abroad among most people, and when they see a man attacked they are apt to pause and evince some interest. If they convince themselves that the attack is unjust, their sympathy is excited, and the wrong falls at once upon the proper party. It is only when the attack is justifiable that it can harm the object of it. In my case my neighbors knew me too well for any thing of the kind to hurt me; and where I was not personally known, my medicine spoke for me, and the microbe killer gave the lie to slander.

The factory at Austin had been in operation only nine months, when calls for a larger supply of my medicine came in, and new factories became necessary. Several new companies were formed, and to-day a little over two years have elapsed, and we have seventeen factories in full operation to supply the demand of the United States, Canada, and Great Britain. Is not this a proof in itself of the value of my discovery? If it were not capable of effecting what is promised for it, how could it have made such a success and been so largely developed in so short a time?

The people are not in the habit of supporting any thing which they know to be worthless. They may be deceived for a time, but any thing which advertises itself by its own merits and extends as rapidly in popular demand as the microbe killer has, must be worthy of approval and equal to all that is represented about it. It must be remembered further, that each factory as it started met with similar opposition. Each had to go through the same ordeal. The doctors, and everybody connected with so-called medical science set themselves in opposition to us. It might be supposed that the druggists would not oppose any thing that they can sell, but they do not want any thing that cures all diseases. They want as much profit as they can get, and they would rather sell half a dozen nostrums, even if they knew them to be worthless. It stands to reason that they do not care to see a person cured. They would rather keep

him on the string, and so make more money out of him. It is a mistake to suppose that the druggist any more than the doctor desires to get a customer off his hands. Then, again, every person who came to me at first, or certainly the great majority of them, had been swindled before by quack doctors, or had paid away a good deal of money in medical fees, and they were cautious. They investigated before they bought the microbe killer, and as soon as they found that it was as represented, they were equally zealous in proclaiming its merits.

My success has not been due to my own advertising. The microbe killer was bound to go because of its intrinsic value. It could not fail as soon as people began to find out what it is. All who are now in the business have used it themselves, either personally or for members of their family or both, and they have seen its advantages among their friends. From this experience they know that it must succeed. What they tell the people who apply to them is from their own knowledge, not merely from instructions, and they know that it must certainly supersede other medicines. Our agents who are evergwhere, are people of standing and character, they include ladies of all ages and gentlemen of all professions, and they are selling the microbe killer and curing people who have been given up by the doctors, and whom physicians have told that nobody can cure. I could cite thousands of cases that have been pronounced as beyond the reach of help by physicians who have been cured by our agents with the microbe killer.

Many experiences have occurred to me within the last two years, some of which I may mention. In 1887, yellow-fever prevailed at Key West, Florida, when it produced great havoc among the scanty population. I was anxious to treat it, feeling confident that I could control it. Accordingly I wrote to the Inspector of Customs there and expressed to him two gallons of my medicine, requesting to administer it according to directions without fear, as I was confident it would destroy the fever germs. I sent him

particulars of my discovery with testimony as to its efficacy and he told me he had never heard of it before. This was probable, for at that time it was quite new and I had taken no special means to make it known. But all to no purpose. He would not use it because, as he said, he did not know how it was made. This was acting up to the ethics of the medical profession, whose members profess to prescribe nothing which they do not understand the nature of and the composition or mode of manufacture. But when we look at the way in which that rule operated in this instance, we cannot fail to recognize how it operates to the detriment of the public. Here were people dying of an extremely dangerous disease. More than a fifth of those who were attacked perished. Medical science failed. I came in with the microbe killer confident that I could cure, and the doctors would not give me the chance to try. They knew that my medicine could do no harm, and they would not find out for themselves whether it would do good. They would rather see their patients carried away to the cemetery than break through a rule which says they must only use certain drugs and certain formulæ.

The deaths at that time were twenty-one per cent., and the doctors called that a favorable result and congratulated themselves on the success of their treatment, which the physician in charge explained to me. He said that he gave his patients as much turpentine as they could bear without being poisoned. Turpentine is abundant in Florida. Then to reduce the fever he applied ice to the patient's head, and his theory was that as the turpentine permeates the tissues it counteracts the poison.

Now, if that man still lives he should, in my opinion, be indicted for manslaughter for the methods that he acknowledges having used. The yellow-fever would not have prevailed in Florida as it did if the same kind of stupidity had not stood in the way of preventing it, for Dr. Wolfred Nelson, a Canadian physician, who has large experience at Panama, saw evidences of it at Jacksonville months before

and warned the people, but again medical ethics stood in the way, and as a result a large part of the population perished. Yellow-fever is at first infectious, but it becomes contagious as it advances in severity, and every hour is of consequence. There is no time to experiment with remedies that have been known to fail,—and these are legion. A physician who has seen thousands of cases of it once said: "Four centuries have taught the profession nothing, or next to it. All that has been known of yellow-fever is that people got it and died. May God forgive the old school of medicine for its ignorance and charlatanism." That, I say, is the remark of a physician eminent in his profession and who knows whereof he speaks when he thus alludes to yellow-fever. But there is more in this. Yellow-fever is acknowledged by the doctors to be a microbe disease. The micro-organisms are in the blood, and they have the peculiarity of seizing upon the blood corpuscles and destroying them. The only form of treatment that can be of any use is one in which some agency is introduced into the blood that renders it unavailable as a culture fluid for the microbes, so that they cannot grow and be reproduced. Turpentine does not do this, and it only kills the microbes by first killing the patient. But that is the principle upon which my medicine operates. It goes through the system. It enters the blood, and while enriching that important fluid it gets it into a condition where microbes cannot exist. They perish as soon as they come in contact with it.

From what I have said in other places about the antiseptic properties of alcohol and whiskey, it may be supposed that these would act against the germs of yellow-fever, but they do not. As a matter of fact, all persons are liable to it in those parts of the tropics where it prevails. Moderate drinkers sometimes suffer more than total abstainers, and hard drinkers almost invariably succumb. Physicians know this, they know that this fever is a blood disease, yet they will not go aside from their old routine. They have hunted about for *post-mortem* appearances to find some pathologi-

cal conditions, but they find none. There are none to find. The disease is in the blood and nowhere else, and if they will examine the blood with a microscope they will see the microbes and the ruined blood corpuscles. The brain is affected in this fever, and why? Simply because the oxygen supplied in health by the blood can no longer be carried there; and the broken up corpuscles are eliminated and shown in the form of albumen in the kidneys. It is well known that yellow-fever may be communicated by mosquitoes. One only of these insects biting a healthy person after having drawn blood from a fever-stricken patient, can convey the disease; and it does so by carrying the microbe from one to the other.

I dwell upon this subject of yellow-fever because it is a most marked illustration of the value of my medicine, and to show that, although the doctors, or some of them at least, know these things, they would rather see a patient die under their old-fashioned treatment than live under mine. But the people are becoming enlightened. Their eyes must be opened to these things. They must be made to see for themselves how they have been preyed upon, and how the medical profession impedes the introduction of medicines that will cure, rather than move from their own beaten track. They must be allowed to recognize the perversity of the men at Key West, who, with persons dying in scores around them, refused to allow my medicine to be used, although its merits were put before them, and preferred to drench their victims with turpentine. If such men had their deserts, they would themselves be filled with turpentine, and then, following their own methods, be stowed away in an ice-house to cool off.

Yet such treatment is still being followed, as in accord with medical science. The reader will have noted in this connection what was said in previous pages about the use of paint as a preservative; and how turpentine assists to destroy fungi and micro-organisms on houses, fences, and on wood generally. Lumber of fat pine lasts longer in the

ground than sapwood, on account of the resin and turpentine, on the same principle. Thus, what Nature and the painter use to preserve dead matter, the physician uses to preserve living matter. Ice does not kill microbes, it only checks fermentation. Experiments have shown that they can sustain a degree of cold many degrees below zero of Fahrenheit, and still be as lively, as prolific, and as dangerous as before. Unfortunately, patients or their friends have found these things out for themselves. The physicians at Key West acknowledge a mortality among their patients of more than twenty per cent. I wonder whether the mortality would have been much greater if there had been no doctors in the neighborhood; but I have no doubt it would have been very much less if some intelligent system of treatment in accordance with the laws and teaching of Nature had been adopted. Friends of the victims have at any rate discovered that the medical system was a failure, and perhaps if ever a similar visitation should fall upon them, they will be ready to cut adrift from medical science and get the benefit of a consistent medicine.

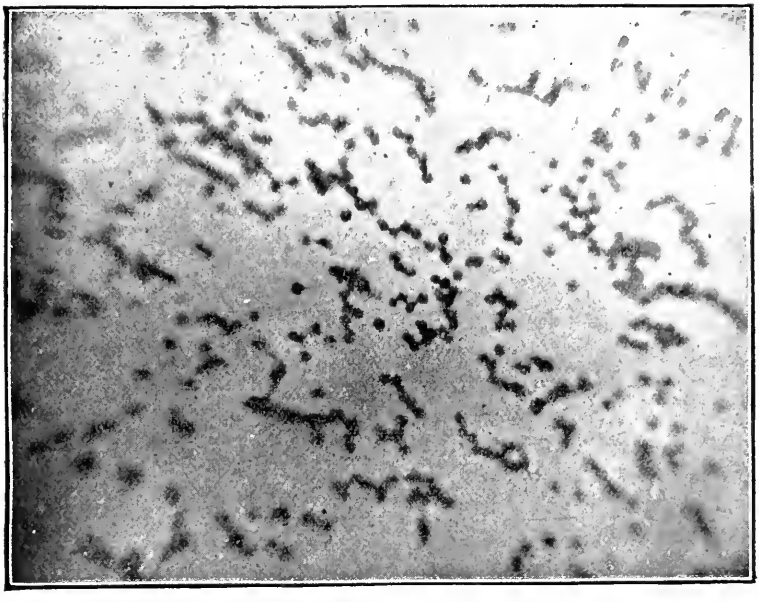
It has always been a source of deep regret to me that through the barriers, erected by the medical profession in the same way in Germany, I was unable to reach the late Emperor Frederick. I wrote seven letters to Berlin, and received not a single answer—not even an acknowledgment. Jealousy reigned among the physicians in attendance. Each one wanted the honor of curing, or at least of advising, and even if they had known of a remedy which was outside of science, it is doubtful whether they would have used it. I gave them ample testimony as to the value of my medicine, and I asked them at least to investigate for themselves and ascertain the truth of my statements, but they would not. Ignorance and jealousy stood in the way. Just as the physicians at Key West would rather see their patients die of yellow-fever than have them cured by some one outside the pale of their own profession, so those doctors at Berlin were prepared rather to sacrifice the life of the

Emperor of Germany than test the value of a treatment to which the only objection was, that it is the discovery of one who is not a physician. Even my letters were suppressed. The patient never knew of their existence. He was kept in entire ignorance of the relief that I offered him, and was allowed to die a victim to professional prejudices and personal animosities.

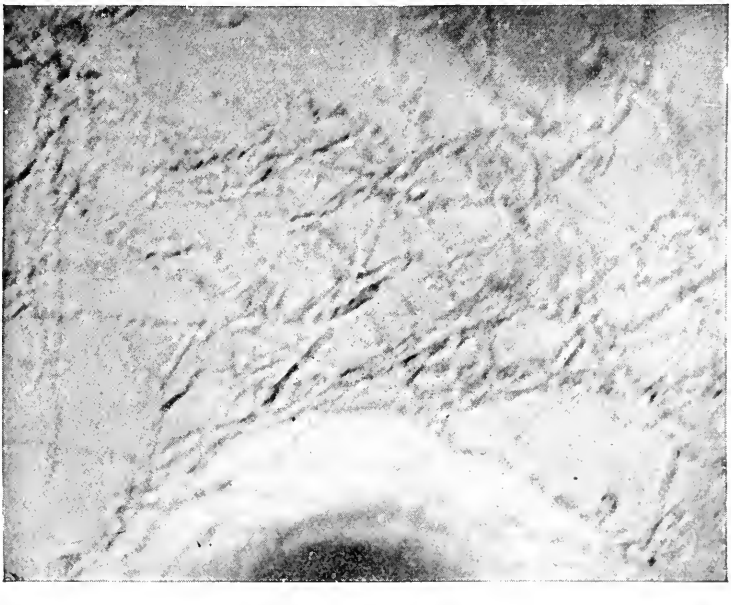
How many hundreds of thousands of people are in like manner kept in ignorance to-day through the perversity that killed the Emperor! The profession ignored my medicine. They did not notice it. I watched the medical papers carefully from day to day and from week to week, and no notice was taken of it. I read all bulletins as they came out, and it was unheeded. The course pursued by the physicians attending on the Emperor was one that favored the production of microbes. They were nursed, and their culture was increased. At first they were in one locality only, but they multiplied to such an extent that soon they occupied the whole body. They filled the tissues. They circulated in the blood, producing a general condition of fermentation, so that the body underwent a process of decay and decomposition during life. The whole system must have been filled with living matter. Every organ, every muscle must have been teeming with micro-organisms. Yet that patient was in care of the most eminent physicians even in Europe, and they, with all the resources which medical science had put into their hands, could not cure him. What then might we expect from ordinary physicians? It was admitted throughout the profession that the disease of which the Emperor died was one caused by the presence of microbes, and still they followed the old-fashioned practice which was in vogue before disease germs were understood, and they refused medicine which is especially adapted to act upon micro-organisms. All this shows that there is something more than ignorance to be overcome, for it is prejudice and superstition and a blind adherence to fatal customs that stand in the way of the proper valuation of new discoveries.

I hope, and I do not entertain any doubt, that the time is not far distant when my discovery will be recognized, so that the microbe killer shall put a stop to such slaughters, and men who are guilty of them shall have to follow some other occupations; for I am quite convinced that cases like those of the Emperor of Germany and of General Grant would readily yield to the microbe killer if it were properly used.

Cases, however, have come under my own immediate observation, which are more noteworthy than those. While I was in San Francisco arranging to start Factory No. 10, I met an old gentleman, seventy-one years of age, who had lost one arm. He came to my office and explained that as a result of accident a cancer had formed on the palm of his hand. He had advice for it, and was under doctors' care for some years, but it did not get better. Instead, it persistently grew worse, until it endangered his life. Every known remedy at that time was tried, but to no purpose, and finally the physicians amputated the arm below the elbow. But this did not stay the disease, for the man's blood was full of cancer microbes, and no medicine had been used to destroy them. Consequently the disease broke out anew, as of course it was bound to do. Sores and ulcers formed around the stump, and again he applied to his physician. Fifteen had given their advice, but they could do nothing except to advise that the arm should be amputated again higher up. He was considering this suggestion when I saw him. His condition was terrible. Red spots were over his face. His left arm was covered with scrofulous sores, and cancer was developing under the arm. He asked my opinion, and I gave it to him honestly. I told him plainly that I could not cure him, as his age was against him. I said: "You see we must purify the blood entirely before all cancer disappears. There is no use in using the knife." These were the words I used, because my business demands that I tell just what I think. I cannot afford to make promises which I am not able to keep. I explained



CANCER.



DROP OF FERMENT FROM A CANCER GROWTH.

that it was true that I had cured many cases of cancer, but that in his case the disease had gone too far, and age was another obstacle. It was necessary to remove all living microbes and micro-organisms before a cure could be effected, and even under more favorable circumstances I could not hope to do it in less than nine months, when the system was so filled with them as was his. In fact I told him I did not think that he would see any improvement in less time than that. But the old gentleman had confidence in me, and faith in my medicine, and he determined to give it a trial.

I gave him the strong No. 2, with instructions to take as much of it as he found the system would stand, which was from four to six wine-glassfuls daily, and I also supplied him with No. 3, with which to treat locally the stump and other arm. I advised him to soak some cotton wool with the microbe killer, and to keep it on the most painful places. He followed my instructions rigidly, and I saw no more of him for three weeks. Throughout the whole course of his disease he had suffered agonizing pain, from which he could obtain no relief except in constant dosing with morphia. His system was suffering from this, for it did not help the cancer, and he was fearful that it might become, if it had not already done so, a habit that he would not get rid of. When he called upon me again, however, he told me that the pains had so much diminished that the morphia was no longer necessary, and that he had without an effort stopped the use of it entirely. He had sound, refreshing sleep, and his appetite was greatly improved. He continued to get better. The pains did not return, the ulcers put on a healthy appearance and began to heal, and at the end of six months he called upon me and said that he was entirely cured, with the exception of one small spot. He had increased thirty-six pounds in weight during the time he had been taking the microbe killer, of which he had had in all seventeen gallons. This was a very free use of the medicine, but I doubt if he would have derived the same benefit if he had

taken less, for his case was a very bad one, and the disease had advanced to a stage where, had it not been checked, it must soon have terminated fatally. The entire system must have been in a state of fermentation, and from experience I know that the body must be, as it were, soaked with the medicine before the full benefit can be derived from it. The cessation of pain, however, which occurred so soon, showed that the microbes were yielding to the treatment and probably perishing, but then the blood remained to be purified, and the general system had to be built up.

This case is in many respects remarkable. It shows that it was not necessary to remove a limb, and that, notwithstanding the age of the patient and the progress of the cancer, it is quite possible by a rational treatment to get rid of this terrible complaint. Physicians well know how very seldom an operation is successful in cancer, and still they go on having recourse to the knife, as though feeling that they must do something, and not having the moral courage to admit that they have not the ability to cure. When an operation is performed in a case of cancer, the entire diseased portion must be removed, but more than that, the surgeon must be sure that he has not left behind one single germ of disease, for as certain as he has done that, the cancer will reappear in a very short time. Now if the cancer microbes were confined to the ulcer, it might be possible by removing enough of the healthy flesh to get them away, and this is the theory that the physician works upon. But it is not so. The germs get into the blood in a very short time, and thus circulate through the system. It must, therefore, be evident to everybody that an operation at this stage of the disease is absolutely useless. It is worse than that, because it invariably tends to the formation of new ulcers not in the neighborhood of the old sores, but possibly in various parts of the body, and thus the second condition of the patient is worse than the first.

I was satisfied, when I saw the wonderful effects of the microbe killer in this old gentleman, that I should have had

no difficulty in curing the Emperor Frederick of Germany, for his case was not nearly as severe. Nature has told me repeatedly, too, that if a tree be blighted or the sap be in any way diseased, it cannot be cured by pruning the branches, a device which would only have the effect of intensifying the disease in other portions of the tree. The sap must be freed from bacteria, and purified; and then, and then only, does the tree itself become healthy again and show its green leaves and put on a healthy appearance. The bulletins issued by the doctors about the Emperor of Germany all seemed to strengthen my conviction that medical science is a fraud of the grossest kind; and it is the public who are the sufferers if this thing be allowed to go on. It is now under the protection of the law, on the principle that physicians hold human life in their hands, and that therefore the people should be guarded against placing themselves unknowingly at the mercy of unqualified people. As a straw showing which way the wind blows, however, I may mention that, even as I write this, a report has come from Massachusetts to the effect that an association of "irregulars" has been formed in that State entitled the Massachusetts Constitutional Liberty League. The object of this body is to resist restrictive legislation or any legislation suggested and supported by physicians as a body. In one of the resolutions passed at the meeting when the society was organized, the patrons of so-called irregular practice were charged that they owe it to those who have served and saved them after the doctors had utterly failed to cure or even benefit them, to sustain them in the struggle for constitutional liberty. This at least indicates that the movement has begun, which, if carried on, will put a stop to the work of a privileged class and allow the full development of such discoveries as mine.

The instruments of the surgeon are the means of destroying more lives in our hospitals and colleges than are the weapons of all our desperadoes and law-breakers. An assassin makes quick work too with his victim. But in the

surgical ward of a hospital the patient is killed by a slow process, and if he protests against the suffering to which he is subjected, he is quieted with morphia or chloroform. I have had many hundreds of patients come to my office and tell me how this or that specialist removed a limb or a breast for cancer, and then sent the patient away with an empty pocket to realize that the disease was not cured, and to find only too soon that it was reappearing elsewhere with more virulence than before. This must be where the microbes are in the blood, bringing it to a state of fermentation, evidence of which is readily perceptible in the sallow or pale-yellow color of the skin, especially where the capillary blood-vessels are usually most apparent.

The practice of surgery is growing worse, and the downward process has been advanced chiefly here by the mistaken notion that good surgery means handiness with the knife. We have plenty of men who are quite reckless in cutting a person to pieces, and they do it, if not skilfully, yet with a good deal of *sang froid*. But he is a better surgeon who saves a limb than he who amputates it, and when that fact comes to be better acted up to the people will be better served. The use of instruments is abused, but there seems to be a mania among medical men for using them, and if they cannot operate on the living man they lose not an hour in cutting up a dead one, hardly waiting in their anxiety to know that he is dead. It is more than likely that, if the old gentleman in San Francisco referred to above, had come to me before he had had his hand removed he would never have had it amputated. It would have been just as easy to save that as it was to save the arm from the second operation. When weeds first appear in a garden it is easy to get rid of them, but if once they are allowed to shed their seeds it is more difficult; and if they are allowed to go to seed several times, it may require years of constant work before they can be exterminated and the land made clean. This is a natural law, and it applies alike to plants and animals, including mankind.

As these sheets were passing through the press I received the following communication:

228 STARK ST., PORTLAND, OREGON,
February, 1890.

WM. RADAM:

Dear Sir: Since writing a testimonial in behalf of your wonderful medicine, "The Microbe Killer," I have been thinking there would be nothing amiss in placing before you the particulars as to how I used it. My experience with compound oxygen gave me a full understanding of the benefit and relief to be had from inhalation, and being supplied with the inhaling outfit I soon thought to try your valuable remedy in the same way, and I now place my late experience before you, hoping that you will investigate the matter and thus further and faster give relief to many suffering as I have been. If opportunity affords please examine Drs. Starkey and Palen's inhaling outfit. That is what I am using. I fill to the line with pure water and place the bottle in a tin cup over half full of cold water, never failing to place a bit of tin or some little thing on the bottom of the cup to prevent breaking. Then put the cup on a stove and heat just a little hotter than you can bear a finger in. This is not so particular unless the patient is very weak, then so much heat will produce a faint feeling. The heat and length of time for inhaling must be governed by the patient's feelings. Never put the Microbe Killer into the inhaler until heated and just ready to use. The little measure with the above-named outfit is what I use once full at every inhalation, and I find it quite enough, which is about a teaspoonful. The next thing is to be careful and not rush this heating process. Experience taught me that the work can be carried on too rapidly. The system must be built up and regulated in proportion. Many times I have left off inhaling for several days, but now I have no fears, and twice in twenty-four hours and sometimes oftener is my usual way of doing. Then as I stated in my former letter, a soft pad saturated with Microbe Killer should be placed on any part where there is pain, with sufficient dry linen over. Then place a hot brick, or iron, against the pad and allow the heat to be all that can be borne, repeating and repeating if necessary. But my experience has been that one heating has never failed to relieve. I must say that in all these years of suffering I have never tried

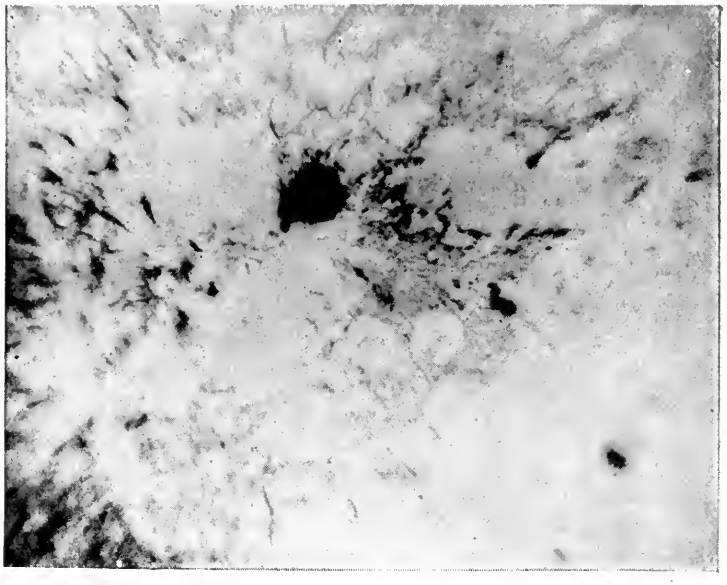
any thing that gave such astonishing relief in every particular as your Microbe Killer. Should these lines strike you forcibly and an investigation follow, I shall ever be ready to give my experience or answer questions at any time.

With every confidence in your success, and with thanks to God and to you for your untiring efforts, I am

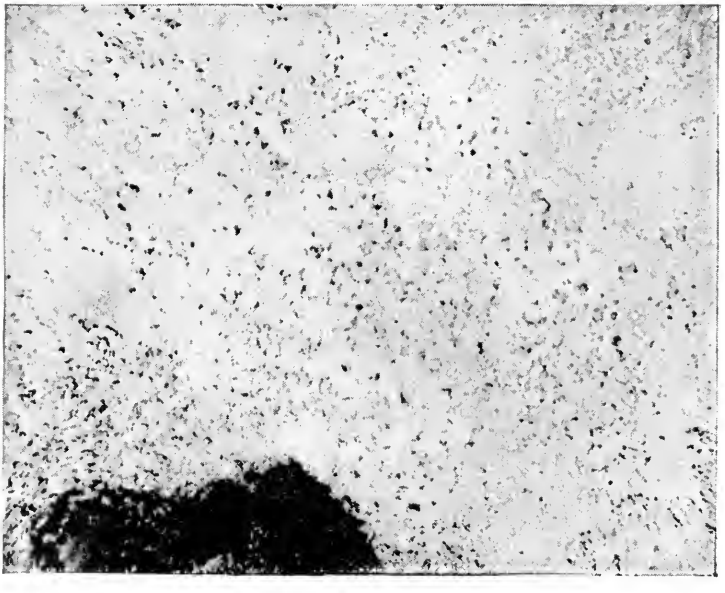
Respectfully,
Mrs. P. F. CASTLEMAN.

This letter is given without alteration or amendment. It is valuable not only as a testimony to the effectiveness of the Microbe Killer but as indicating another way in which it may be employed with direct advantage, especially in low cases where the patient is unable to drink it, as in affections of the throat and air passages. We meet with patients sometimes where the stomach is in an extreme condition of debility, or possibly the lining membrane of the organ may be ulcerated, and in all these inhalation is easier, and if persevered in fully as effectual. Any form of inhaler where a gentle heat can be applied will do for the purpose, or one may be easily improvised. All that is needed is a wide-mouthed bottle with two holes in the cork. Through one of these pass a straight glass tube open at the top and reaching down to within an inch of the bottom of the bottle. Through the other insert another glass tube bent at an obtuse angle and extending down only just below the cork. Fill this bottle two-thirds full of water as Mrs. Castleman directs and stand it in a tin cup half filled with water at a temperature of about 120°. Air passes down the straight pipe through the water to which the Microbe Killer has now been added, and the vapor is inhaled through the bent tube.

Unfortunately, most of the patients who come to us now are suffering from chronic complaints, that is, diseases of long standing. The system in these is a mass of fermentation. Some are rotten throughout, and they have been brought into that condition under the care of the faithful family doctor, over a period possibly of years. When they come to us they want to be cured "right away." They



BRIGHT'S DISEASE OF KIDNEY. (PARIS.)



MICROBES FROM THE KIDNEY.

have had any amount of patience while their physician was bungling and experimenting, but the instant they think they see a chance of getting well they want to be there without any further delay. Now this cannot be done. When a disease has been years in the system it has become almost a part of it. Indeed, there are instances where an old complaint having been apparently removed, another, in a different form, makes its appearance, showing that an abnormal condition has become so much a part of the being as to be rendered almost normal. In a chronic disease the entire body is more or less involved. But when the trouble has been of short duration only it may be but local; or if not, it certainly has not acquired the same hold upon the constitution. It is therefore very clear why a chronic disease requires greater patience and more steady perseverance if we would remove it entirely.

The example of the weeds in the garden illustrates this again. Where they are few and of but short duration they yield readily to our efforts for their removal, but when they have seeded through several seasons they resemble a chronic disease in man, and are more difficult to deal with and require a longer time. Then note the effect of weeds, and our illustration goes further. Observe a field of corn where the land is clean and in good order, and compare it with the adjoining field, where, although the land may be of the same nature, it is covered with weeds. In the one the corn is strong and vigorous, the stalks and leaves are clean, and the plants show every indication of thriving. In the other the stalks are small and slender, the leaves are sickly and pale in color, and in every probability there is evidence of fungus having attacked it. This, if left to itself, feeds upon the unthrifty plants, and soon they die for want of air and sustenance, crowded out of existence by a host of enemies that followed quickly on the impoverished condition caused by the weeds surrounding them. So in the case of a person suffering from chronic disease. He has something that, like the weeds, impoverishes the soil, feeds on his life blood,

and gradually drags him down to death. Then where a neglected cornfield is cleaned and the weeds removed you may have observed how it looks shocked; it has an appearance as though it were going to die, and continues so until it gets a start. Then, there being nothing around it to draw nourishment away from the soil or to deprive it of the vivifying effects of the air, it grows thicker and stronger, blossoms, bears fruit, perfects its seed, and, having fulfilled its mission, it dies of old age.

It is necessary I should mention these things in order to carry conviction to the mind of the great public concerning the methods of Nature in working out her laws. I write to instruct, but not for the benefit of those who acquired their wisdom in medical schools and colleges. Their bread and butter is obtained as the fruits of what they learned at those places, and not from what it is my province to prove. Deprive them of their teachings and you deprive them of their present means of living, and their plan and mine are not the same. I want to enlighten the public, to teach them that things which they have hitherto felt to be complicated and difficult to understand are simple and quite within the comprehension of all. But the college practitioner would hide these things from the people and keep them in ignorance. He conceals Nature. He makes her works appear mysterious. He describes them in terms that the people do not understand. He keeps his patient in the dark that he may not know the devices that are used to take money from his pockets.

When I read of the wonderful progress of medical science, of the triumphs of medicine and surgery, and so on, and then think of the number of cases I have cured which medical science had abandoned, and of the unfortunate people who have come to me with limbs sacrificed to professional ignorance, I am shocked at the deceptions that are practised.

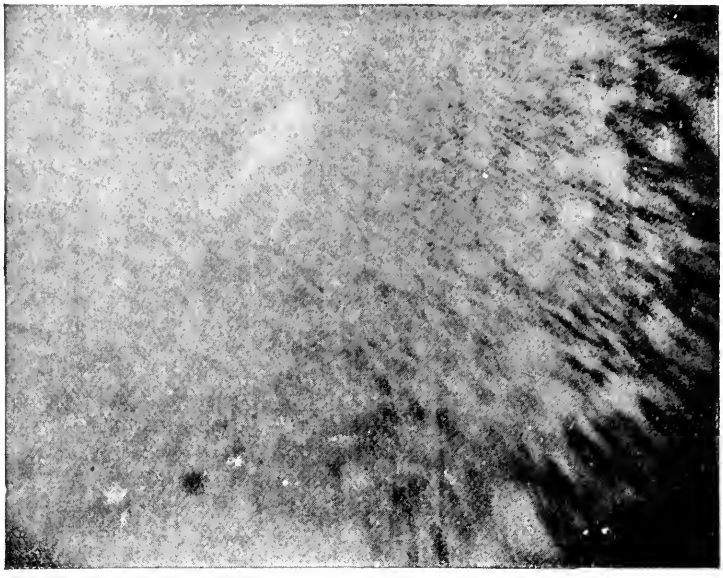
When I see people who have been ruined by doctors' bills, left sometimes with large families of children dependant on them and almost without bread to eat; when mothers

and fathers have come to me, and with tears in their eyes have told me of their misfortunes and how every thing they had has been sacrificed in the vain hope of recovering their health, I should be less than a man if I were to hide my light under a bushel and refuse to help the needy when I know that I have the means to do so. No, rather will I set my light high up that the whole world may see it and benefit by its rays. None need look if they do not want it, but it is certain that they who do look will be anxious to investigate and to ascertain for themselves whether the statements I make are true. I solicit investigation, for every thing I say will bear it, and it is gratifying to know that others can test my sincerity.

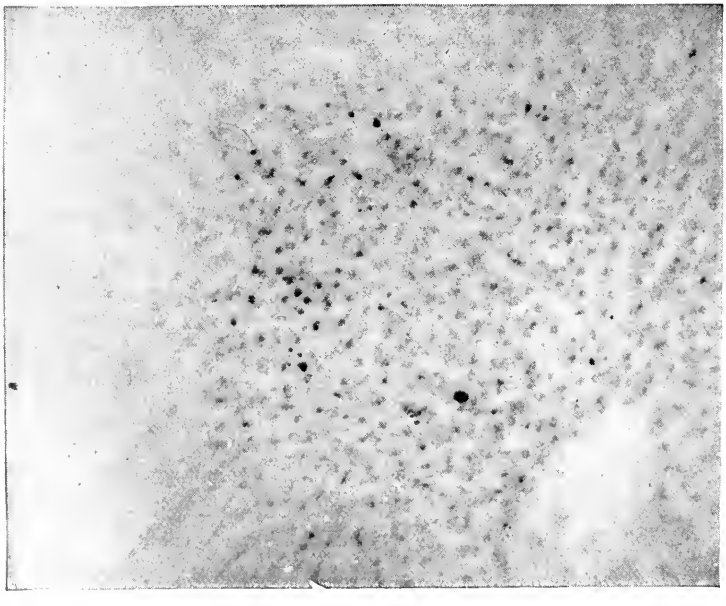
What medical science writes about is within the reach of all, although only those who have been duly trained can comprehend the mysteries and the technicalities with which the popular mind and understanding are befogged. But some things can be known. We know, for example, that there are thousands of medicines and combinations to cure as many alleged different forms of disease; we know that there are many diseases which are classed as incurable, and that whoever is attacked with them must die; we know that there are numberless different forms of instruments with which to operate upon the human body, to amputate limbs, remove bones, cut out diseased tissues, and mangle the human frame. We know that besides these there are hundreds of different forms of implements with which to place the body, or parts of it, in suitable positions whereby to facilitate the movements of the microbes, for if their action be impeded the blood thickens and pain is the result; and many of the devices for this purpose are exceedingly ingenious. We know that ice is used in some cases, hot water in others, and cold water again in others. We know that some are burned with caustic, others are thumped with sticks or pounded with the hands; some are covered with plasters, others are encased in rubber, and others galvanized and electrified. And all these things and a thousand others simply to kill microbes.

The profession own some of the finest laboratories and colleges in the country, hundreds of thousands of dollars have been spent upon them, and new doctors go out from these in troops every year, all trained in medical ethics and the doctrines of medical science, all qualified under the law to practice medicine and surgery, all privileged to kill, all freely sustained and protected by the people and the Legislatures. They ask, and they have. Any legislation they want is accorded them. They hold the lives of the people in their hands. Their certificate can set the law in motion, or it can close the courts. They can convict the prisoner or acquit him. They can commit a man to a lunatic asylum, or permit him to exercise the privileges of a citizen. Their authority may at times be above that of the courts, for no judge will dare take the responsibility of defying a doctor's opinion when life or great interests are involved. No power is greater than that which we sometimes see wielded by a legally endowed physician. In addition to this he has the privilege of our homes. He is entrusted with secrets which not even the lawyers know of. He holds in his power not only the lives, but the reputations of families. He has it at his will to blast the record of persons who before the world are immaculate. He is the receptacle of knowledge about private things such as exists nowhere else, not even in the church, and nothing but his honor guards it. It is a vast power and responsibility, and people do not always bear it in mind, but it is all given by the law, and it exists as a prerogative obtained with the piece of parchment that carries with it the dignity of a doctor's degree.

This has been going on from early times, and still young people die and disease is neither prevented nor cured. We all know these things, or we can know them by a little thought and consideration, but we do not think of them, and so they pass unheeded. But here comes a man who sets the whole institution at defiance, who is prepared to antagonize the whole organization of medical science. He brings you a jug with a liquid, whose chief constituent is what



CHOLERA MORBUS. (BERLIN.)



BACILLUS ANTHRACIS IN LUNG. (BERLIN.)

the body most needs for its existence, and he claims and shows by indisputable proof that he can do with that liquid what the doctors with all their science, study, and experience, cannot do. The discovery is an unusual one. It involves so much that people have a just claim to insist upon complete conviction. They are right in demanding absolute proof. The risk is too great to justify any one being satisfied with a mere assertion. When anybody is sick he does not want to experiment with himself, or to be experimented on by others ; he wants to be cured. He must find something that is useful, not something that will probably prove ineffectual, and which may be injurious. I offer to cure all diseases with but one remedy, and to stop children dying of disease, for of course I cannot prevent accidents—in all cases that are taken in time, and where my instructions are faithfully followed. This is undertaking a great deal, and it would be worse than an error on my part to make it, unless I knew that I could carry it out. I have this certainty. It is no supposition, no theory. I have the experience and the proof, and I wish every one to convince himself as fully as may be necessary.

CHAPTER X.

HOW TO CURE DISEASE AND PRESERVE LIFE.

WHAT have I done in this writing? I have explained the cause of sickness, and shown that drugs cannot kill microbes, or, to put it differently, that they cannot purify the blood without killing the patient. I have described my own sickness, and how I cured myself, although I am not a doctor. I have told how I also cured everybody who used the microbe killer in time and according to instructions, using it in sufficient quantities to purify the blood and to build up the system. Nobody can deny that I have done this; nobody does deny it. My imitators are evidence in my favor, for if I had not succeeded I should not have been imitated, and they have by their conduct testified to the merits of the microbe killer. My own experiences in the courts are also evidence, and they go to show also that I have discovered something worth fighting for. The medical press and physicians generally take such an interest in me as they never took before. They decry me as an ignorant man, one who knows nothing about medicine, or any thing but the raising of beets and cabbages, a useful thing to know, by the way, and an honorable business too. Possibly florists and nursery-men could tell the doctors a little about things that belong to their profession, and which they ought to know, for botany is not taught in their medical colleges here, although in Europe it is justly esteemed an essential part of a medical education. Then after abusing me for ignorance, they cry that I am killing people with poisons, and in the same breath they pray: "Oh, Heaven aid us,

and make these microbe killers harmless! Lord, protect our profession!" (*Vide* Appendix.)

Rest assured if I had killed anybody the doctors would not have been content to talk about it. They would have had me in jail long ago. The law gives them the power, and they are not likely to waive their rights. They would have prosecuted me relentlessly. The public will not be deceived by their talk about my killing my patients. If I had ever done such a thing I should not be free now to pen these words, and any appeal to Congress for relief would have been useless. It should be sufficient testimony to the worth of my discovery and to my not having killed or injured any one, that within two years the people have taken this thing into their own hands, that they have formed companies, spent money, erected seventeen factories, and extended their operations not only throughout the United States but into Canada and England. That the microbe killer has succeeded wherever it has been introduced, means that it is at least worthy of investigation and trial. It means also that it possesses merits which commend it to the people. In short, knowing what I do about it, knowing that it is capable of doing much good, and with the testimony that I have to its success, I should not be warranted in withholding it. It is a duty of all of us to benefit our fellows when we can, and I should be no more justified in retaining the microbe killer for my own private use, than I should be in refusing to help my neighbor whose house might be afire.

I have not yet referred to the value of my discovery in the treatment of leprosy. More about that will have to be said, but there is no doubt that it is beneficial, and that the leprosy microbe can be destroyed, that too with the same medicine that saves the lives of little children. I make no unreasonable demand, therefore, when I ask for some credit to be given me, and if further I can preserve the lives of any of the reader's friends I shall feel well compensated for the publication of my book, and for all the slander, vituperation, and trouble that I have had to submit to.

I now come to the question: How can we cure disease and preserve life? The answer to this problem is simple; Use the microbe killer; read this book and act up to instructions. But do not wait till sickness comes upon you. Prepare for it by a careful perusal of all that I have written. A clear understanding will thus be obtained of the nature of disease, of the principles upon which it must be treated, and of the only remedy which fully meets all requirements and enables the patient to save the expense and delay of consulting a doctor. For not only is the microbe-killer effectual in doing all that I promise for it, but it brings a certain remedy home to everybody, so that doctors' bills are saved. It simplifies treatment. Everybody who follows me in my statements will comprehend the cause of disease, and will have a cure at hand. Valuable time is often lost even in sending for a doctor. People do not want him if they can help it. They do not want to pay out the money which his attendance involves. But here with the microbe killer ready near by no time need be wasted, and it can be used at once and all trouble and annoyance will be spared.

As already explained every thing created is from the first in danger of destruction. Nature demands change. Just as every particle of matter is in motion, so in like manner an alteration of form is a universal law. The first breath that a young child takes in all probability implies the introduction of microbes, even if there were none derived from the parent. I have already referred to this, but a little more elucidation may be desirable, as I write to throw as much light as possible upon the subject. There is no mere supposition about this question. Microbes are not a theory. We know what they are and where they most abound. Pasteur exposed twenty flasks containing clear broth in the open air in the country on the sea level, and very soon eight had become affected with micro-organisms and were fermenting. On the Jura Mountains only five out of twenty fermented, while at a height of six thousand feet above the

sea only one was affected. This showed what has since been verified, that the higher the altitude the fewer the microbes. They are also increased in the neighborhood of human dwellings, and when the air is still they have a tendency to settle downwards, showing merely that they are heavier than the atmosphere. The aëroscope is an instrument devised by M. Pouchet for collecting dust from the air, and it is found to consist chiefly of remnants of articles in use, generally in the form of impalpable dust, particles of inorganic matter, sometimes pollen of flowers, and the spores of minute vegetals, moulds, and microbes. Experiments have shown that dry dust and earth, especially from hospitals, is filled with micro-organisms, but that the evaporation of water from the ground does not carry them with it. Their existence was shown microscopically more than two centuries ago, but their activity as agents in organic life was not recognized.

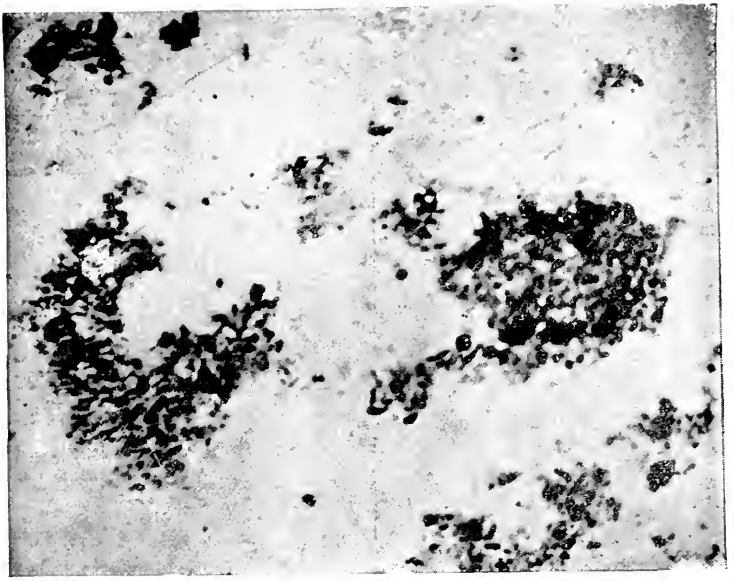
Last year a valuable paper on the subject was read by Dr. Samuel N. Nelson, of Boston, before the American Academy of Medicine, which I propose to notice more fully in the Appendix to this volume, but he quotes an opinion as to the use of these micro-organisms which aptly comes in here. Some are doubtless harmless in the human body so far as the production of disease is concerned, but it has long been thought that they accomplish a great work in Nature. The yeast plant, for example, does not give rise to dangerous symptoms when taken into the system; on the contrary, it is frequently employed as a curative agent, yet its powerful influence is understood all the world over.

Sir William Robertson writes thus: "Without microbes there could be no putrefaction, and without putrefaction the waste materials thrown off by the animal and vegetable kingdoms could not be consumed. Instead of being broken up as they are now, and restored to the earth and air in a fit state to nourish new generations of plants, they would remain as an intolerable incubus on the organic world. Plants would languish for want of nutriment, and animals would

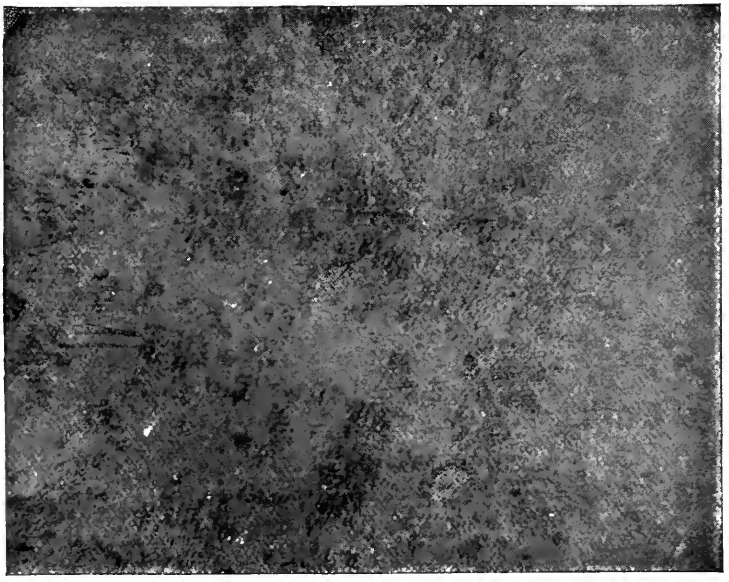
be hampered by their own excreta and by the dead bodies of their mates and predecessors—in short, the circle of life would be wanting an essential link. A large proportion of our food is prepared by the agency of micro-organisms. We are indebted to certain bacteria for our butter, cheese, and vinegar. Our daily bread is made with yeast, and to the yeast plant, discovered independently by Cagniard de la Tour and Schwann in 1836, we owe our wine, beer, and spirituous liquors. As the generator of alcohol this tiny cell plays a larger part in the life of civilization than any other tree or plant."

The sea is teeming with microbes, but not of the kind that we find in the air, and it is ascertained that these latter rarely extend more than one hundred and twenty miles from land, and generally not as far. Their number in a room depends on the number of people present. This has been shown by carefully conducted experiments. Thus the increase on a free day at a public museum is about six hundred per cent. over the amount on a pay day, and if the number in an empty public hall be represented as 100, the increase during a meeting will be equal to 432. Professor Frankland found that in a barn in which wheat was being thrashed it was easy to count eight thousand as falling upon a single foot of surface in one minute, showing the immense number that exist in dry vegetable matter awaiting only heat and moisture to multiply and induce fermentation.

These facts are important as indicating the precautions that should be taken in a sick-room, especially quiet, and the absence of all persons who are not absolutely necessary. Temperature is an important factor in the process of fermentation, and it seems to have some relation to the proportion of microbes in the atmosphere. Thus there are fewest in January, and if the number in that month be taken as unity, they increase and diminish in about this ratio: February, 4; March, 6½; April, 7; May, 8; June 13½; July, 16; August, 26½; September, 11; October, 9; November, 5; December, 5.



CATARRH OF UTERUS.



COMMON CATARRH.

When a young child is sick, no matter what the age be, no time should be lost, but the progress of the disease should be checked immediately with microbe killer. For the medicine may be used with perfect safety to the youngest child, even to one only a few hours old. It cleanses the blood, prevents unhealthy fermentation, and is beneficial in all diseases to which children are subject. I have had considerable experience with children, and have found that when the microbe killer is used regularly children seldom have trouble of any kind, thus proving that it acts as a preventive as well as a cure. This might be expected, because by the habitual use the system is kept in good order and microbes are destroyed as fast as they appear. Children are fond of it. The flavor is agreeable and they take it readily, and, when they are allowed to do so regularly, their skins become perfectly clear and healthy. The capillary circulation becomes normal, the little ones have rosy cheeks, and not a pimple or spot upon their bodies.

We can preserve wood and stone from fungi; it is natural therefore that we should preserve the body, as my medicine proves that we can. It only needs to be known to every family as it is to me, and children will no longer be down with measles, scarlet-fever, or any of the other troubles of childhood. They will take the microbe killer freely in time, when the very first symptoms appear, and they will hear no more of such epidemics. In fact, even if the medicine is not used habitually, it should be taken whenever any disease is prevalent and it will protect the person from an attack.

It may be thought that by constant use its effects will be lost, but it is not so. Some medicines, especially many aperients and cathartics, do act in that way. They produce an immediate action on the bowels, and a torpidity follows, just as the action of some medicine is cumulative, like arsenic. So no effect may be produced at first, and then when a sufficient amount is in the system poisonous symptoms supervene.

But the microbe killer is a tonic. It never loses its power

of killing micro-organisms, and is more effective the longer it is persevered with, and it acts constantly, strengthening the system, purifying the blood, and supplying food to the blood and tissues that nature demands. It may therefore be used safely and advantageously at all times, and it is essential when contagious diseases are prevalent, no matter what names be given to them, whether typhoid or scarlet-fever, small-pox, cholera, influenza, or what not. If your child has already been in the doctor's hands, and even if he has given it up, take my advice, ask him to send in his bill, give up his noxious drugs and poisonous medicines, and avail yourself of my discovery.

A gentleman in Dallas, Texas, wrote me and said: "Mr. Radam, your microbe killer cured our baby, and I can hardly find words to express my gratitude. We expected it would die. The doctor told us he had done all he could, and advised us to give it no more medicine. He gave up all hope and left. He had no sooner done so than the wife of one of our neighbors came in and told us of your microbe killer. We read your circular, and, feeling that the child would die, we determined to try it. We warmed the medicine slightly, then wrapped the child in flannels, and poured the microbe killer all over the body. We also used a little as an injection, mixed with starch, and gave the child three teaspoonfuls internally. Then the child was wrapped in warm dry flannels, and, to our surprise, in half an hour it was asleep, and not asleep only, but it slept quietly till early morning, and then awoke laughing and free from pain. It nursed freely, and the milk was not rejected by the stomach. We continued the medicine; the child continued to improve, and is now living."

For aught I know to the contrary it still lives. The case is instructive, for if the father had been content with merely administering the microbe killer internally, I doubt if he would have cured the child. Its illness had advanced too far, and it was necessary to use the medicine externally, as well as internally, to attack the microbes, wherever they

could be reached. The case shows also that we may be able to rescue a patient, even from the edge of the grave, if we go the right way to do it, and if we are able to act with an understanding of Nature's laws and methods, so that we may see the importance of using the medicine in such a way as to permeate all the tissues, and thus as it were soak the body, just as the railway tie is soaked, as I have before explained.

The microbe killer contains no drugs of an organic character. It is simply a solution of gases, which pass readily through the tissues, much as the perspiration passes through the pores of the skin, and thus they get into the blood and circulate throughout the system. It will be seen, therefore, how important it is to thoroughly carry the remedy everywhere, to leave no part of the body free to enable the microbes to increase; and the facility with which this medicine passes thus into every tissue and to the remotest parts, by means of the capillary vessels, adds very much to its great value.

In serious diseases which run their course quickly, and in the treatment of which prompt action is important, such as typhoid and scarlet-fevers, measles, small-pox, and the like, external applications are also necessary and important. The skin absorbs the active principle of the medicine, almost as freely and as quickly, sometimes even more quickly than the absorption through the stomach, and its effects must in such diseases be obtained as rapidly as possible. But in ordinary diseases, especially where treatment can be begun without delay, internal dosing in sufficient quantities will effect a cure, and, as already stated, it acts as a preventive when taken during health.

Some doctors have asserted that the microbe killer contains poisonous drugs. It is a bare assertion, made in complete ignorance of what it really is; but the folly of such statements is apparent on its face, for if such were the case how could it be administered in large doses to children without injuring them? As a matter of fact, it contains, as

I have said, no drug at all. If it were what these doctors say, it would soon kill itself. No poisonous medicine such as they describe would be allowed to exist. The people would soon find it out, and they would not have it. The microbe killer is harmless, and that it cures all who use it according to directions is an assertion that proves itself.

When a child is taken sick, no matter what the sickness may be or what name the doctor chooses to apply to it, remember what I said at the beginning of this book. The disease is caused by a microbe, possibly a special microbe, and your duty then is to use the medicine immediately, as long as necessary, and as freely as possible, until the child is cured, as it most assuredly will be. Young children require less than adults, and I have found that small people can do with less than larger ones, as might be anticipated from the method by which the medicine is known to operate. It is not necessary, for example, to use as much to secure a complete saturation of the tissues in a small body as in a large one. For very small children two teaspoonfuls will usually suffice for a dose, and this may be repeated as often as is necessary, but every six hours is about the frequency that I find to answer. The size, age, and temperament of the patient all have to be considered. In the treatment of wounds, ulcers, boils, or local inflammations, poultices of linseed meal saturated with the microbe killer should be kept constantly applied to the surface, and the internal treatment should be attended to at the same time. Here I would again direct attention to the method described by my correspondent and patient, Mrs. D. F. C., of Portland, Oregon, on page 131, whose testimony as to its value in curing pain should be conclusive. But it must not be forgotten that, whenever employed externally, it should also be used internally at the same time. This is necessary. Taken internally it purifies the blood, and when used externally some may become absorbed; but its chief value then is to relieve pain and to prevent the increase of microbes on the injured surface. A wound left exposed or improperly

attended to becomes a nidus for microbes, sometimes in the simplest form, as micrococci or as bacteria or bacilli, but the result is the same, whether they be in the form of simple cells or as tubular or spiral bodies.

Twelve hundred years ago this was known. Paul d'Egeneta understood the phenomenon of fermentation and putrefaction; and more than two hundred years ago the cause was correctly described by Megatus. Surgeons in the sixteenth century found that wounds healed better if not exposed to the air, and one of the ablest surgeons of that day, Ambrose Paré, said that gun-shot wounds which under ordinary circumstances would prove fatal, might be cured if kept covered and not dressed too frequently.

The process of fermentation has always been known, at any rate so far as history carries us, and it is understood among savages, but it was only about the date given that it was identified with putrefaction. The air containing microorganisms in large quantities,—if these fall upon a wound, or an ulcer, there will be some which will find it a suitable place for reproduction, and then fermentation, inflammation, suppuration, and possibly gangrene may be the consequence. But if this be stopped, as it may be by the prompt application of the microbe killer, the wound heals, the process of nature being uninterrupted, and none of those dangerous results ensue. The rationale of this must be clear.

It is my firm conviction, taught me by experience, that if a child dies it is from some cause that might be prevented. I do not refer to children who inherit disease from parents to such a degree that their lives are forfeited as soon as they are born, but to all ordinary cases of disease. For example, the remedy may be applied too late, or in insufficient doses, or in a manner contrary to directions, or it may have been given irregularly, or not continued long enough. When death occurs in such circumstances it is the fault of the nurse, not of the medicine.

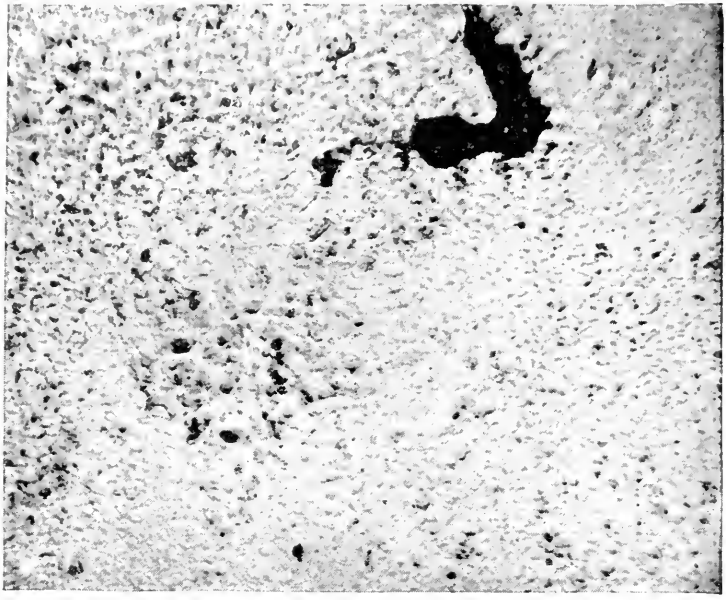
Nothing is easier than to cure children, if action be prompt and effective. They are easily affected by disease, but so,

too, their system readily yields to medicine, and with competent attention rules are more easily carried out.

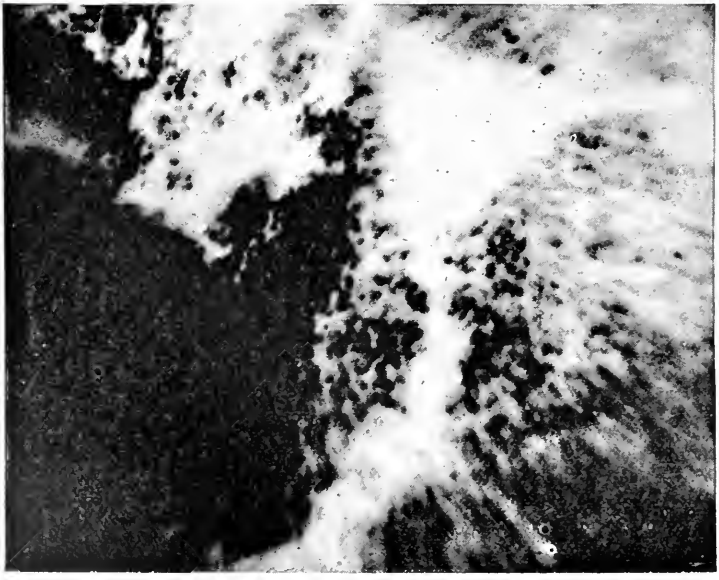
It is much more difficult to cure chronic disease, whether it be of years' or only of months' duration. And to return to my former similes, the florist finds it in truth more difficult to attend to his seedlings and to protect them from fungus, than it is to defend children from the attacks of microbes, of which the doctors know nothing.

When a plant has become matured and the wood is hardened, it can withstand more rough usage, and so it is with the human family. Statistics show that there is a greater mortality among children than among grown people. A child cannot describe its symptoms; it merely cries with pain and discomfort. Then comes the doctor, who guesses what kind of microbe has got hold of it, and in accordance with his theories he puts up a lot of drugs which are probably no antiseptics at all. They do not affect the microbes, which go on producing a state of fermentation in the child's body, and are possibly encouraged rather than otherwise by the medicines that have been administered. In this case the child grows worse, the doctor gives it up, and presently it dies. The doctor did all he knew, but he was ignorant of the true cause of the sickness, and more likely hastened the child's decease instead of doing any thing to prevent it. What is this but child-murder? Legalized it may be, but nevertheless it is increasing mortality where it ought to be, and where it can be, diminished. I never see a hearse passing my window without deploring the ignorance that prevails among the members of that profession whom the law allows to carry our lives in their hands.

The treatment of older children and young people is similar to that of young children, only it requires longer time usually and more of the medicine to perfect a saturation of the body. It also usually requires more time to complete a purification of the blood. Chronic diseases require still longer time and more medicine. They are long coming, and they go slowly. In them the process of fermentation probably



DIPHTHERIA.



FROM ENLARGED TONSILS. (PARIS.)

began years before the disease made itself felt. Then the microbes have probably advanced to such an extent that the circulation of the blood is impeded, the microbes clogging up the vessels, causing pain, and not until then perhaps does the person complain of being sick. Even these diseases can be cured by the microbe killer if it be taken with enough perseverance, so that not only the microbes are destroyed, but the red corpuscles of the blood are renovated, the circulation freed, and the red color of the skin restored through a complete action of the capillary vessels. Young women about arriving at maturity should use the medicine freely. It purifies the blood, and increases the tone of the system, arousing the circulation, so that they would not feel the change. In the same way it is useful to women looking forward to maternity. It is beneficial to the child, keeping the blood in a strong and healthy condition, and assisting the mother both before and during confinement. It also tends to facilitate the flow of milk, and to render it more nutritive to the child.

Where there is any sickness there is some blood impurity —that is, microbes are at work, and fermentation to a greater or less extent is going on, and the microbe killer is the only discovery yet made which directs itself immediately to the cause of the disease.

Ladies can find ample testimony from those of their own sex as to the value of my medicine to themselves. There is much to discover, and much yet to learn, and it is not my wish to keep back any thing that has been ascertained by me since I made my first cures. I must therefore touch upon this more fully.

The discharges attending menstruation, when examined under a powerful microscope, show blood containing vast quantities of microbes. Investigations made among many patients always show that the darkest blood is a mass of living micro-organisms, and that when women complain most of pain in the back, headache, neuralgia, etc., they are suffering from these enormous quantities of microbes.

When women thus affected have taken the microbe killer for several months, the character of the discharges changes. It becomes red, and when examined it is found to be free from microbes; the woman at the same time suffers no more. The headache and pain in the back have left her, the periods are more normal and free from inconvenience, and the patient puts on a healthy appearance. Her eyes are bright, and her complexion is clear, and she has more energy.

My first discoveries of this kind showed the nature and cause of woman's sufferings at these times, and that it is Nature again acting on her own laws, the pain and inconveniences being caused by a process of fermentation as usual, and the pain ceasing when the cause of that process is removed.

But such cases are not cured right away. It is absurd to suppose that they can be, and it would be wrong for me to say that they can. The blood must be purified, and as the microbes must be killed, the remedy must be one that accomplishes this object and thereby puts a stop to fermentation. At the same time, no antiseptic can take effect until it has entered the cells by passing through their walls, and so can be brought into contact with their contents. This explains how persons are deceived by those medicines which are given to purify the blood, and which have no power whatever to destroy the causes which render impurity possible. Medicines which have no effect upon the life of micro-organisms cannot purify the blood, and none of the medicines used for the purpose do accomplish that end. We must have something that kills microbes, and hence the value and necessity of my discovery, for, as I have shown, there is nothing else that does that without also killing the patient.

Any one who advertises or claims to be able to purify the blood should prove that he does so, and if he will allow his medicine to be fairly tested, it is quite easy to ascertain whether it will do all that is promised for it, because if it cannot prevent fermentation, it certainly cannot do what is

promised for it; and if it will do that, it can cure disease everywhere, whether in man or other animals. If anybody doubts this or fails to understand it, I have tangible, visible evidence that I can produce, but I hardly think that the people generally will fail to find ample proof in the cures I have already effected. These should alone be convincing, even though my medicine is the same for all, and I myself, in place of being a professor with a long name, am nothing more than a close observer of Nature.

This is certain, that Nature cannot be denied. Whatever she teaches is beyond contradiction at the hands of the doctors, and medical science, if there be any science in medicine, is not in a position to oppose it. But I do not see the science. I know the profession is wrong, emphatically wrong, and my only wonder is how people can allow themselves to be misled by it. Let me not be misunderstood. I do not say that there are not some good and useful medicines. But those, for instance, which are useful to regulate the bowels cannot be called blood purifiers. Even those act in different ways,—some influencing the functions of the liver and other organs, others increasing the peristaltic motions of the intestines, others again producing an exosmosis from the lining membranes, and so on. But none of these actions implies a purification of the blood. There are probably thousands of medicines sold as blood purifiers. Some of them, through being kept constantly before the people, are popular, and occasionally they may do some good, or if they do not, people think they do. They are announced as being free from mineral compounds, and the medicine man declares they are made exclusively from herbs, roots, barks, seeds, and so on. Now the fact is that those things would ferment and they would promote fermentation in the blood, and to prevent that the manufacturer of the compound uses alcohol or whiskey as a preservative. If he did not do that the stuff would breed microbes in the bottle in which it is sold.

Any one can prove this for himself by taking some of the vegetable compounds, diluting them with water, or make an

infusion of the roots or herbs, add to them any of the fluids or excretions of the body,—add the ferment with the medicine,—and keep the mixture closed in a bottle. In a short time you will see whether or not the medicine has prevented fermentation. You need not be an expert with the microscope. You will see the process going on rapidly. If, then, the medicine that you are asked to take increases fermentation, how in the world is it going to cure you? This experiment you can pursue with any of the nostrums that are offered to the public and which are prescribed, and you can learn for yourself without swallowing them whether they are likely to accomplish what is promised for them. Or you may take a piece of lean meat, place it in a bottle with any of the popular medicines, and see whether they prevent fermentation and the formation of microbes.

This, however, must be remembered: Suppose that any particular remedy stands the test. In order that it shall be efficient as a medicine it must be of such a nature that it can be taken like water, so as to saturate the body, permeating all the tissues. A small quantity taken into the stomach is of no use. You may take strong alcohol and it will stand the test, but can you saturate your body with it? You may, indeed, go on experimenting until you have covered all the drugs known to the doctors, and still you will not find one that will effectually kill microbes without also killing the patient.

Many things will give relief. Chloroform, morphine, mercury, and numberless drugs will, on occasion, do that: but relief is not cure. Many persons have told me—some personally, others by letter—that years ago they had some form of disease, that they went possibly to some celebrated doctor and got well. Then, some years later, they had another attack of the same disease, and again they got well under some physician's care; and now they have it again. The truth is, these people never were cured. They were simply relieved either by a partial suppression of the microbes, or by driving them to other parts of the body.

Persons have often come to me who had suffered from cancer. They showed me where it had been removed by the knife or checked by plasters. At the time they had thought themselves cured, but now evidences of cancer were appearing in various parts of their bodies, and it was more severe than it had been at first. Cutting away portions of the human body that are diseased in that way is evidence of the grossest ignorance. If a person have cancer of the tongue, a removal of that organ will not cure him. If he have cancer in the throat, the removal of a portion will not cure him. The amputation of a leper's limbs would not remove the leprosy. Whereas, if we can purify the blood, there is no occasion even to think of the knife, and this refers to almost any kind of surgical operation.

They say that exceptions prove the rule, and I will name one. There are cases where, from some cause or other, mortification supervenes on an injury. As soon as that process stops, of which Nature gives unmistakable signs, then the diseased portion may be safely and rightly removed; for, if it be not taken away, and assuming the patient's health to continue good, Nature herself would remove it, but the process would be slow and the stump would be unsatisfactory.

If I had a compound fracture of one of my limbs, I should be content to keep the parts in place, keep the wound saturated with microbe killer and use it freely internally, and I should have no fear for the results. Microbes would be prevented interfering with Nature, and I know that every thing then would progress satisfactorily.

Persons whose bodies are mutilated usually die from inflammation—that means fermentation, which again means microbes; but if the microbe killer be used intelligently no microbes can exist, no fermentation can take place, and, consequently, there can be no inflammation.

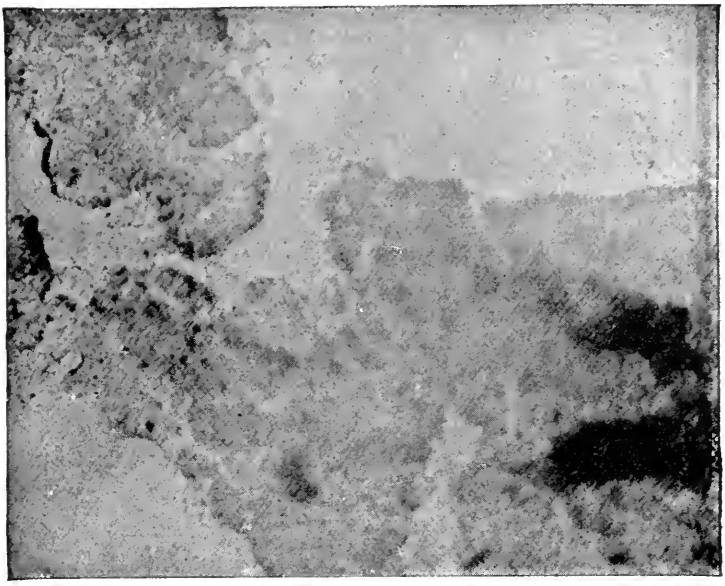
We shall always require surgeons. That is certain. There are numberless forms of accident and injury where their assistance will be necessary, but in all their work the microbe

killer must fill an important place, since it stops fermentation and what the doctors call blood-poisoning, which is simply blood filled with microbes. When the value of my discovery is fully understood, there will be but little use for surgical instruments. We may take any diseased growth on the human body, call it lupus or cancer, or a tumor, or what you will, there was a time when it had a beginning. In the future, when such things are first observed, the microbe killer will be used immediately, and thus the growth will be stopped and no trouble will ensue.

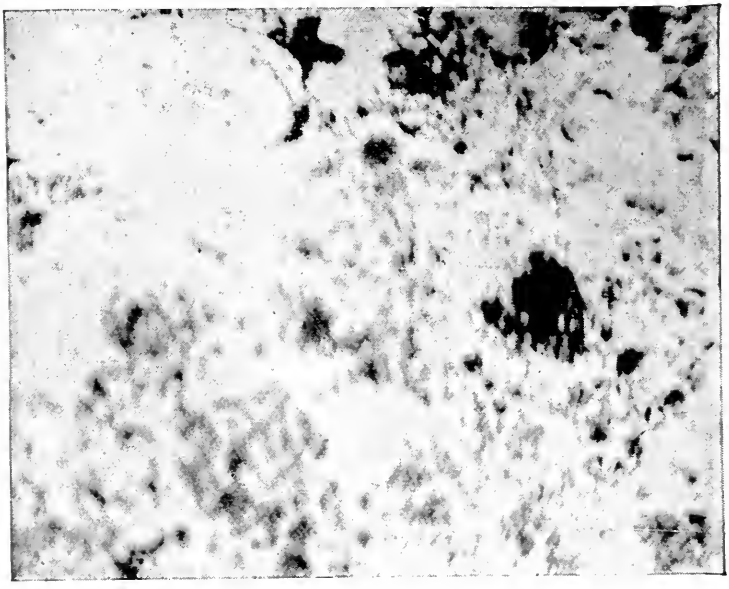
During the short time that I have been using the medicine, I have seen many cases of cancer, ulcerated sores, abscesses, etc., etc., all of which have been cured by a free use of the medicine. Not, recollect, by small doses, but with sufficient quantities taken regularly and perseveringly.

If we remove the limb from a tree, and at once stop the cut surface and protect it from the atmosphere so that no fungus shall be deposited on it, the heart wood will not suffer, and the tree will soon protect the part itself by the bark growing over it. But if the exposed section be not protected, the surface will soon become black from fungoid growths, and these will at times extend throughout the tree, of course shortening its life. The same process goes on in the human body. A person may be never so healthy, but if he lose a limb or become wounded, and microbes are allowed to form and enter into the blood, his life may be shortened or even lost. On the other hand, if he can prevent fermentation altogether, the parts must quickly heal, and no further injury will be done to the system.

Antiseptic plasters so-called cannot be of any use. They cannot do any good in surgical operations. They cannot be used internally, and, consequently, they cannot reach the general circulatory system. There must be some internal remedy as well, and something that can be used so freely that it may saturate all the tissues and thoroughly, as it were, soak the body. Most surgical work must cease. The removal of limbs for leprosy must be stopped. All cutting



SYPHILIS (?).



BUBO.—SYPHILITIC ULCERATION.

around the eyes, face, and limbs is unnecessary. Every case can be cured through purification of the blood by means of the microbe killer.

I read in the medical papers how patients, especially women, after being drugged with chloroform or ether, are cut open, diseased portions cut away, and then the parts are sewed up again. Accounts go on to show how they lived through the ordeal, then the symptoms are reported, the action of microbes is duly chronicled under another name; inflammation follows, which is fermentation; fever ensues, with exhausting perspiration; appetite fails, and the patient succumbs—destroyed by the destructive action of microbes. Yet this is called surgical science!

The thoughtful reader must acknowledge that I do not exaggerate or state what is not absolutely true. Let him go into any hospital and see the machinery devised for relieving pain and enabling patients to survive these terrible operations. Let him picture to himself, as I have seen it sketched in a scientific paper: the surgeon, standing with uplifted knife, and clad in a long white gown, ready, before fifty or more young students, to open a patient who, having first been chloroformed, has just been wheeled into the operating theatre. How many of these unfortunate creatures survive the operation?

Now note the change that will be effected when my own discovery becomes known. Here comes a man with a jug who takes it to the patient's house. The patient can use it himself and cure himself and his family without pain or risk by simply removing the microbes from his blood. And then because I cure people in this way, and in spite of proof that I do, these same surgeons and physicians appeal to the public not to trust me, asserting that my medicine is poisonous, that it must kill sooner or later, and they try to destroy confidence by saying that it is made by a man who knows nothing whatever about medical science. "He is no doctor," they say. "He has no diploma, knows nothing whatever about medicine, and is simply a gardener." Well

they may go on saying so if it affords them any satisfaction. I will go on proving what I can do, and in due time the public will have their eyes opened to the backward science of the medical faculty,—that too at no very distant day.

A lady came to me at Austin, Texas, who had been under medical treatment fifteen years. None could cure her, and although relieved occasionally she was worse now than she had been years before. At last the doctors recommended an operation for the removal of what seemed to be a tumor in the abdomen, but to that she would not give her consent, for she regarded it justly as a death-risking experiment. One of my first experiences was with that lady, and I treated her gratuitously. I gave her the microbe killer in doses of four to six wineglassfuls every day for about six months. Twenty-four hours after beginning the treatment she reported an improvement in her appetite. Five days after that she suddenly vomited a mass of fermented matter the size of a hen's egg. She suffered from constant headache and her face lacked all color, showing that her blood was in a poor condition and fermented. But she gradually improved. As she grew stronger, which she did slowly but steadily, she was able to resume her household duties, a thing she had not done for several years. Her terrible pains ceased. Her natural functions were restored, and nine months from the date of the first treatment by me, she published a statement explaining how she had been cured by the microbe killer. As far as I know, that lady is still living and in good health, and her case shows that my discovery can both cure and heal.

Healing and curing are very different. A wound may be healed and disease be left internally. But where a cure is effected the blood must be purified and the disease eradicated from the system. A doctor may heal, but he never cures.

In the same neighborhood was another lady similarly affected. She had been constantly under the care of a doctor. She suffered from what is known as female diseases, and she had an abscess which had been so badly attended to

that worms visible to the naked eye came from it. The doctors had cauterized the wound, they had plastered it over with medicaments and tried all the means they knew, but they could not heal it. I had some conversation with her husband, who said on one occasion: "Mr. Radam, if you were to cure the rest of the world you could not cure my wife, for her disease is peculiar and there is absolutely no cure for it, and I have no hope of any being found." He consented, however, to try. I gave him some microbe killer and told him how to use it. I knew full well that the abscess was only an outlet for the microbes which filled up the whole body, and that it was worse than nonsense, for it was dangerous, to try to heal that without freeing the system itself from the cause of the disease. If I wish to stop water running along a channel I must go to the source and stop the spring that supplies it.

Many similar cases came to me. A prominent lady in San Francisco once called upon me and, as she had been recommended by a friend, she candidly explained to me all her ailments. A glance readily told me that she was curable. Her breathing was good, and her lungs were evidently sound. She appeared to have no organic disease, but only that her entire system was in a state of fermentation. She explained to me that she could not sleep, sit, or walk. She was suffering from extreme nervous depression and irritability, and to allay that and to make her life endurable she was constantly taking morphine. She had had disease of the rectum and bladder and had gone through an operation for disease of the womb. She was a great sufferer from dyspepsia, and could only at times retain food upon her stomach, so that it was necessary to be very careful with her diet, and she was a martyr to headache.

This lady was wife of a senator and had spent a great deal of her time in Washington, and having been sick many years she had consulted some of the most celebrated doctors at the capital. It was evident to me at once, from what she told me and from what I could judge for myself, that these

doctors had never cured her of any thing. They had simply relieved her from time to time, and then by using powerful and poisonous drugs as local applications only. Of course the fermented blood was untouched. It had never been freed from microbes and purified, but left to ferment in increased ratio, as it always will when the cause of the fermentation is allowed to increase and multiply. The condition she was in was precisely the same as that of many hundreds of women at this moment.

I knew that I could cure her if she would follow instructions, but I had great misgivings whether she would persevere long enough, as it was necessary to take time and to begin gradually. I explained the law of Nature to her, that the medicine must remove all the microbes that now abounded in her blood, together with all seeds and germs and every thing that would encourage their growth. This I told her would require some months, and possibly it might be a few months before she would experience any marked improvement. It would be necessary then to renovate and build up the system, all of which would require time. But she had confidence. She had heard of the many cures I had made in San Francisco, and she believed what I told her. She thereupon promised to carry out my instructions as faithfully as she possibly could, for she seemed to feel that in the microbe killer was her last hope.

I instructed her to drink the No. I, a mild grade, at first, and to take three wineglassfuls every day; then to warm some of the medicine by standing small bottles of it in warm water, and to use this as a rectal and vaginal injection twice a day. I consented to her using the morphine hypodermic injection for a time until she should be sufficiently recovered to do without it. Soon after the treatment was begun very much fermented matter began to be discharged, which when examined under the microscope proved to be filled with millions of micro-organisms. She saw this for herself, and at once her confidence in all I had told her was strengthened. Her menstruation always left her extremely

weak, and her headache was at times unbearable. To relieve this I advised her to wet a flannel in the microbe killer and to bind it around the head till the worst pains subsided. I explained to her that the blood thickened by microbes was impeded in its circulation, and that that necessarily caused pain, but that as the microbes were overcome and the blood became purer those pains would cease.

During the first three weeks she had many very bad days, but she persevered faithfully with the medicine as she had promised she would, using as much of it daily as she could bear, and after the three weeks she began to feel easier and to improve. The pains were less severe and her appetite became stronger. At the end of two months, after using eight gallons of the medicine, she came to report progress. At that time her face and body were covered with red spots or pimples the color of scarlet-fever, but she felt well and took a great deal of exercise around the city.

She also mailed my circulars to all the friends and acquaintances she had over this broad land.

I examined some of the red spots and put the contents of one of the pimples under the microscope—and what a number of little black feathery-looking worms we did see! My patient was wild with joy at the thought that my medicine would bring these little things out, for she never had any idea that any such could possibly be in her body. None of her doctors had ever told her any thing of the kind, and she had no suspicion of them. By continuing the medicine the spots gradually disappeared. My patient's skin became clear and smooth, and a few weeks later her cheek glowed with color and health, and she felt so well that she never passed my office without coming in to thank me and to shake my hand and tell me how she was indebted for her life to my medicine. She promised me, too, that as long as she lived she would be a worker for me and would proclaim the value of my discovery everywhere.

Her cure was slow and gradual, but it was steady. She had no relapse, or any falling back at any time. Yet it was

a long process, and only perseverance and an unflinching confidence in me sustained her. She lent a deaf ear to all slander, paid no heed to the jeers and false prophecies of the doctors, and never believed that she would be killed if she did not stop using my medicine. She understood all that. She knew that it was nothing but the outpourings of jealousy and marks of ignorance and prejudice. But first of all she knew that the doctors who talked in this way had failed to cure her, although every opportunity had been given them, and she was not likely to place much confidence in them when they informed her that I used poison, and that if she insisted on persevering with it the lining membrane of the stomach would be destroyed.

This story was not confined to her. Thousands of patients have told me the same thing, how the doctors assured them that I should kill them if they followed my treatment. That was the tale in Austin, where my discovery first became known, and it is the same to-day. But if I had ever killed anybody, where should I have been to-day? Certainly not in my own house, writing this book. The Medical Faculty would have been but too glad to get hold of me, to have me indicted for manslaughter, and put me in a gaol. The medical profession is powerful. They have known how to blindfold the people and keep them in ignorance of the first principles of Nature's laws and operations, just as the Salvation Army misleads the ignorant and rules its devotees with the terrors of an alleged Satan.

This lady whose case I have given was entirely and permanently cured by the microbe killer, and she not only acknowledged the cure to me, but she gave me the following statement for publication, with the request only that her name should be withheld, except to those who might with sufficient reason apply for it:

RADAM'S MICROBE-KILLER CO.:

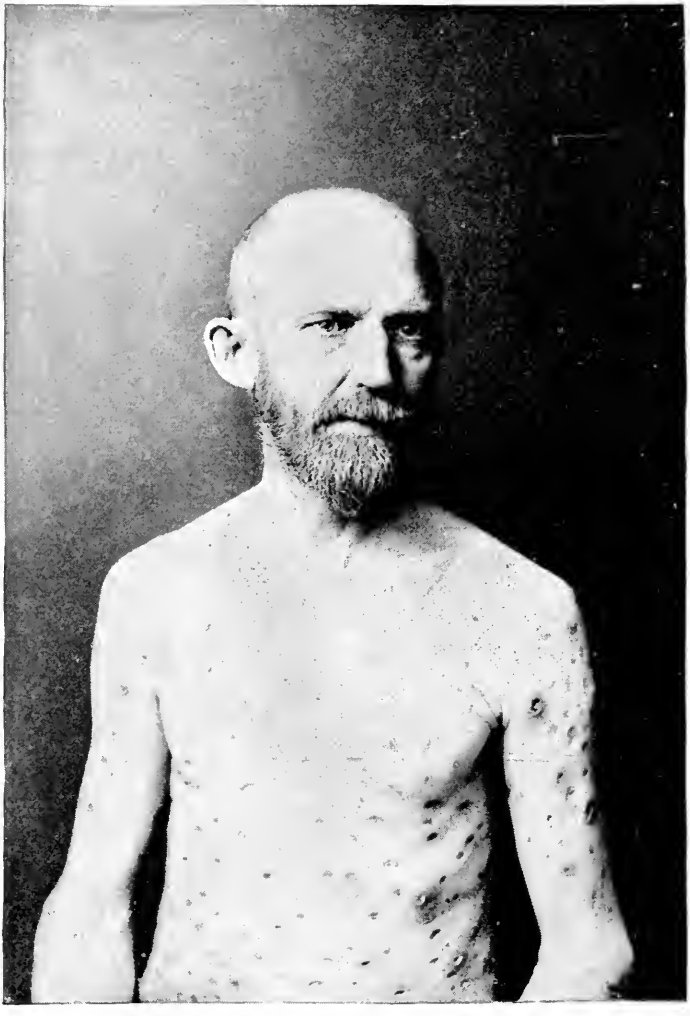
The benefit received from the use of the microbe killer cannot be told in stronger language than I would use. I truly believe it has saved my life. I was very much reduced in health by long-con-

tinued and painful illness, was treated by good physicians and specialists, but gradually grew worse, until I was handed one of your circulars and commenced at once your medicine. At the commencement I was so emaciated and in such fever I could hardly walk across the floor. Indeed, I felt that my life was of little value, and hoped soon to be relieved of my great suffering. I began the medicine as directed ; the fever soon left me, and pain grew less, and health gradually restored, until I felt like a new person, and in six weeks could attend to business and home affairs. I have friends in San Francisco who knew how ill I was, and of my wonderful recovery. I heartily recommend the Microbe Killer to the suffering who may read this, as I feel for humanity, and without health life is not worth much, but any who take this medicine for a sufficient length of time for restoration I am sure will benefit. This to some might seem a broad assertion, but I have found it of so much benefit to myself I can speak emphatically of it as one of the best medicines in use. I wish its success. Truly a friend of humanity,

I am yours,

Among my other patients was a young lady who as she came into my office sank into a chair in a state of exhaustion. She was pale, and any one to look at her would have pronounced her near her death. She brought with her a small quantity of fermented matter that had been thrown off from her stomach after taking medicine prescribed by her family physician. I placed some on the field of the microscope, and the sight was so alarming that I wondered at her being alive at all. She saw for herself, and I explained it all to her, and described exactly the condition she was in. The microscope displayed an enormous quantity of micro-organisms, in the presence of which there must have been the greatest discomfort and sense of disease. But bad as the exhibit was I felt that the microbe killer would overcome it and I encouraged her. "You are not seriously ill, and can be cured without much difficulty," I told her. "The contents of the stomach are in a constant state of fermentation. Even the medicine you have been taking promotes that process,

because it supplies food for microbes, without which fermentation cannot exist. The more you take of it, therefore, the worse you will get. As fermentation proceeds, the matter gives off gas, the coats of the stomach become irritable, and the matter is rejected; hence while this lasts you never can retain any thing on the stomach. If you take a quantity of foul water, you cannot sweeten it by putting a little clean water into it. If you add something that is food for microbes to matter that is already fermenting, you do not stop the ferment, nor can you stop it until you put in something that destroys the micro-organisms. If this is done with the stomach it will then become clear. The fermentation will cease. Gas will no longer be given off. The stomach will cease to be irritable. It will not throw off its contents, but the digestive process will go on regularly and the patient will be free from pain and will derive full benefit from food. The blood will now become enriched. Impurities will be excreted. New blood will be formed, and thus in a short time the entire system will undergo a renovation. Powerful drugs cannot be used so as to permeate the system, and such harmless drugs as you have had given to you merely encourage the growth of microbes and make the disease worse than before. Now take a glass of my medicine and you will find that it is not rejected, because it almost immediately destroys the microbes in the stomach, and so checks the process of fermentation." I had to use some persuasion at first, because she objected to take any thing more, and as soon as she tasted the microbe killer she raised further objections because it was, as she described it, "sour." But I talked to her, told her that there were no drugs in it, and after some further pressing I induced her to drink a large glassful, after which she immediately hurried home. The next morning she was back at my office, but in a very different mood. She had had, as she told me, the first good breakfast in a long time, and it had remained on her stomach without producing any inconvenience. I promised her that she should be perfectly well in three weeks if she would follow my instructions. She did



M. C. BATTEY.
Cured by Microbe Killer.

so, and my promise was kept. She was perfectly well in the time stated, and, as I told her, I wish I never had any more difficult cases than hers to treat. Two gallons of the microbe killer was what she took. I mention the case not as in any way singular but merely as a fair sample of many hundreds that have come to me.

The case illustrated was of a very different character. Mr. M. C. Battey was ticket-agent at the office of the Fort Spanish Railroad Company, in Canal Street, New Orleans, Louisiana, and he first called upon me in the month of July, 1889. The photograph taken at the time gives but a faint idea of his condition. His body was covered with ulcers. I examined him carefully, and found that many of the sores were from one quarter to three eighths of an inch deep, and some of them from one to two inches in length. They were suppurating, and a discharge was constantly coming from them. All the patient could do was to keep them dressed with cotton wool and bandages, and to remove the fermented matter as fast as it accumulated. He had had the best medical advice that could be procured. The most accomplished physicians in the city and elsewhere had seen him, but they had not been able to afford him any relief. The fermentation appeared to become worse instead of better under their treatment, and when he came to me he had abandoned all hope of ever being well.

He was very much depressed, and it was with tears in his eyes that he told me his sad story, describing his long and terrible sufferings, the difficulty he had had to support his wife and children, the constant and intense pain he had undergone, until he felt that he could endure it no longer, and was now only wishing for a speedy death. I felt great pity for the man, and requested the company to supply him with the Microbe Killer free of charge, and endeavor to demonstrate through him what the medicine was capable of. I asked him only to let me have the photograph. He gave me that, from which the illustration is taken. I then promised to have him all right in four or five months, although up to

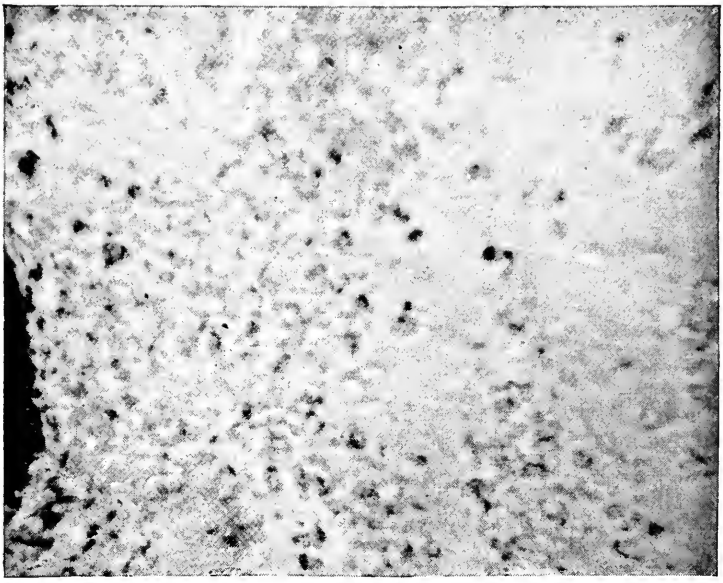
that time he was gradually wasting away from the constant fermentation, almost as though he were affected with leprosy. At the end of the period named, he sent a letter, which I will allow to speak for itself as follows:

NEW ORLEANS, November 1, 1889.

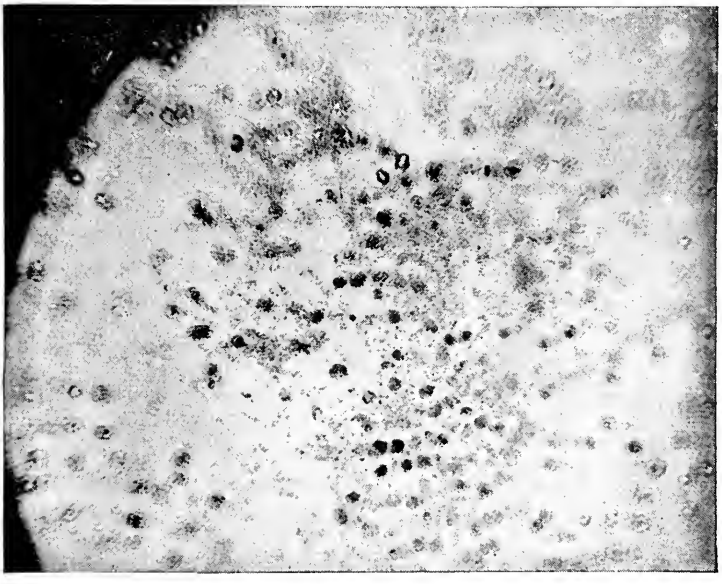
Radam's Microbe Killer Company:

I consider it only your due that I add my testimonial to the thousands given you, all breathing praises of the wonderful remedy discovered by William Radam, and named by him "Microbe Killer." To me it has proven a God-sent gift, for to its wonderful effects I firmly believe I owe my life.

For the past fifteen months I have suffered all the agony a man could, covered with ulcers from thighs to neck, on front, back, and sides, the result of blood poison, caused by my own imprudence. Over a year ago I had an ulcer appear on my leg, big as a hen-egg. To open it I used a large-sized hypodermic needle, laying the needle aside without cleaning it with carbolic acid or other agent, as I should. When a second ulcer came I used the same needle to open it, and thus put into my system all the old poison contained within the needle. The effects were terrible indeed. Malignant ulcers began to come, often ten at a time, on all parts of my body. They caused the most intense suffering, day and night. Poisonous pus constantly exuded. They would not heal, although I used every agent known. I began to lose flesh rapidly, my weight being reduced from one hundred and seventy to one hundred and twenty-five pounds. I had no appetite, no ambition, no strength. I gave every medicine advertised, as well as various physicians' prescriptions, a thorough trial, and got rapidly worse instead of better. I gave up all hope of being cured, and neither my family, friends, nor myself believed I could possibly live to see this year out. Finally, owing to the persuasions of Mr. Meyers, of the *Picayune*, I consented to try the Microbe Killer as a last resort, and I frankly confess I had no faith in it, as I had used S. S. S. and B. B. B. and P. P. P., five bottles of each, and received no relief, and I believed there was no cure for me. But I determined to give your remedy a fair trial, and I thank God I did. I determined to use heroic treatment, and not follow directions, so I began on your strongest



MICROBES FROM ULCER. (M. C. BATTEY.)



FROM ABSCESS ON THE BACK OF A LADY.

preparation, No. 3, and drank it freely as water, eight or nine times a day, using a jug, or gallon, every five or six days ; at the same time I used the remedy as a wash, bathing the ulcers night and morning, forcing the liquid into the sores with a sponge. I soon found the benefit of such treatment, for the ulcers at once ceased to come ; they began to discharge a healthy pus, my appetite returned, I slept well (as all soreness had gone from my body), the color came back to my face, body, and hands, my flesh returned, until now I weigh one hundred and sixty pounds ; my family regained lost hopes, my friends congratulated me on my improved appearance, and I said good-by to disease.

I have used seven gallons, and do not propose to quit until I am perfectly cured, although I believe I am now, yet I do not propose to give the microbes a chance to multiply yet awhile. I give you permission to show the photograph I enclose. It was taken when I commenced to use your remedy. If I had one of my present appearance it would show the gain which has been effected ; but it might mislead the unthinking, as although the sores are healed up the scars remain, and many of them I will carry to the grave. But to all and every one I truthfully say that I owe my cure and my life only and solely to the unstinted use of the Microbe Killer, and so long as I live I shall use no other medicine for the cure of any disease, for I firmly believe with Mr. Radam, that microbes are the cause of every disease, and I also believe his remedy is the only cure there is in the world.

I have had the worst case of blood poisoning I ever saw, and I believe my case is the only one which has ever been cured. You can find a score of men who can vouch for the facts I have given. Nearly every one of them has seen my body in its worst condition, and all will testify that only Microbe Killer has cured me.

Yours truly,

M. C. BATTEY,

709 Burgundy Street.

CHAPTER XI.

CURABILITY OF TUBERCLE AND CONSUMPTION.

PEOPLE are constantly deceiving themselves and often letting others deceive them about their ailments, and they think they have organic disease when there is only some local weakness or derangement.

The stomach is the source of very many troubles, of more than people generally have any idea of. Frequently a patient will come, asking to be thoroughly examined, because confident of the existence of heart-disease. He has an irregular pulse, palpitation, pain over the region of the organ, and probably much nervous irritability. His chest is examined, but it is hard to convince him that his heart is perfectly healthy. He insists that he knows his own feelings best, and that they tell him differently, and he prefers to believe them. If the doctor says he is mistaken and tells him that the stomach is the source of trouble, he is probably dissatisfied and seeks another physician. Any doctor who is regardless enough of the truth to gratify him by telling him he is right, and that his heart is in such a terrible condition that death may come at any moment, will have his confidence. If such doctor treats him for heart-disease he will fail, but if he attacks the stomach the patient will get well and will give the doctor credit for having cured his heart, while the more honest man who told him the truth will be set down as a person ignorant of his profession. What people think is palpitation of the heart is in reality nothing more than a symptom of disorder of

the stomach, which in this country is more prevalent than in any other. But why it should be so prevalent has nothing to do with the climate. It is a result of the way in which people live and of their disregard for the ordinary rules of diet and hygiene. Hot bread, iced water, insufficient exercise, fast eating, too common use of whiskey, are all conducive to indigestion.

We read a great deal in political speeches in America of pauperism in Europe, although very few of the writers and speakers who use the word know what it means. But the people there, even the poor among them, live better than we do. They dine, they are not content to feed. They are more regular in their habits. Their food is more wholesome; and so where a hundred persons are suffering from dyspepsia here, often in its worst form, there would scarcely be found one affected with it even mildly there; and yet there is a great reluctance to attribute the evils of it to their true cause. Before I ever sold a gallon of microbe killer I experimented with it on myself, to see how it acted on an overloaded stomach. I took a hearty meal of meats and vegetables, including cucumbers and peas. Fermentation took place, gaseous matter was formed, and a sensation of swelling and bloating produced with severe pain. I drank one or two large glasses of the microbe killer, and all pain ceased in from five to ten minutes. This satisfied me that the superfluous fermentation was destroyed. Some kinds of food, especially some kinds of fruit and vegetables, ferment much more readily than others, and again, there is a difference in the degree of fermentation of different things. Overripe fruit ferments very readily, in fact it is already in a state of fermentation when eaten, and diarrhœa is the result, the microbes passing into the intestines. Unripe fruit is not readily digested. It is apt to remain in the stomach too long, and thus when fermentation ensues, colic, pain, and diarrhœa, again result.

Persons suffering from indigestion have a weakened stomach. The lining membranes, where the trouble is of long

standing, are broken down. There is no tone in them. They have been weakened by neglect of Nature's laws in the first instance, and their digestion being impaired over-fermentation has set in habitually, and thus no medicine can be of any use which does not check that by destroying the microbe that produces it.

But that is not all. Impaired action of the stomach and digestive organs causes a mal-assimilation of the food, consequently an impairment of the blood, so that while the microbe killer will produce a prompt effect by direct action on the stomach and its contents, it must be persevered with to purify and strengthen the blood and restore the whole system to a healthy condition. When the disease is of long standing, as it always is, for dyspepsia begins before the patient knows what is the matter with him, time is also required to bring the membranes of that organ back to a proper form. Nourishment is also necessary to strengthen the blood, and this cannot be effected until the stomach is restored. It is evident, therefore, that when so much is required, time must be taken. Perseverance in the use of the remedy is essential, although, where that is used there need be no fear about the result. A cure is certain.

It is useless to give artificial drugs like iron, and it would not be done but through mistaken ideas. It is useless to spread manure over a field of corn unless the weeds are removed; for they will use up the fertilizer, and growing more luxuriantly than before they will choke out the crop; in other words, so long as the microbe remains on the stomach it is useless to put in food or drugs, because the fermentation still goes on, probably even in an exaggerated form, thus leaving the patient in a worse condition than he was before and the system weaker. It is a false policy, resulting from ignorance, which gives iron to recover the coloring matter of the blood when a person looks pale and anæmic. Iron will not make blood. It cannot do it. First purify the stomach, then let the patient eat any thing that is nutritious and agreeable to the taste. The stomach then

can digest it, the food is assimilated, and the entire body becomes improved in tone. This is effecting a cure in Nature's own way, and it is not only preferable to artificial methods, but it is the only way in which a cure can be permanent and complete.

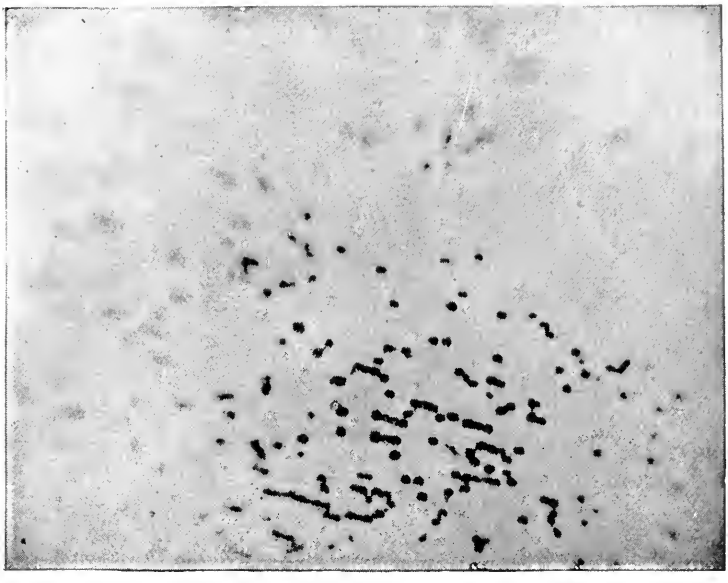
Upon this principle, consumption if taken in time becomes curable. The microbe of the disease is very common. It was discovered in 1882 by Koch of Berlin. They are readily found in the bodies and in the sputa of persons suffering from phthisis, and when inoculated into other animals they reproduce tuberculosis. Consumption then is a contagious disease and may be conveyed from one person to another. It has not been popularly regarded so, but there is no doubt of the truth of it, the only difference between the contagion of phthisis and of such a disease as small-pox being in the less power of the microbes, except in larger quantities, to convey the disease.

Laws existed in Italy as long ago as the last century in which pulmonary consumption was treated as contagious. Physicians were required to report every case that came under their notice, and a heavy penalty was imposed for neglecting to do so; a second offense involved expatriation for a long term of years, so important was the precaution considered. Under the law isolation was practised. Poor persons suffering from consumption were removed to a hospital, and after the death of a patient in a private house, the bedding and clothes that had been used were destroyed, and after fumigation the house itself was made to undergo complete renovation. The law was not successful in abating the disease, chiefly perhaps for the reason that persons suffer from it long before they are aware of it, certainly before it is necessary for them to lay aside their usual avocation, and hence the isolation comes too late. It is very doubtful whether the laws prevalent here which apply similarly to other diseases of an infectious or contagious character possess advantages sufficient to counterbalance the evils attending them. Too little regard is paid to the rights

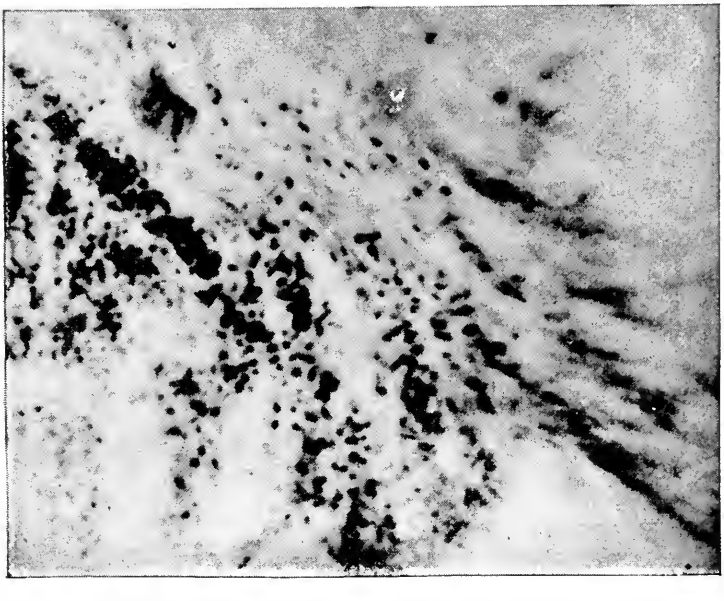
of individuals, and in consequence, coupled with the ignorance and impulsive nature of our legislators, laws are placed upon the statute-book which look very well in theory but which are in reality inhuman and practically of no value.

The isolation of consumptive patients would be a perfectly gratuitous and useless cruelty. It could never be made effectual. If every one suffering from tubercle were to be taken away, the streets would be denuded of a large proportion of the population, and persons following an active business or professional life would become wards of the State, living apart from their fellow-men. There is no danger in the moist sputa of phthisical patients. It is only when the sputa are allowed to dry that the microbes get into the air and become dangerous. The filthy habit of expectoration, peculiar to Americans, is thus a public evil, and to guard as far as possible against its consequences the mats and floors of street cars and the carpets, rugs, and floors of public halls and buildings cannot be too constantly or too carefully cleaned. In the same way there is danger in hotels. The same rooms are occupied by different people to a degree that possibly hundreds live for a time in the same apartments in the space of a year, and the cleansing that such places receive is wholly inadequate. Rooms occupied by transient visitors at hotels and boarding-houses would be more healthy if the floors were left uncarpeted, and if all curtains and hangings were excluded.

One inference which the reader will deduce from these remarks is that consumptive patients take considerable risk, and involve others too in risk, when they go to summer resorts, and the inference would be correct. In such places due precautions are not taken. A person affected even mildly with tuberculosis occupying rooms at a summer resort which had been previously used by another similarly diseased would be very likely to intensify his trouble. The only suitable places for such persons are sanitaria, of which there are now plenty in the country, where proper precautions are taken and all risk is guarded against.



TUBERCLES—CLEAN CULTURE. (BERLIN.)



TUBERCLE—CAVITY. (PARIS.)

Florida is proverbially dangerous to consumptive patients, but that is not due especially to this cause. Some hotels in that State are built suitably to the climate, and contain lofty and well ventilated rooms, which have at least the appearance of being adapted to sick persons. It is a well-known fact, nevertheless, that phthisical patients do not obtain relief from a visit to the "Land of Flowers." On the contrary, a fatal result is far more likely to be hastened by it. Persons suffering merely from throat affections may obtain relief, though not as they would in Bermuda, but tuberculosis is rendered worse. The extremely moist and warm as well as variable climate of Florida is particularly well adapted to the growth of the tubercle microbe, and if a consumptive patient retain strength to enable him to escape it, he will almost certainly suffer from its influence on returning north. Florida should be avoided by everybody who has a tendency or predisposition to tubercular disease.

Not long ago the French Academy of Medicine appointed a commission to investigate the disease, and they formulated the cases most liable to contract it into three divisions:

1st. Persons born of tuberculous parents or from persons belonging to families which include many members affected with tuberculosis.

2d. Those who are weakened by privations and excesses; the abuse of alcoholic drink is particularly injurious.

3d. Persons suffering or convalescent from measles, whooping-cough, and small-pox are likewise predisposed to tuberculosis. Diabetic patients are especially predisposed.

It was calculated by that commission that about twenty-five per cent. of the total number of deaths in Paris arise from some forms of disease where the tubercle microbe is found. It is a popular error to suppose that consumption is the only form in which it exhibits itself. Many diseases are due to it, not only scrofula, abscesses, ulcers, tumors, and diseases of the bones and joints, but others frequently regarded as inflammatory only, such as peritonitis, bronchitis, pleurisy, meningitis, enteritis, and catarrh.

Any accurate estimate of the percentage of deaths in this country is impossible by reason of the great inaccuracy of the census. The stated population is greatly exaggerated. This results partly from carelessness and partly from the clumsy way in which the returns are made. It is also done for political reasons. In the year of the last census, 756,893 deaths were reported. We do not know how many were not reported. But of those, 91,270 were caused by consumption, while if we could learn accurately the number in which the microbe of tubercle alone was involved, the number would probably rise to nearly one half of the total.

I have before me some returns only now completed which go to show that the deaths by consumption in New York are 3.5 per thousand of the population. In some wards of the city it is set as high as 9.71. It is more than probable that the truth lies nearer double these figures. The population of New York was given by the last census as 1,206,299 and it is estimated now at 1,800,000. The first number is too high by probably two hundred thousand, and the estimate is in excess by probably from four to five hundred thousand. Apart from the constant effort to make the population appear higher than it is, a large number of persons get their names on the census who do business in the city but are residents outside of the limits, Staten Island or Long Island or in New Jersey. Consequently statistics are of very little value, and it is more than likely that if accurate figures could be obtained, it would show mortality rates to be not less than 26 to 30 per thousand, sometimes higher, of which about one half are influenced, if not directly caused, by tubercle diseases. The number of deaths recorded last year was 39,583.

The prevalence of the tubercle microbe, the bacillus of Koch, is only what might be expected when we remember that it exists in meat, milk, and many articles of food, that it can reach us through the lungs and skin, and be transmitted readily from one person to another; then again, that it may remain in the system long before its effects are

marked by any indication of disease. Knowing this, the necessity for adopting means to prevent its action becomes more imperative, as well as are the precautions requisite to prevent its being taken into the system. Physicians allow that their treatment of tubercle has of late years undergone a great change, arising entirely out of the discovery that it is a microbe disease. When they are forced to acknowledge, as they will be, that all are microbe diseases, their treatment will perhaps undergo still further change.

A quaint acknowledgment has been made by Professor Sommerbrodt, which I shall notice more fully elsewhere. He has great faith in creasote as a curative agent, and especially as an antiseptic, and when the bacillus of tubercle was discovered he thought it would be an excellent medium for killing it. Using it tentatively he found that his consumptive patients derived some benefit from it. It happened about that time Dr. Guttman was also experimenting and testing it on the cultured bacilli in his laboratory. These experiments led him to the calculation that before the microbes could be destroyed about one third of a drachm of the fluid must be introduced into the circulation, and he concluded that although the bacilli would be killed the patient would also assuredly perish from the poison. One drop of creasote is a dose. Notwithstanding this, Dr. Sommerbrodt persisted in his fancy, and has capsules made containing creasote for persons suffering from tubercular disease, content to take his chances whether the microbes or the patient die first.

It is popularly supposed that tubercle is more common in towns than in the country. Careful observation shows this to be an error, and the explanation is not very clear. The tubercle microbe is not, like that of typhoid or diphtheria, dependent upon inefficient drainage or corrupt air, and possibly the large use of milk in the country may have something to do with it. But that is only a suggestion. Further investigations, however, are required. The statistics which led to the above conclusion were obtained from

France and Germany. None, so far as I know, have been prepared in America, and if they had, they would for the reasons before specified hardly be trustworthy.

Paté de foie gras, although esteemed a delicacy, is, as is well known, produced by disease, but it is not as well understood as it should be, that this liver is little else than a culture of tubercle germs. In this we have an instance therefore, not only where microbes become an article of food, but where they are largely esteemed and sold at a high price. Nevertheless the *paté de foie gras* should be abolished.

Tubercle bacilli are very frequent in poultry, and, again, dentists tell us that where persons are predisposed, they may produce serious results through decayed teeth. To lessen the danger the brush should be kept in requisition and used two or three times a day, and with it a safe antiseptic wash, which, like my microbe killer, destroys all germs.

In France it is not as usual as it is with us to use milk unboiled, yet in Paris there are about two thousand deaths of children every year, caused by tuberculous disease brought on by impure food. No meat or animal food of any kind may be eaten with perfect safety unless the inner portions are as well cooked as the exterior. Milk is, however, always a large item in the nourishment of children, and Dr. Ernst, of Harvard, has shown that in a large number of samples very many were found to contain tubercle bacilli in great quantities. Such milk is highly dangerous and should not be used until it shall have been allowed to boil for at least ten minutes.

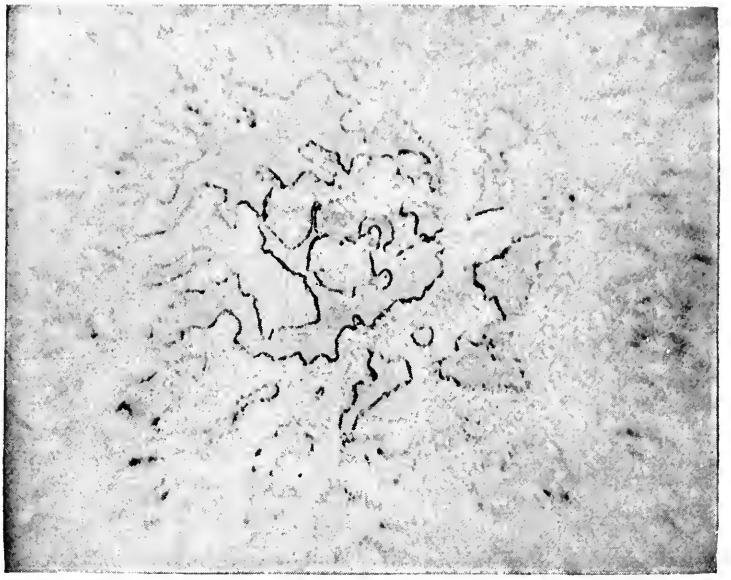
Milk already sterilized may be purchased, and if prepared by a substantial manufacturer, it is generally all that one could wish. In the works of a well-known maker in this city the following is the nature of the process, and the utmost care is used to insure its success: The milk is taken into a pan capable of holding a thousand gallons. Then it is mixed with a fresh extract of the pancreatic fluid at a

temperature of 105° Fahrenheit. It is then drawn into a vacuum-pan at a low temperature and gradually raised to a high one, the milk being partially concentrated at the same time. Milk sugar is now added and the evaporation is continued until the contents of the pan are nearly dry. They are then taken into a room where presence of all germs has been removed by filtering the air contained in it through a thick bulk of cotton-wool. It is there ground, bottled, and packed in hermetically sealed cans, which have in their turn been also sterilized and purified from all microbes. Nothing short of a process of this kind, conducted with the utmost caution, will suffice to render milk absolutely free from disease germs, unless it be a long process of boiling immediately before being used.

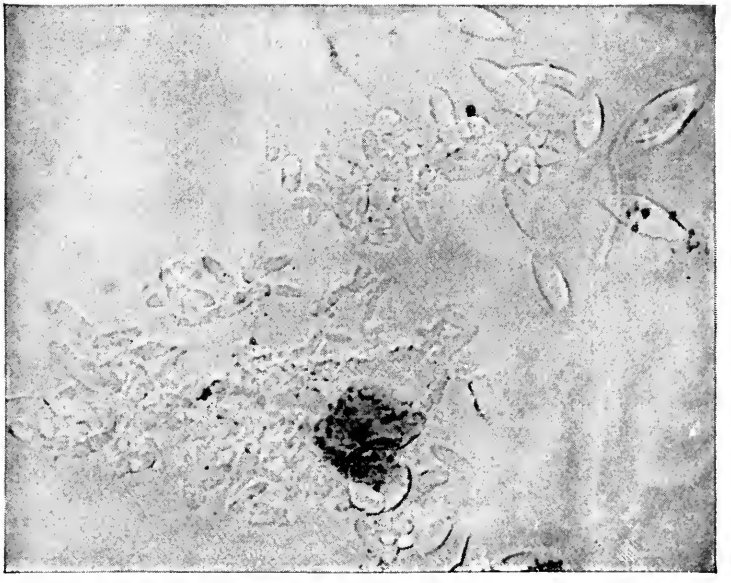
The bacillus being conveyed from the sputa of diseased persons, the habit of expectorating in public places cannot be too strongly condemned, and care should always be taken to empty spittoons so that their contents shall be thoroughly destroyed. If thrown upon the soil the disease-germ may be conveyed to chickens or domestic animals, and so be returned to the human family. Young children, and anybody with any predisposition to tuberculous disease, should never sleep in rooms with persons suffering from it, and thorough disinfection, with high-pressure steam if possible, should be carefully followed. In buildings such as hotels and boarding-houses, attention should be given to this, and rooms should be furnished with it in view. The practice of using fixed carpets and much upholstery is bad. Tuberculous people may have occupied apartments for weeks or months. They leave and others occupy their rooms and at once incur all the risk of infection. In such places, floors should be painted or stained and rugs or "art squares" used for carpets. Curtains, lambrequins, and such like things should be dispensed with. If the floor must be covered, linoleum or oil cloth are the best materials to use, and the former is the warmer. Rugs may be used over either. Railroad sleeping-cars are among the most likely

places to incur infection; no sufficient care is taken to prevent it, and it is more than likely that many persons have suffered in consequence. The method of cleansing and airing the sleeping berths on railroads is most imperfect and reprehensible. A show of diligence in this direction is of necessity made when the berths are closed for the day, but it is only a show. Strictly each berth should be thoroughly ventilated, and every precaution should be used about it so that no microbe or disease-germ can possibly be left behind. This has probably never yet been done.

Physicians have looked in all directions except the right for a cure for consumption, and among them is one that has been followed, especially in France and Germany,—of inhaling hot air. This is based on the fact that heat kills the microbe, but it has been found in practice that the air must be of a temperature of about three hundred degrees, or eighty-eight degrees hotter than boiling water, and even then it is not to be depended on. I have prepared a list of some at least of the remedies that have from time to time been proposed for consumption and tubercular diseases, all produced, as even the doctors now admit, by that little microbe discovered by Koch. That list, which is too long for full quotation, comprises alcohol, quinine, salicylic acid, antipyrine, arsenic, pilocarpine, morphia and opium and their compounds, oxygen, corrosive sublimate, iron, digitalis, atropine, chloral, iodine, glycerine, the hypophosphites, potassium iodide, cod-liver oil, chloroform, benzoin, cocaine, bromides, picrotoxin, terpin hydrate, creasote, agaricin, iodoform, phosphorus, sclerotic acid, etc., etc. From the number and varied character of these alleged remedies, the majority of which are powerful poisons, it may be judged that medical science has not been very successful in finding the means of treating tuberculous diseases;—and the popular belief that consumption is among the most fatal and incurable has been justified. Nevertheless experience now tells us that, as I have said above, it may be cured if treated in time and upon proper principles.



NEPHRITIS.



NEPHRITIS.

When lungs are already destroyed it is too late to hope for their restoration, although even then relief may be afforded. But in the earlier stages of the disease, now that the cause is known, it is certainly possible to remove every trace of the trouble and to bring back the patient to a state of sound health. My discovery has done this and will do it again if taken properly and persevered with. Inhalation is in such cases very valuable.

Gradually physicians are recognizing the truth that more and more diseases must be attributed to the presence of microbes, and as they do so their mode of treatment will become simplified. But even then their ordinary Materia Medica will not suffice, and they will be forced to the adoption of my medicine, which alone of all others may be taken in sufficient quantity to destroy microbes without injury to the patient. A French physician has quite recently shown that baldness is to be attributed to the presence of a microbe which he has detected and named, and which, he says, attacks the follicles and destroys the hair at the roots. By degrees, perhaps, medical science will accept my teaching, and admit that all diseases are due to the same cause; and meanwhile, what must strike every reasoning man is the fact that, even where the doctors admit that microbes are the exciting cause, they nevertheless look about for different means by which to get rid of them; whereas my experience has shown beyond question that one agent is quite capable of destroying all forms of disease germs, some only requiring a longer time than others.

Every thing in this world operates by laws which nature herself lays down, as any one can see who will take the trouble to look into it. But people are apt to believe what they are told without exercising their own judgment and reason. Just as when I was a boy, I accepted every thing which I heard or read without questioning its truth, and it was not till I grew older, and exercising common-sense, I began to inquire for myself that I realized how much of error there was in every-day teachings. Now I have come

to wonder how people are so misled, and how hard it is to make them see through the simplest things, although medical science is ever doing its best to keep them in ignorance. The truth is, that too many people like to let other people do their thinking. They are too indolent or too indifferent to do it for themselves. Again, to many the idea never occurs. They take whatever is offered to them without asking the whys and the wherefores, or even suggesting whether the thing is as represented, much as a child sees the sun rise and set, and night follow day, without ever asking itself the cause. Perhaps when we remember how much people are engrossed with their own business affairs we may find some excuse for them when they receive every thing with too much faith; the wonder rather is that they are so reluctant to accept the truth when it is put under their eyes.

The public likes to be humbugged. The various medical companies and agencies that live by advertising and offering certain cures depend entirely on the gullibility of the people, and money in large amounts testifies to the extent to which that weakness prevails. There are many instances where in the country farmers and business men have borrowed money and crippled themselves financially to procure a worthless nostrum, to which they were led by some shrewd advertiser.

This city of New York abounds with men who live entirely, and live well, on the money they squeeze out of the pockets of individuals who are silly enough to trust them. These victims are ready enough to believe promises if they are well worded, even if, by the exercise of a little commonsense, they might know them to be deceptive; but put actual facts before those same persons, and they are too obtuse to understand.

It must be the perversity of human nature; hence knowing this, I am the more anxious to prove all my assertions, to take the reader fully into my confidence, and to explain every thing so that the most unwilling comprehension can-

not fail to understand, and the most skeptical must believe. People who have been deceived by the doctors, and who have found out the inutility and worthlessness of medicine, are naturally the most difficult to convince. I do not blame them. I have been through that same school myself. I ascertained to my cost how useless it is to trust to the doctors or to any modern system of medicine, and when one has tried every remedy and had them all fail, one very naturally looks with a little suspicion upon another new one that may come to light.

A few years ago I was one of the most faithful followers of the doctors. I took any thing and every thing they offered me. I saw nothing outside of medical science, and swallowed every thing there was within it. But my experience satisfied and destroyed all my faith. I no longer had confidence when I discovered that every thing deceived me, and I cannot find fault with others who are in the same position. Charlatans and quacks understand this proneness of people to put confidence in the profession, so when they want to sell medicines they call them blood purifiers, or specifics for nervous debility or for special diseases. They seldom profess to cure every thing, and by thus abstaining they pay a tribute to medical ethics. I have often been told by physicians that I make a mistake when I undertake to cure every thing and to abolish or remove all diseases. That word *all* overcomes them. They would not so much mind my curing a few, because then they could have the balance for themselves. But if I cure *all*, why there is, of course, no field left for them to work in. But I cannot limit my sphere of usefulness. Nature showed me that there is but one cause of disease, and the cures I made endorsed that teaching. Why, then, should I withhold the truth and deceive the public by denying my own knowledge?

I have often heard it said, by very smart persons too, that they cannot believe in a medicine that cures all, so such people must still accept the doctrine that the causes of disease are very many, as many, probably, as the divisions into which the

doctors themselves classify human ailments. It is strange, when we contemplate the enormous strides that the world has made of late years in every branch of industry and in every other section of knowledge, to see how little progress has been made in medical science. It still lags as far behind as it was a hundred years ago. I do not refer to chemistry and to mechanical preparations, but to the practice of medicine and surgery. Physicians are multiplied enormously. There are medical institutes, medical schools and colleges, medical books, in vastly increased numbers, and there are also larger graveyards and more of them. What improvements have the doctors made in the cure of disease? None. What advance has medical science made? None whatever. If a physician can cure catarrh, cancer, consumption, he can cure all diseases, because they are only a few of the results of disease germs. Those, therefore, who promise to cure those might as well undertake to cure every thing. But the truth is, that medical science never has succeeded in destroying micro-organisms. It has never killed microbes. If the doctors can do so, why do they not come forward, not with promises, but with proof that they have done it? No, they cannot do it, and they still number them among the incurable diseases. This book should open the eyes of the people to the fact. It should let them see the true state of things, how they have been kept in ignorance first, and then how that ignorance has been imposed upon, and how they have been misled and deceived. They will, however, soon see things in a new light. The cause of disease is so simple. It is nothing more than a fulfilment of the law under which small bodies feed on and destroy larger ones. They are visible to us, and they cannot therefore be doubted.

I explained in a previous chapter the nature of the ordinary lichen, which consists of two parts, one of which is a parasite, and that is only an example of a system prevalent in nature. People who are ready to deny this, which, if they choose, they can see for themselves, are quite willing to accept the doctrine of a personal devil, although they cannot see him

and have no proof whatever of his existence. There is no disputing that the masses of the people are ignorant of these subjects. They do not give them sufficient thought, and I am glad to have the opportunity to enlighten them. But there is no excuse for the medical profession. They have every opportunity to learn the truth. They devote themselves to the subject of disease and still they remain in ignorance, and when a patient dies under their hands the law protects them, and they care nothing so long as they receive their fees.

CHAPTER XII.

THE MICROBE KILLER IN LEPROSY.

THERE are two popular errors on the subject of leprosy. Many people suppose that it is not contagious ; and still more think that it is uncommon, or at any rate, that it is confined to certain parts of the world. Both ideas are erroneous,—but for the first there is ample excuse. About thirty years ago the disease assumed a virulent form in Demerara, a settlement in British Guiana. The London Colonial Office submitted the matter to the Royal College of Physicians, and through that body sent a series of questions to various portions of the empire. A committee chosen by the college examined and collated the information thus obtained, and drew up a report, which was published in 1867, in which they announced that a consensus of opinion throughout the world was opposed to the belief that leprosy was contagious or communicable by proximity or contact with a diseased person. They also said that leprosy is rarely transmissible in married life where one of the parties has no tendency to the disease. This report was accepted as conclusive, and measures previously in vogue on the supposition that the disease was contagious were abandoned, and as a result, the mortality from it has been greatly increased. "It may," says an English physician, "without much exaggeration, be said that if leprosy slew its thousands before, it has slain its tens of thousands within the confines of the British Empire since 1867. Even outside the limits of Her Majesty's sway the evil effect has been felt, for the

authority of an institution which was supposed to be the concrete embodiment of medical science, necessarily had great weight in the minds of foreign practitioners." That that unfortunate "Report on Leprosy" did not do still more harm is only due to the fact that the dangerous doctrine which it was intended to enforce was not universally acted upon; the practical common-sense of mankind in many places where leprosy has its home refusing to be led astray by theoretical opinion. The doctrine laid down in the report was the reverse of truth, and the fact soon became realized when it was seen how rapidly the disease increased when the old restrictions were withdrawn. It is evident that the persons upon whom the committee had relied for information, were either incompetent or untrustworthy, and it would have been better if a commission had gone out and sought facts for themselves, when they would certainly have found ample evidence of the transmissibility of the disease.

Doubts may have been due to the circumstance that leprosy takes its own time to develop, as was made evident in the case I have referred to at page 34, but that ought not to have led a body like the College of Physicians into so serious a blunder. Frère Étienne in a little work entitled "La Lépre est Contagieuse" mentions an instance of a lady in Venezuela whose husband died of leprosy. She was at the time in perfect health, but five years afterwards was a well confirmed leper. Another case is given where a man became leprous by frequently visiting the hospital, and whose wife remained for ten years without showing any sign of the disease, to which, however, she ultimately fell a victim. Dr. Goddard, a young French physician, and a stern believer in the non-contagious nature of leprosy, went to Palestine and took up his residence in one of the lazar-houses that are not infrequent in that country. For a time he felt that his experiment had proved the accuracy of his opinion, but he took the disease and ultimately died of it. There is also abundant evidence obtainable that persons whose duty it is to attend upon the sick are frequently attacked. It would

appear from the partial statistics that have thus far been obtained, that the proportion amounts to about fifty per cent., certainly not less and probably very much more. Of the contagious character of the disease then there is no longer any room for doubt. It is transmissible and insidious, the victim not knowing when he is first smitten.

Leprosy is also a common disease. A writer in the *New York Saturday Review* of February 22d, reports having seen a woman seriously affected with it riding in a Broadway car, and it is well known that there are several cases in this city about which no precautions are taken. In the Appendix will be found an abstract of a discussion in the New York Academy of Medicine on this subject, which is well deserving attention. Sir Morell Mackenzie has also accumulated some valuable data. He points out how it has been carried into California by the Chinese, into some of the Northwestern States by Norwegians, and into Salt Lake City by Mormon converts from Honolulu. " In Louisiana, where last century leprosy prevailed so extensively that a hospital for it was founded in 1785, it again showed itself in 1866, in a woman whose father was a native of the south of France. From this fresh centre the disease has spread to such an extent, that Dr. Blane recently reported forty-two cases in New Orleans alone." It broke out in South Carolina in 1847, and between that and 1882 sixteen cases were reported, the first victims being Jews whose families had immigrated early in the century. There were also some native Americans and one Irishman.

Norway is the most considerable leprosy centre of Europe, but the disease there is limited to certain regions, especially the districts round Bergen, Molde, and Trondjeim. It was prevalent in Sweden at the beginning of the century, but has nearly died out there now. Spain is another of its strongholds. Dr. Roman Viscarro says: " From time immemorial lepers have swarmed in Spain, especially in the provinces of Asturias, Tarragona, Valencia, and Castellon. Dr. John Webster visited that country to study the disease about a quarter of a century ago, when it was said

to be spreading. He found fifty-three cases in the hospital at Granada, and he heard of 284 more outside. In 1880 Sir Morell Mackenzie found thirty-nine sufferers in the San Lazaro hospital at Seville, and he learned that as many as twenty-one had been admitted in one year. But these figures give no adequate idea of the truth, for in addition to the sufferers who enter the hospitals there are many more who remain at home with their families, some maintained by them, others dependent on public charity, and probably only those seek shelter in a hospital who are destitute of all resource. Leprosy is especially prevalent in the district of La Marina, which takes in the seaboard of the two provinces of Valencia and Alicante.

Portugal stands next to Norway in the number of its lepers. In Italy the disease prevails on the Genoese Riviera, and at Commachio, and it is rapidly spreading in Sicily. It is very prevalent in Crete, and cases are to be found in other islands of the Eastern Mediterranean, as well as in Greece and Hungary. Occasionally it is met with as far north as St. Petersburg.

In Nice and Savoy it is not uncommon, and Dr. Besnier, of the French Hôpital St. Louis, says that since France had extended her colonial possessions French soldiers, sailors, traders, and missionaries have fallen victims to leprosy in large numbers. The disease is certainly spreading in France, but that statement of Dr. Besnier is remarkable in view of the fact that while the British Empire extends over a fifth of the globe, there is no leprosy in Great Britain unless an isolated case be occasionally imported.

It is increasing rapidly in the West Indies. In 1805 there were three cases in Trinidad. In 1815 this number had increased to seventy-seven. In 1878 this again had grown to eight hundred and sixty, so that in that small community the disease had extended four times more rapidly than the population. It was the alarming increase of the victims in Barbadoes that led to the report of the Royal College of Physicians that I have referred to.

When the English began the colonization of New Zealand

in 1839 a peculiar form of leprosy was discovered there, and it has since been met with in other parts of the Pacific. In precolonial days the natives killed lepers, and care was taken never to eat the flesh of one. The disease is most common in a zone of about twenty-five miles around Lake Taupo, but it has never affected the white settlers unless they live among the Maories or intermarry with them. It is, however, steadily on the increase within the district where it prevails.

The supposed number of lepers in India is 250,000, though only 135,000 are on record. There, too, the number is increasing, as it also is in Canada, but only among the French population of the province of Quebec and in New Brunswick. The most remarkable development of the disease in recent times is in the Sandwich Islands. Until 1853 it was unknown there. In that year one case was noted in Oahu, a thinly populated place about twenty miles from Honolulu. In 1859, when it was first officially recognized, there were less than ten marked cases, but the number rapidly increased, so that in five or six years it had become quite a common occurrence for lepers to apply for relief at the public dispensary. An official return in 1865 gave 230 patients. In 1866 the segregation settlement at Molokai was opened, and since then more than three thousand cases have been received there. In 1888 there were 749 at the settlement, but Dr. Prince A. Morrow, of this city, who has visited the place recently, and given much attention to the disease, puts the present number at 1,100.

The origin of leprosy is unknown. The Maories attribute it to the use of fish from Lake Taupo as an article of food, and the disappearance of the disease in England has been put to the credit of improved agriculture and an abundant supply of fresh food and vegetables. There has been a frequent tendency to the belief that a constant fish diet has something to do with it, but it cannot be sustained. Neither climate, soil, nor race has any thing to do with it, nor is there any force in the theories that it depends on a defi-

ciency of salt in the food or of potash in the blood. We know that it may be derived by heredity and by contagion, but there our certain knowledge ends. If, however, the origin be obscure, the cause is better defined. Even physicians are beginning to look upon it as a microbe disease, as it certainly is in common with all other human ailments. There is nothing exceptional in leprosy. Dr. Danielsen, of Norway, has studied the disease throughout a long life among his countrymen, and he believes that much of the prevalence is due to heredity. His son-in-law, Dr. Hansen, took up the inquiry at the point to which Danielsen had brought it, and he was the first to discover the peculiar microbe of the disease, which he designated *bacillus lepræ*, and which at once settles the question of contagion, if it had not been settled before. But where this microbe originates is not yet ascertained. We cannot trace it as we can, for example, the microbe of tetanus in Cuba. It has been suggested that possibly it may ultimately be found in fish, but that is merely an idea arising out of the other theory, that a fish diet is a predisposing cause of leprosy. Certain it is that the disease has always been most prevalent in times of want or when the vitality of the people has been lowered by poor or insufficient food. The overcrowded tenement-houses of New York are especially adapted to the spread of leprosy, possibly to its origin, and it is a disease which, when once recognized, should come under the attention of the government. Sanitary arrangements, segregation, and an abundance of wholesome and nutritious food for the patients are essential elements of success in its treatment and of its prevention.

Dr. Arning, who undertook the inoculation of the prisoner in Hawaii, and who watched the case, has defined his opinions upon the disease. He says:

1st. That the bacillus of leprosy is limited to the human race.

2d. That it must be transmitted either directly from individual to individual, or,

3d. Through a stage of poor condition which we are at present unable to detect, but which may be present in the soil, water, or food, but can only get into them from the diseased tissues of a leper.

4th. Accepting either theory—the direct or indirect transmission,—we must look upon every individual leper, whether in the incipient or advanced state of the disease, as a dangerous focus of the malady, he multiplying and nursing the germ in his tissues.

5th. As every seed requires its conditions of soil, atmosphere, etc., to allow it to strike, and when struck to grow up and be itself a seed-bearing plant, so does the leprous microbe require a certain disposition of the human soil to strike and thrive. What this peculiar disposition may be we are at present unable to define. It is evidently a condition which may coexist with apparent good health, as many examples of strong, robust men developing leprosy show us. This disposition may be transmitted by heredity.

The only part of this statement to which exception may be taken is the first. It is not certain, only probable, that the leprous microbe is peculiar to mankind. Further investigation may prove that, if time be given it, it might, by inoculation, produce a similar disease in other animals, but three or four years would be necessary. This is, however, of small consequence compared with the fact that, even though the medical profession admits that leprosy is caused by a microbe, no successful means of combating the disease has been applied by it, and it has remained for the microbe killer to produce any thing like satisfactory results.

The case that I am about to mention presents, however, some conditions that were an extremely unfavorable test of the remedy. The disease had been long developed, the patient was very much reduced, and his circumstances have been such that he has not been able to obtain proper nourishment, but, on the contrary, his system has been throughout ill nourished and reduced, simply for the reason that he

has not been able to provide himself with necessaries. Nevertheless, the results are highly encouraging and satisfactory.

It was some time in July, 1889, that I went to New Orleans to see the patient whom my company then had mentioned to me. They were anxious to test the effect of my discovery in leprosy, and the occasion was the first that had offered itself. We had tried before, but every case we met with was under medical treatment, and the physician in charge would not allow us an opportunity to test the medicine. They have even attempted to dissuade the man who is now under our care from continuing with us, although he has derived so much benefit. This man's name is James Kavanaugh. He was a member, as I am informed, of a fire company at Algiers. When I first saw him he had been using the microbe killer for five weeks, and he assured me that he already experienced considerable relief. His condition, however, was most pitiful. I had never seen any thing like it. Persons interested in the company turned from the sight, sickened by what they saw. I remained with him for half an hour, making a thorough examination. He was living in a poorly furnished cabin, amid conditions that held out but little hope of success. The place was not attended to. Sanitary requirements were neglected. Foul matter was to be found on the bed and surroundings, and the more I studied the prospect the more convinced I became that the disease had advanced too far to justify me in looking for a cure. His tongue was swelled so that he had difficulty in closing his mouth; his eyebrows and toe-nails had dropped off; the skin might be peeled off in large flakes from various parts of the body; his eyes appeared as though about to fall from their sockets; swellings were in every limb, and his ears were enlarged to twice the size that they would have been in health.

I held him out very little encouragement, for the advanced stage to which the disease had arrived, and the inability of the man to obtain nourishing food and plenty of it, caused

me much misgiving. He was willing, however to put himself in our hands, all other treatment having failed, and I undertook to do what I could. I told him that the microbe killer must be used very freely, both externally and internally, every place where fermentation had developed being kept continually moist with it. He accordingly increased the amount, and exclusive of external applications he drank eight wineglassfuls of the strongest form (No. 3) daily. The effect of this was to stop all evidences of fermentation in about three months, and his father reported to me such a marked improvement that I was anxious to see him again. I made an examination of his blood and found that all microbe life in that had diminished, and hence I became convinced that at last a cure for leprosy had been discovered, if only it can be properly applied. If this man had had to purchase the remedy he would never have been cured, for he had not the means, but this difficulty could of course be overcome if it were used in dispensaries and public hospitals.

As he continued to steadily improve I visited Algiers again, this time taking with me Mr. Lilienthal, a photographer of New Orleans, and then I obtained the photograph which was the original of the illustration. The engraving is not as effective as the photograph, and that hardly conveyed a complete idea of the man's appearance. Mr. Lilienthal was at first very reluctant to come with me into the presence of a leper, but consented on being told that there was no danger, and that I would handle the man myself. He is always ready to testify as to these facts. The patient was photographed in his kitchen, and, as we thought, every thing was kept very private. But soon it leaked out. Newspaper reporters were sent to investigate, and they had personal interviews with Kavanaugh, the result of which was the appearance of an article in the New Orleans *Picayune* which is sufficiently interesting, apart from its value as an endorsement of the microbe killer, to justify my quotation here in full. It read as follows:

LEPER. (AUSSATZ.)

James Kavanaugh, Algiers, La. From photograph by Lilienthal, 137 Canal Street, New Orleans.

LEPROSY IN ALGIERS.

JAMES KAVANAUGH A VICTIM OF THE DREADED DISEASE.

OTHER CASES ALLEGED TO EXIST IN AND ABOUT ALGIERS.

THE PATIENT IMPROVING AFTER ONCE GIVEN UP TO DIE.

DECIDED DANGER OF THE SPREAD OF LEPROSY IN AMERICA.

All medical authorities agree that leprosy is one of the most dreaded of all the ills humanity is heir to. A well-known writer on the subject, in making general observations, says that by the term leprosy a disease of the cutis only was originally meant, terminating sometimes, perhaps, unfavorably in unhealthy sores or spreading, sloughy ulcerations, marasmus, and decay of mental and bodily strength ; but in many, the majority of cases, where cleanliness may have been attended to, in slow and gradual return to health. Medical authorities are not agreed as to whether or not the disease is contagious, but the civil authorities of all countries where the disease has been found have shown alarm and endeavored to isolate the subjects.

According to Wilson, lepra is described as a non-contagious and chronic inflammation of the derma, consisting in the eruption on various parts of the body of raised and circular patches which are speedily covered by thin, semi-transparent scales of white and morbid epiderma. The patches are prominent around their circumference and somewhat depressed in the centre; they increase by the extension of their periphery, while the central area gradually returns to the natural state. During the progress of the patches the scales are often thrown off and replaced by successive formations. The local disorder is unaccompanied by constitutional symptoms ; it is most strongly marked in the neighborhood of the knee and elbow joints, where it frequently forms patches of large size and endures for a considerable length of time, sometimes recurring at particular periods for several years and lasting for several months. The varieties of lepra, with the exception of the syphilitic form, are mere modifications of the same disease, dependent on trivial circumstances. This

author treats of four varieties—lepra vulgaris, lepra alphoides, lepra nigricans, lepra syphilitica.

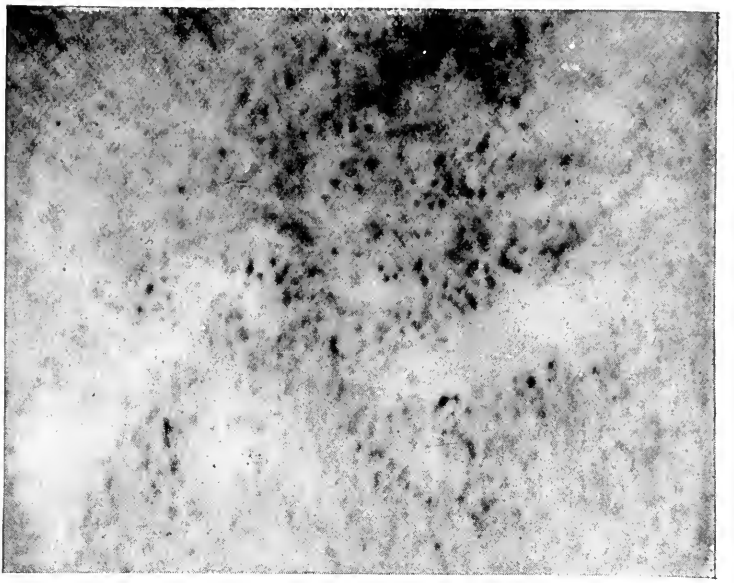
These remarks are prompted by the discovery of a genuine, well-developed case of leprosy located in a little isolated house at the corner of Chestnut and Eliza streets, Algiers, across the river from New Orleans. The leper is a young man named James Kavanaugh, aged twenty-nine years.

He was visited yesterday by a representative of the *Picayune*, and quite an interesting chat was held with him regarding his most unfortunate condition. Inquiry among physicians and citizens of Algiers and the man's general appearance settled the fact beyond dispute that he is, or was until recently, in the last stages of the loathsome and hideous disease. It is also current rumor that there are other cases of leprosy in and about Algiers; in fact the people do not seem to feel any alarm, and talk about the disease with as much indifference as if it were a bad cold under discussion.

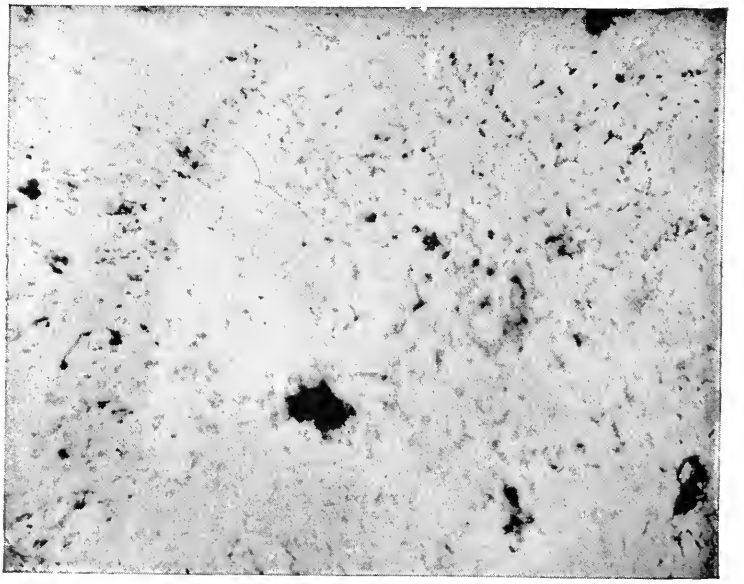
Kavanaugh was born and raised in Algiers, and was for eleven years employed as a teamster by the Morgan Railroad Company. He was quite popular among his associates about the railroad shops and in the town generally. He was an active and popular member of Morgan Steam Fire Company No. 3, and is practically under the care of the firemen at present.

The disease began to show itself about four years ago in small brown spots on the chest and neck. He called in a prominent and well-known physician on this side of the river, and after a thorough diagnosis of the case it was pronounced leprosy and incurable. Fearing contagion the members of the fire company built the little red-painted house above mentioned, and young Kavanaugh was placed there as a doomed man. His father and sister moved into the house with him, and additional rooms were provided for their occupancy. In a short time the disease began to spread until his entire body was covered with brown spots; his tongue was swollen and cracked until he could not articulate distinctly; nasal passages clogged; his eyebrows and lashes fell off; toe-nails rotted off, and his entire body was fast becoming a mass of putrefaction.

A purse of $500 was made up by the firemen, and offered to any one who would cure him. One or two doctors called on him, but he got no relief, and was finally given up to die.



LEPRA.—SKIN SHOWING MICROBES. (BERLIN.)



LEPROSY.—FROM JAMES KAVANAUGH.

About three months ago Kavanaugh began taking a preparation called Radam's Microbe Killer, extensively advertised as a destroyer of microbes, which infest animal and vegetable life, and strange to say he is not only very much improved, but, according to his own statement made to the *Picayune* reporter yesterday, believes firmly that the remedy will finally cure him.

Kavanaugh states that he takes the remedy eight times a day and keeps saturated rags on his body, and in consequence the swelling in his ears has gone down, the ulcers on his feet are healing, and that he has certainly experienced more relief from the use of this remedy than anything else he has tried. Is it possible that here is actually a cure for leprosy? If so, and appearances would seem to prove it, patent medicine though it be, it should be accorded due merit. When seen yesterday the leper was walking about the yard surrounding his house and smoking a cigar. He spoke distinctly and seemed cheerful and lively.

Asked how he thought he contracted the disease—whether by inheritance or by contagion,—he said his father and sister lived in the same yard with him and were perfectly healthy; that his progenitors were all a hardy, healthy people, and that he believed he had caught the disease from a young man who worked in the Morgan shops several years ago and died from supposed leprosy.

At the present time a fair estimate puts the number of lepers in the United States as not less than three hundred. Of course, there is no means of determining just how many cases America is harboring, and very likely the number given is much too small.

Dr. Morrow, who has studied the subject closely, holds, according to the *Medical News*, that there exists a decided danger of the spread of leprosy in America. He thinks that the disease in its present state here might be compared to a conflagration, which could easily be extinguished at first, but which, left to itself until it had gained a certain headway, could not be subdued until after the material it had to feed upon had become exhausted. In the Sandwich Islands in 1848 there were but few cases of leprosy, and for twenty years the government paid no attention to the disease. By that time there were about two hundred and fifty cases, and the authorities, becoming alarmed, took stringent measures for its repression. A system of segregation was adopted, but, unfortunately, the danger was appreciated too late. Dr. Morrow says he does not believe that a calamity such as has overtaken the

Hawaiians is in store for this country ; but, at the same time, he thinks there is a sufficiency of leprosy seed here to stock this or any other country.

Cases of leprosy have developed in New Orleans before, and the leper settlement on Bayou La Fourche is too uncomfortably close to repel all fear of a spread of the disease, when the increase on the Sandwich Islands is contemplated.

On July 21st the following appeared in the same paper:

LEPROSY IN ALGIERS.

SEVERAL OTHER CASES REPORTED BY A LEADING PHYSICIAN OF THAT SUBURB.

Further investigation of the case of the young man, James Kavanaugh, in Algiers, who is now suffering from tubercular leprosy, and is attracting considerable attention, discloses the fact that his companion and associate, a few years ago, was a man named Mallager, who resided in the Third district, near the Mint. This man was afflicted with the loathsome disease, and Kavanaugh was constantly in his company, at times ate with him and drank out of the same vessel that he did, and it is evident that he contracted the disease by so doing.

Some time ago two alleged Mexican physicians called to see the leper and agreed to cure him. Physicians in Algiers and in the city agreed, if they did, to give them thousands of dollars to know the cure. The Mexicans set to work and closeted Kavanaugh in a close room and put him through the sweating process. Before doing this, however, they covered his hair with a piece of mosquito bar tightly drawn around the forehead, and tattooed his face and entire body with mercurial ointment, giving him the appearance of an Indian. They worked on the man in this manner for three weeks with but little or any relief, and then discovered that they would have to return to Mexico for certain remedies. The gentleman having charge of the fund raised by the citizens to pay for curing the man gave them $100 for their trouble, and they left and have not yet returned.

A prominent physician of Algiers was visited by a reporter of the *Picayune* and questioned in regard to the above case, and he

remarked that he had under his observation several suspicious cases. He knew of a case of a mother and son, residing near Morgan No. 3's engine-house, who were pronounced lepers. The daughter, who is a married woman residing in one of our parishes, has all the appearances of having become attacked by the disease.

The physician stated that he was now attending to an aged negress who was suffering from tubercular leprosy. The nails on her toes had rotted off and he had amputated the toes. The disease began eating the foot, and on last Friday he amputated the foot at the instep. There is also a case in Gretna, the sufferer being a baker. Some time ago this baker's brother died from the disease. This physician desires that the Board of Health send a corps of experts to Algiers to inquire into the suspicious cases.

Two days afterward the *Picayune* printed the following letters from the patient and his father, who both felt that it was but right to make known over their own signatures the effect of my treatment on a disease that had hitherto baffled the highest medical skill:

NEW ORLEANS, LA., July 23, 1889,
Fifth District.

I positively assert that my son was afflicted with that most loathsome and hideous disease, LEPROSY, and of a character most malignant. Any person who may doubt, or be skeptical regarding this case, is most cordially invited to call and see him now, or at any early date, at my residence, No. 157 Eliza Street, Algiers, Fifth District; because if not seen soon, and he continues to improve as he has since beginning the use of William Radam's Microbe Killer, they will not have an opportunity of giving an honest verdict concerning his case.

Respectfully,
JAMES KAVANAUGH.

I, the undersigned, do hereby declare that I have been afflicted with "Leprosy" for over four years; my sickness has been pronounced "Leprosy" by the leading physicians and the public

generally, and I was entirely abandoned and left alone to die ; but thanks to Mr. Wm. Radam, whose medicine, or Microbe Killer, I have been using for five weeks with the most beneficial results, I am satisfied that by continuing his great and wonderful remedy a few months longer I shall again be able to go to work and support my poor aged father, upon whom I have been a drawback in his declining years.

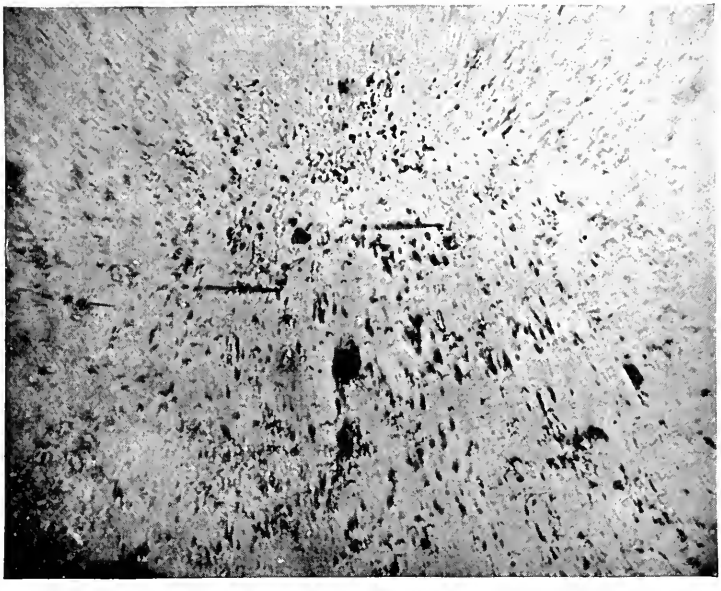
Respectfully,

JAMES KAVANAUGH, Jr.

James Kavanaugh, Jr., has all along steadily continued to improve. On January 20, 1890, I received a letter telling me that he can eat as much as any man, if he only had it. He says that his head is very much swollen, but not nearly as badly as when he began the treatment. There are still a few sores on his feet, from which a greenish matter exudes ; but the upper part of his body is nearly cleared of all appearance of disease, and no new ulceration has taken place. He further states that three physicians from the hospital have called to see him, and, after the closest examination, they besought him to go now to the hospital and put himself under their care. The reader will understand the meaning of this. They failed to relieve him when they had the chance, and now, finding him so much benefited, they are anxious to have some of the credit.

This, however, I can say, that my patient will either be cured by the Microbe Killer, or he will die ; but the present appearances are favorable to a cure, and I advise every leper who can do so to go at once to New Orleans and see James Kavanaugh and his neighbors and judge for themselves. If any physicians attempt to remove the man, as they desire to do, I must take further action at once, although the revolution in medical treatment must come sooner or later. The eyes of the public are being opened, and the Microbe Killer is in the hands of the people who make the laws and the government.

In the last letter that I received from Kavanaugh, he says that he had had to stop the medicine for a few days, on



PECULIAR SKIN DISEASE. (NEW ORLEANS.)

SKIN DISEASE IN NEW ORLEANS.

account of some passing indisposition, and that he had then resumed it in smaller doses, but that all his wounds and ulcers had nearly healed, and that he was growing stronger. This completes the history of the case up to April 2, 1890, and, in a subsequent edition of this work, I hope to be able to report it as that of the first leper cured.

Any favorable result must necessarily be slow. It is not dissimilar from one of phthisis, or low tubercular disease. They are curable, but time is required, sometimes two years probably, and Kavanaugh has not yet been one year under my treatment. The microbes must be destroyed, but, what is of equal importance and more tedious, the tissues must be renovated. The system must be built up, and this is where good nourishing food, which unfortunately Kavanaugh has not got, becomes almost essential. The case, even at this stage, testifies to the power of the microbe killer as an antiseptic. It proves that no microbes, not even the bacillus of lepra, can exist in its presence, and that they must cease to multiply in the tissues when these last are thoroughly permeated with it.

It is difficult to take people out of their customary ruts, to make them reason for themselves on lessons which Nature offers, and to induce them to believe facts which are beneath their eyes. For ages, even throughout history, it has been customary to regard leprosy as an incurable, as well as a most loathsome, disease, and so it has been. But my conviction is that a cure is now to be had in my discovery, and if I cannot convince others by putting before them truths which are tangible and cannot be controverted, it is not my fault. I am not responsible for the blindness of people who will not see, but most certain it is that the only case of leprosy that has come under my treatment, that, too, a very bad one, and surrounded by most unfavorable conditions, many of which are still at work, has been very materially benefited, while it is reasonable to believe that time only is needed for a further improvement, even to a complete restoration, to be effected.

CHAPTER XIII.

HOW TO USE THE MICROBE KILLER.

I TRUST I have now made sufficiently clear the position in which I stand with my discovery, the study which led me to it, the nature and universality of micro-organisms, their relations as a common cause of disease, the means to be employed to destroy them and to renovate the system, the failures of medical science and of ordinary remedies used by physicians, and the necessity for a complete saturation of the system with any medicine that must be effectual to remove the cause of the disease and to rehabilitate the blood. I will now state generally the rules that should be followed.

I wish to say most emphatically that the microbe killer is harmless. I cannot lay too much stress upon this, first in direct contradiction to those who have asserted so gratuitously that it is injurious, and then because it is necessary to use it in considerable quantities to renovate the entire system. I have shown that those persons, whether doctors or mere adventurers, who say that the preparation is poisonous, do so without any real knowledge of the character of my discovery. It is neither poisonous nor injurious in the smallest degree, but, on the contrary, it may be given to the youngest children with most absolute confidence. It will not injure the eyes nor the most delicate tissues. It will not destroy the enamel of the teeth, although even this has been alleged against it by my enemies. It is slightly acid, but not as acid as ordinary pickles, which, indeed, may be injurious, because they contain acetic acid, sometimes even sulphuric

acid. Be sure that those who bring charges against me of harming people are merely trying to serve their own interests.

The microbe killer cannot be compared with ordinary drugs. It does not contain any of them. It is pure water, permeated with gases which are essential to the nourishment of the system, and in which micro-organisms cannot live and propagate, or fermentation exist. It may be taken almost like water, and it must be so taken when a full and permanent effect is desired, so that the tissues shall be thoroughly soaked with it, and the blood become perfectly purified. Each one of my companies furnishes a separate circular which forms a general guide in using the microbe killer, for special instructions are not required here. I have already explained how to use it in chronic cases of long standing. In acute cases, where the progress of the disease is rapid and the microbes increase very fast, it must be used in large doses, and then it very often makes a cure immediately. If a person were attacked with cholera, small doses would of course be useless. Active disease requires active treatment. Very often every hour is of importance, and if time be lost at the start it is impossible to make up for it afterwards, and the patient dies before control of the trouble can be obtained. Thus in cholera the system must be thoroughly influenced as soon as possible with the microbe killer, so that the propagation of the micro-organisms shall be stopped at once. Intermittent fever equally demands the complete permeation of the tissues, but it is a disease that acts less promptly, and consequently a slower and longer treatment may be necessary. It may be taken, as a rule, that the more active the disease the more prompt must be the measures that are taken to overcome it, and the more chronic the disease the longer will be the time required to combat it.

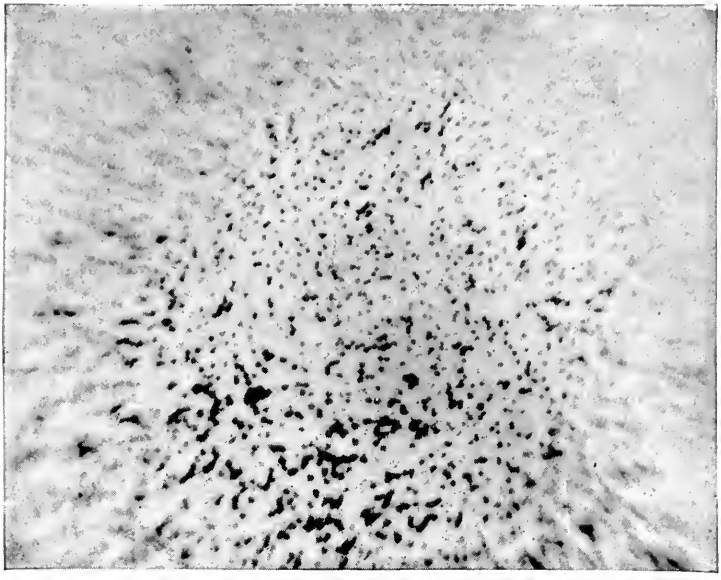
Whiskey is acknowledged by the doctors to be a good cure for snake bites, but of what would be the use to administer small doses at long intervals? The patient would be dead before the second dose became due. It must be given in large quantities and with the least possible delay, and in that

way only can it be of any service. A pint of strong whiskey or even more may, in these cases, be taken with advantage and without any injurious effects. The same holds good with the microbe killer in acute forms of disease. If some antiseptics, such as carbolic acid, bichloride of mercury, sulphuric acid, and others could be used in that way, possibly many forms of disease could be cured that the doctors now describe as incurable. But it is not so. We cannot so use such antiseptics without killing the patient before getting rid of the microbes, and hence these diseases cannot be cured.

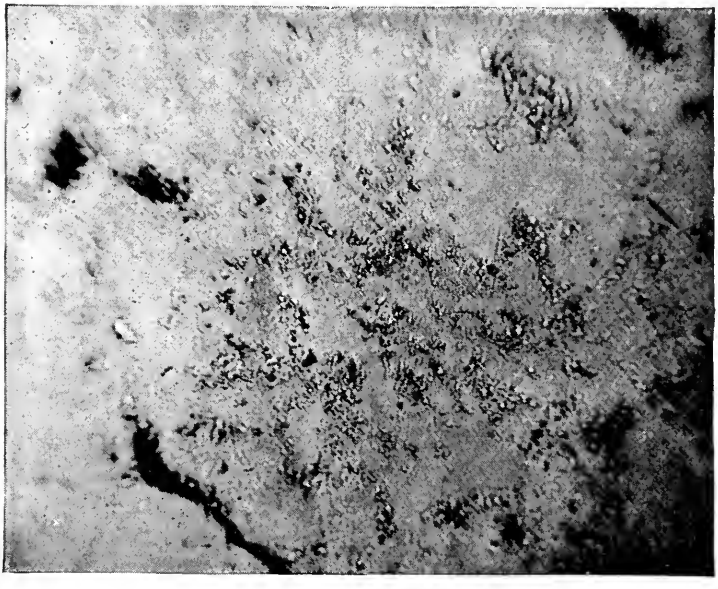
To show how harmless my discovery is, and still effectual, I may say that I have sometimes taken as much as a quart in three or four hours for severe cold, but in every case I succeeded in breaking the cold up, or, to put it better, I destroyed the special microbes before they had a chance to go through the system.

There are certain forms of fever very closely allied to each other in their symptoms. Of these we have what is commonly called chills and fever in its mild form, then ague, dengue fever, bone-break or back-break fever, chagres fever, and the violent fever which is met with in the western part of tropical Africa. It is likely, too, that *la grippe*, which has been so prevalent this last year, is of the same kind. Differences here depend very largely upon climatic conditions, the severity of the disease being increased in tropical and pestilential countries, and they illustrate the necessity of prompt action. In ordinary chills it may suffice to treat steadily and in fairly moderate doses, but in chagres fever large doses without loss of time would be the only means of saving life.

When the case of leprosy already recorded was submitted to me, I saw at a glance that to stop the process of fermentation that was going on the unfortunate patient would need at least six to ten glasses daily, and that at the same time all the diseased parts should be kept in contact with the medicine so as to destroy micro-organisms on the surface and to have the full benefit of absorption by the skin. When this



BACTERIA. (BERLIN.)



NAILERS' CONSUMPTION.

was done decay or fermentation was arrested at once, or at any rate as soon as the system became permeated with the medicine. This done, it may sometimes happen that the dose may be lessened, but it is always better under all circumstances to use it freely, to take as much internally as the system can stand, and to apply it externally whenever it can be done with advantage.

Leprosy and phthisis are very different. In a consumptive patient there is a loss of part, or sometimes the whole, of an organ. The lungs are diseased, and portions at least of them are no longer capable of bringing the atmospheric air to vivify the blood. But in a leper the organs are not necessarily affected, and I should expect that leprosy will yield more readily than phthisis to the microbe killer, although, when too far advanced, both diseases are incurable. If a piece of meat be already fermented to a condition of putrefaction, it cannot be restored to its former condition, and that is much the case in the two diseases named. We cannot reproduce an organ like the lung that has been destroyed by tubercle, any more than we can reproduce a limb that has been removed by amputation.

There is another reason. In a consumptive patient, the cause of fermentation, the microbe, can be destroyed, but the disease has weakened the recuperative powers of the body. Nourishment does not have its normal effect. The blood is impoverished, and the system cannot restore it quickly enough. So that, although the microbe be killed, and the state of fermentation be stopped, the patient is too far gone to be resuscitated. The blood has not time to be replaced, the tissues cannot be renewed. In short, it is more correct to say that a person in such condition is already more near to death than to a cure.

At the same time, there is no reason at all why, in the early stages of consumption, a person should not be cured. There is generally a predisposition to phthisis. It is inherited. But a person may inherit the predisposition to phthisis and yet die in old age of some other cause. It

requires an exciting stimulus. Common cold is often the beginning of active consumption, and a cold can certainly be cured by the microbe killer, without leaving behind any germs of disease.

The trouble may go further. Phthisis may have set in. The first stage, with cough and all the other symptoms of consumption, may have begun, and still I should not despair of curing. The fermentation may be stopped, and while the lungs are not seriously injured they may be healed, and at this stage the general system is not so weakened but that the blood may be restored. The nutritive functions do not give way all at once, and as long as the assimilative process goes on, and the diseased processes are stopped, a cure may be effected, and the person be restored to fairly good health, if not to the vigor that belongs to one who has not inherited any taint in the system. In such cases, although some people may be inclined to regard them as chronic, active treatment should be adopted, and the whole body should be brought under the influence of the medicine as quickly and effectually as possible. It may indeed be taken as a rule in every case to use as much of the medicine as possible until relief is afforded, because it cannot harm anybody, and always it is well to produce an effect as speedily as possible. It is easy to reduce the dose when the trouble is under control.

In malaria and intermittent fever large doses should be used at first, and continued until the fever has abated or ceased, then more moderate doses will suffice, but they must be continued until the blood is purified, the microbes removed, the corpuscles restored to their normal healthy condition, and the patient shows this change by a return of the appearance of restoration in the superficial capillaries of the skin,—which give a rosy color to the cheeks and a warm clear appearance to the complexion.

With a correct understanding of Nature's laws, it becomes apparent that we can cure every disease that comes before us at the right time, if proper conditions are fulfilled and

persevering and efficient treatment be adopted, because it is simply a purification of the blood that is demanded. If we attain to that, we have done all that is possible. It does not matter where the disease is, or how it may be classified, because the entire system must be purified, and thus every weak portion will be covered. It is unnecessary to inquire about details, suffice it to know that there is trouble of any kind, and the microbe killer will reach it. We cannot make a mistake. That would be impossible. I have but one form of my medicine. My discovery is single. There may be different degrees of strength, but that is all. The composition of the microbe killer remains the same. I have experimented to ascertain if I could improve it, so as to make cures more rapidly, but it cannot be done. It would be contrary to Nature. Progress must be gradual. We must aid Nature, we cannot force her. We cannot obtain any purification of the blood by injecting any thing into the circulation. The functions must be continued, and the blood must be nourished through them, for any permanent effect. Only in that way can we replace what is lost, and bring the blood back to a normal and natural condition.

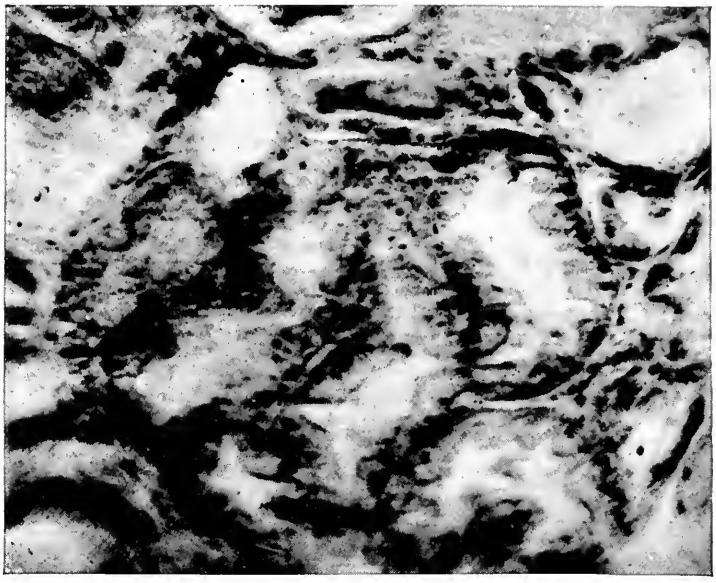
There is no inconsistency in what I have said about leprosy and consumption, or in the statement that all diseases may be overcome, but that certain stages of phthisis are incurable. When the true value of my discovery shall be known, leprosy, consumption, cancer, and such ailments will be unknown. People will not wait until a lung has become useless, or until a large cancer has actually formed. As soon as any premonitory symptoms arise, they will have recourse to the microbe killer. They know that, directly evidences of disease make their appearance, microbes are present, and they will not give them a chance to make headway and to get control of the body. They will have recourse without delay to the medicine, and the ailment will be stopped at the outset. Cancer or consumption, as we know them now, will not be permitted to develop.

It may be well here while on this topic, to record the fact

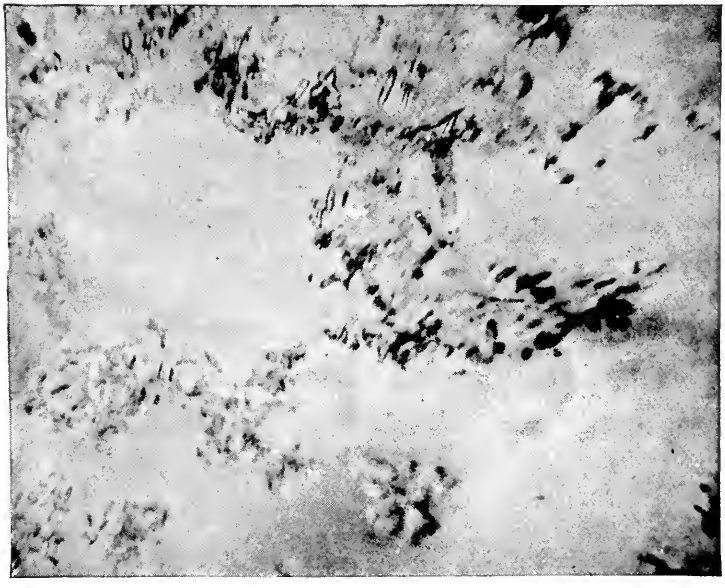
that the chances of inhaling the microbe of consumption, which is a bacillus, are very good. The habit of expectoration, which a recent writer names as one of the distinctive marks of the American people, viewed from an ethnological point of view, is not without its dangers. Böllinger has demonstrated that a cubic centimetre of phthisical sputum contains from eight hundred and ten thousand to nine hundred and sixty thousand microbes. So that in an ordinary day a consumptive person expectorates thirty or forty millions of these micro-organisms, from which it is estimated that, with about ten thousand tuberculous people in this city, three hundred thousand millions of microbes are thrown out daily. As the sputum dries on the ground or in street cars or railways, these microbes pass in large numbers into the air, and thus to some extent they promise to be injurious to healthy persons.

It must not be supposed, therefore, that phthisis can only be obtained by heredity. There is no doubt but that the special bacillus may be taken into the lungs, and that if inspired in sufficient quantities, and unless the person be constitutionally strong enough to resist them, they may propagate and immediately proceed to bring about all the evils of consumption. Thus it is evident that anybody is liable to this dread disease, and especially are those liable who abide in rooms with friends or patients who are affected, and such persons, although apparently in perfect health, should use the microbe killer freely as a precautionary remedy.

Prevention of disease is more important than cure, at least in one sense—that is, it implies the preservation of health, whereas the other means only a restoration to health. Too little attention is paid to this. Bad drainage prevails in spite of all the evils that are known to arise from it. Diets are neglected because the people lack moral courage to forego satisfying their tastes even at the expense of their comfort. Injurious habits are persevered with, although those who follow them know well that they are shortening their lives and weakening their systems, and people often allow a fatal



FATTY DEGENERATION OF KIDNEY. (PARIS.)



CHRONIC CYSTITIS.

disease to seize them because they were too thoughtless or too indolent to take the necessary precaution to prevent it. Each is apt to think that he himself is secure from attack; or sometimes persons may be prevented doing any thing because they do not know what to do, and they delay applying for aid because they have not confidence enough in the doctors or money enough to pay the fees that would be exacted from them. The doctors themselves often let a patient die because they are dilatory and unwilling to obtain the necessary assistance.

But this must soon stop. The day for a change in all this is near at hand. When people know that they have a certain and safe cure in their own home, which they can use in perfect confidence without advice or aid from any physician, they will not get sick; they will not give disease a chance to get hold of them, but they will take the microbe killer, first as a preventive and then as a curative agent, directly the necessity for something makes itself known. I believe I have accomplished more in two years with my discovery, than has ever been done by any thing of the kind before, especially when I consider the opposition I have had to encounter from imitators and from the medical profession. I have done something which will reform the entire treatment of disease. I have put the cause of disease in a new light. I have enlightened the people, who have hitherto been the victims of ignorance and of the erroneous theories of medical science. I have shown the only means by which disease can be cured, and I have so simplified the whole thing that everybody may become his own physician, and thus avoid the perils that are necessarily involved where dangerous drugs are used and where empiricism forms so large a part in the physician's practice. Moreover, I have inaugurated a reform which will save the people from that most objectionable of all payments, the doctor's bill.

The idea that any specific can cure all diseases has been made unpopular in many ways. Charlatans have come forward and made that pretence to advertise their wares, and

they possibly sold something that would not cure any thing. Then of late years specialists have become more numerous within the pale of the profession. Formerly this was not considered in accordance with the strict laws of ethics, neither is it now, but nevertheless the custom has extended and is further extending, and specialism is in direct opposition to the principle I have laid down as the results of my study of Nature, and of my simplification of the cause of disease. Thus the idea has got about that nobody can cure all ailments,—and when I introduced myself as ready to do so people thought me crazy. This was nothing. There are always plenty of persons ready to regard everybody else as mentally weak who happens to hold opinions different from their own. The doctors were most prominent in declaring me of unsound mind, and perhaps if any two of them had had the chance they would have prepared a certificate which would have consigned me to a lunatic asylum. For the law gives them that power, and a very extraordinary one and a very much-abused one it is. Among my customers was a professor who bought at different times many gallons of Microbe Killer, but he once said to me: "Mr. Radam, when you first introduced your 'Microbe Killer' I told my wife about it, and she said: 'Oh, I am sorry for Mr. Radam, the poor man is crazy.'" Yet he came to me, used a great deal of my medicine, and was very glad he had done so for it did him a great deal of good.

I have often been amused at the way in which I have been talked about and the charges made against me, and still more amused when some of the people who were loudest in condemning me and pitying me were among the most faithful in availing themselves of my discovery and among the loudest afterwards in its praises. How many times I have been pronounced out of my mind I do not dare to say. It has been too many to keep record of. But I have grown accustomed to it. It does not affect me. All proprietors of new inventions and all discoverers of even the most useful things have had the same to go through, and I know that I must

submit to it. I can afford to take it all with perfect equanimity. I regard it as merely the idle talk of ignorant people, or the malicious talk of persons interested, and unless it gets to be very unreasonable I can treat it with contempt. If, however, it passes beyond the limits that I am willing to allow, I do not propose to overlook it, and the people must be prepared to see me fighting my enemies without gloves. I am convinced that my discovery must be productive of the greatest good. It preserves the body from an enemy which, although invisible to the naked eye, comes to view under the power of the microscope and so places its existence beyond dispute, and if in like manner somebody will discover a means for destroying the devil, whom no instrument known has yet discovered, then the dawn of the millennium is at hand. Jenner discovered a means of mitigating the terrors of one disease, Pasteur has applied the same principle to preventing another, and others have turned it into account to theories about preventing yet more. I have made a discovery which promises to prevent and to cure or to check the development of all, and I feel justified in claiming that much appreciable public benefit must be the consequence.

CHAPTER XIV.

"LA GRIPPE" AND THE MICROBE KILLER.

THE hurried visit paid us by the epidemic last year, which, for lack of a better name, was called "la grippe," found the doctors absolutely unprepared. It came upon them suddenly, but not without premonition, if only natural signs had been observed. The newspapers did a great deal of harm. For the sake of making a sensation, they exaggerated and misrepresented the truth. They created groundless fears in the minds of the people, and by publishing alleged interviews with physicians who wanted to advertise themselves in that way, they showed how little medical science was doing to alleviate the disease. Druggists broke the law by prescribing for patients, and thus every thing combined to render the visitation much more serious than it would under reasonable circumstances have been. Many people who had only ordinary colds read the newspapers or rushed to the drug-stores, and immediately believed that they were on the brink of the grave, while others who had a genuine attack of the disease too often had to experience the utter ignorance of ordinary physicians as to the principles of successful treatment. But it afforded a good opportunity to test the effect of the microbe killer, and when this was used with careful attention to instructions its power was most marked. In order to emphasize the contrast I must, however, enter more fully than otherwise would be necessary into the subject, and since it involves several points of interest, I have no hesitation in doing so.

It is remarkable how unwilling physicians are to lay aside old notions, and even now many of them are reluctant to admit that the epidemic was any different from what for generations had been known to them as influenza. It appears to have originated in a town a few miles southwest of St. Petersburg, but how we cannot say. One newspaper writer in London put forth the absurd notion that it was caused by the putrefaction of bodies of Chinamen drowned in the floods that occurred in China a few months previously! A woman who publishes a small paper in Washington announced that she had discovered the cause in some theory propounded by a friend of hers fifteen years before! And these are only specimens of some of the wild suggestions that were made. The truth is that nobody has yet defined the cause of it, and probably never will, although guesses may be numerous.

It spread rapidly, and in three weeks it was estimated that half the population of St. Petersburg was affected by it. It then travelled into Austria, and there attempts were made to define it. A correspondent writing from Vienna was unwilling to acknowledge that it was contagious, because there were instances where one in a family would be affected and all the others would escape. But, again, whole families might be laid down in succession, and yet again several members might be attacked and the rest be exempt. At first it seemed to be uninfluenced by age or sex, but later they noticed in Vienna that very old people escaped, while in New York the young people were rarely attacked. The incubation period was supposed to be about two days—and I shall revert to that presently,—then the active symptoms came on suddenly. They began with headache, shivering, and prostration as in other infectious diseases. In this city there were instances where persons fell suddenly unconscious, and remained either in that condition or in delirium for two or three hours. In one case that came to my knowledge a business man was stricken down at his desk, and was delirious for fourteen hours under homœopathic treatment. A

physician of what is known as the regular school was then sent for. He treated it as a microbe disease, and in thirty-six hours the patient went back to his office well. The temperature was always high, sometimes as high as 105°, but it fell as rapidly as it rose, and the disease seldom lasted as long as four or five days. Under proper treatment it usually ran its course in two. Convalescence was variable, but it seems to have depended more upon the treatment than upon the severity of the attack. The worst cases often got well soonest because more care was bestowed upon them. Relapse from neglect was very common, and bronchitis or pneumonia sometimes supervened from that cause, and proved fatal. In all these respects it was quite different from the epidemic of influenza which prevailed everywhere in 1847, in which severe catarrhal symptoms were most prominent. The French Académie de Médecine also determined, after a very exhaustive discussion, that, although closely resembling dengue fever, it was not identical with it, facts which point to the inference, independently of any other knowledge we may have, that influenza, la grippe, and dengue are caused by three different microbes, and that the difference of symptoms in different instances is due to constitutional influences or to changes in external conditions.

It was about the last week in October, 1889, that la grippe made its appearance in Russia, and I never hesitated a moment to attribute it, as I do all other disease, to the presence of a microbe, but medical science was averse to that idea. Accordingly, the doctors dealt with it on their theory and I treated it on mine. Their cases derived very little benefit, and mine were cured. But now let us note how rapidly medical men came round to my views. The epidemic stimulated inquiry, and in January Dr. Klebs, in Germany, who had been carefully examining the blood of influenza patients, found a micro-organism different from any previously described. It was oval in form, the long diameter being about twice that of the transverse, and it showed slight quivering or contractile movements. Stained

with blue coloring matter, flagellæ became apparent; and what is especially worthy of note, is that these microbes were for the most part within the blood corpuscles, just as are the microbes of ague or malarial fever. Micro-organisms have also been found by Kollmann, Fraenkel-Weichselbaum, Ribbert, Jolles, and others in Germany, and by Sée and Bordes, Du Casal, and Vaillard and Vincint, in France. At Bucharest most careful investigations have been made, and in the *Centralblatt für Bakteriologie und Parasitenkunde*, Babes has described two forms of bacillus which he found in influenza patients, one being much more prevalent than the other.

These must not be confounded with forms which have been illustrated in some of the sensational papers as having been discovered in this city. The latter are entirely deceptive, and it is to be regretted that the exigencies of modern journalism should lead to the publication of many things which are calculated to deceive, or, what is worse, to make the people distrustful of the truth when it is honestly put before them.

It has been difficult to obtain cases of la grippe for examination which were entirely free from other complications. Dr. T. Mitchell Prudden has made some valuable investigations on the subject, but he could examine only seven cases, and he admits that three at least of these were complicated with bronchitis, but several forms of microbes were discovered in all.

Dr. Jolles, of the bacterian laboratory connected with the general hospital at Vienna, is among those who have had the best opportunities of conducting the inquiry, not, be it remembered, an inquiry to settle whether or not there is a special microbe, for that is acknowledged, but to identify it. He and his associate, Dr. Maximilian, discovered traces of it in December last, and people who are accustomed to the use of the microscope know how difficult such results are to reach. They named it the bishop bacillus from a peculiar form which it presented at one of the extremities. They cultivated it in quantities. It is entirely different from the

microbe of cholera and yellow-fever, but bears some resemblance to that of pneumonia discovered by Friedlander. This is important, because influenza is by many persons regarded as a precursor of cholera, a supposition which cannot be sustained when it is shown that the microbes of the two diseases are essentially different. The same microbe is said to have been discovered by Dr. Jolles in water taken from a well in the Styrian Mountains. If this discovery can be sustained, it would point probably to a direction where the actual origin of la grippe must be looked for, the spread of the disease being due to its infectious and contagious character.

Even this was denied by the doctors down to a very recent period, but they are gradually and apparently reluctantly accepting it. The following incident is of the kind that they cannot get rid of. There is a steamer called *St. Germain* trading between ports on the Mediterranean. On December 2, 1889, it left Saint Nazaire. It put in at Santander three days after, and there took on board a first-class passenger, just arrived from Madrid, where la grippe prevailed. The health of the ship had before been good, but in twenty-four hours the person from Madrid was taken with la grippe; four days after the surgeon of the ship and a servant were attacked, and between the 12th of December and the 7th of January of this year, or in 26 days, no less than 154 out of 436 passengers, besides 47 men of the crew, were successively affected. No better illustration of the transmissibility of the disease could possibly be desired. It completely upsets the theories of those who looked upon influenza in any or every form as purely a miasmatic disease, although among them were some who have always been regarded as leading authorities in medical science.

It may then be quite safely affirmed at the present time that physicians have come to accept my view of the disease, and to acknowledge that it is due to the presence of a microbe which may or may not have been seen, and that it is both infectious and contagious. But the treatment that

medical science has marked out is a curious testimony to the confusion that exists among the doctors directly they are called upon to kill that microbe. Among the drugs recommended for the purpose I find aconite, acetate of ammonium, opium, morphia, belladonna, calomel, phenacetin, Dover's powder, acetanilid, antipyrin, salol, salicin, salicylic acid, salicylate of sodium, convallamarin, strychnia, caffeine, camphor, sulphate of spartein, quinine, carbamide of quinia, musk, bromohydrate of quinine, tannin, arsenic, and how many more I cannot say. From the fact that some of these powerful agents are entirely different in their therapeutical effects, it is self-evident that they were selected experimentally, and without any definite purpose. Little wonder then that, while la grippe was present with us, the mortality bills were nearly doubled. Some physicians admitted that they could do nothing, and advised that in every instance the disease must run its course; others—and they were chiefly of homœopathic pretensions—floundered about with bryony, gelsemium, and arsenic, and with results that were unfavorable to a startling degree. This is what might be expected. Almost all the drugs I have named, and I have collected them from actual experience among physicians' prescriptions, are very powerful poisons. It would be impossible for any person to have the tissues of his body saturated with them, as I have shown must be done, and to live. He would die of the medicine long before it could reach the microbes. But the practice of the homœopathist involves the use of infinitesimal doses, which, even if the agent were effective, must be perfectly useless. Homœopathy is, in truth, nothing but a scientific name for the policy of doing nothing. It is simply absurd, and an insult to anybody's reason to ask him to believe that such quantities of any remedy as the homœopathist affects to administer, can permeate the system and pass into all the tissues. But unless it does that, it is worthless, and people who foolishly rely upon it are indeed trusting their lives to a broken reed. It is quite easy to ascertain by experiment the degree of strength which must be reached in any solution of the most powerful antiseptics in order to

destroy microbes. A weak solution they resist. It is evident that what they can resist outside of the body they can survive in the tissues, and that if we would destroy them we must permeate these tissues with an amount of the remedy that experiment shows to be necessary. No agent used on homœopathic principles, under the most favorable circumstances, has yet been known to kill microbes. Many interesting notes bearing upon my views of this subject are given in the appendix, but a careful perusal of them can only show the strength of my position, and point out conclusively how utterly at variance the medical treatment of la grippe has been with any consistent knowledge of its nature, or of the remedies that are necessary to cure it.

The results of my own experience are more simple, and can be briefly disposed of. La grippe is a microbe disease. If the doctors allow their patients to die while they are making up their minds about it, my study of the laws of nature enables me at once to act upon the knowledge already attained. During the prevalence of the epidemic, many people availed themselves of the microbe killer, and none of them regretted it. They avoided the doctors, and merely exercised their own judgment while using the remedy under general instructions, and always with satisfactory results. Many took the remedy and were cured, and we heard no more about them. Severer cases came under notice more closely, and their progress was watched. I usually found it desirable in the first instance to advise a gentle laxative, especially when the symptoms were urgent, and after that a free use of the microbe killer taken in doses regulated by the age and constitution of the patient, and applied to the lining membrane of the nostrils and external air-passages when there were any catarrhal symptoms. The effects were speedy and effectual. A few hours often sufficed to alleviate the most painful indications, and improvement which began thus soon proceeded until a complete recovery was secured.

I have said in the beginning of this chapter that the incubation period of the disease has been supposed to last about forty-eight hours. In many instances the patient is

not cognizant of it, but where he is, immediate recourse to the microbe killer prevents the attack, or if absolute prevention be not obtained, the severity is so much lessened that the patient suffers nothing that renders abstention from his ordinary occupation desirable or necessary. During the prevalence of any epidemic the slightest indication of trouble should therefore be met at once by a liberal use of the medicine, and in that way a painful if not a serious illness may often be averted.

Bronchial affections and diseases of the air-passages and lungs are promptly relieved or prevented. In New York liability to these complaints is unusually great. Sudden changes from the dry and overheated atmosphere of most houses, the bad construction of street and railway cars, where no control is exercised by conductors, and any messenger-boy or imbecile can open a window and so endanger the health of half a score of other passengers, are frequent causes of illness. They could, of course, be prevented, but they are not likely to be until people are intelligent enough to understand the danger of high artificial heat in winter, and until companies and public servants have some regard for the rights of individuals. American railroad cars have some advantages over the form of carriage adopted in Europe, but they are counterbalanced by numerous disadvantages, and among others the far greater safety and healthfulness of the European system is not the least important. This could be remedied in some degree if means of ventilation were adopted which involve less risk to travellers. Meanwhile the microbe killer presents a simple and effective remedy. An ordinary cold may be dissipated by its use in a few hours, using it as recommended in influenza; and bronchitis, pneumonia, and other diseases of the chest and throat may be entirely averted if treated in time, or speedily cured if resort to the remedy may have been delayed. These, however, are acute diseases, and the medicine must be used in sufficient doses and persevered with, as I have explained elsewhere. There is no ailment of any kind, acute or chronic, to which it is not applicable.

CHAPTER XV.

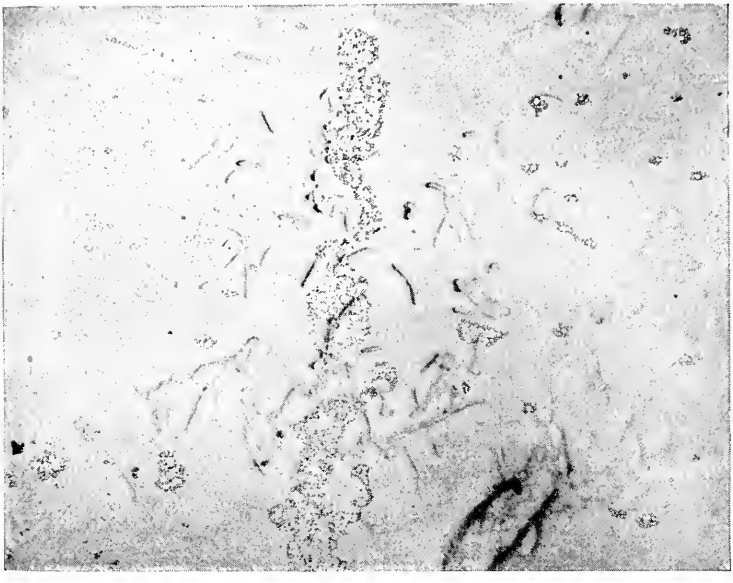
PEDIGREE OF MICROBES, AND SUMMARY.

My experiments have developed many points of interest in the history of microbes, and the reader will be glad to know more of a subject of so much importance.

The part which micro-organisms play in the economy of Nature is a great one, and it is quite worth while to look at their origin. This carries us back almost to the beginning of life. There was a time when the whole of organic nature on this globe consisted entirely of these little bodies and of their nearest kindred organizations. The length of that period in the world's history has been estimated at hundreds of millions of years, or more than half the interval since the earth assumed its present form. Then they probably existed exclusively in the waters.

The highest forms of vegetation in those early periods were the tangles or sea-weeds, such as are found in the Sargossa Sea now. No insects existed then. There would have been no sustenance for them, for there were no land plants nor any form of land vegetation. The air was dense with aqueous vapor, and hot. The primeval seas must have been warm too, and well adapted to the enormous increase and propagation of such organisms.

Among animals the skull-less fishes were the highest. Of these only one, the amphioxus, remains. This little creature, about two inches long, and quite translucent, is found only in Europe, in the North, Baltic, and the Mediterranean seas. But insignificant as it may appear, it is of vast importance to



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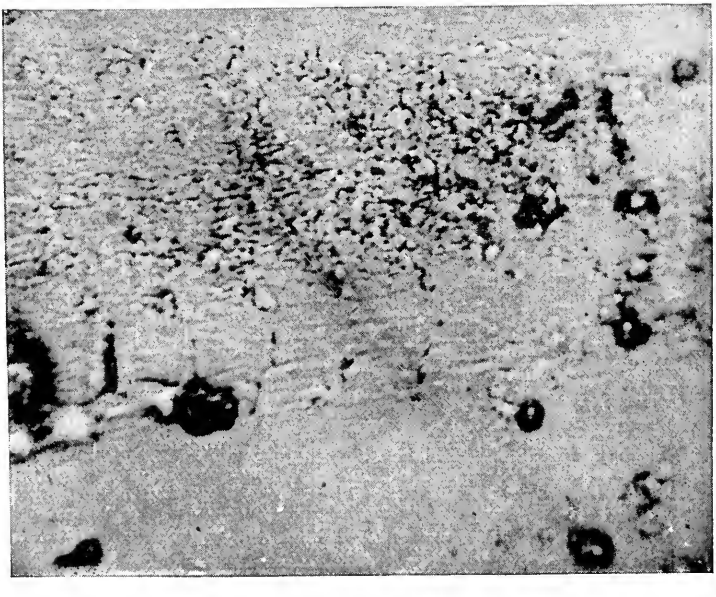


MICROBES FROM OPHTHALMIA.

the biologist, as forming a link between the vertebrate and invertebrate animals, and closing up a space that long existed in the chain of life indicated by the doctrine of evolution, for the amphioxus was discovered not many years ago. It possesses a backbone and spinal cord, but no brain, and the circulation is caused by the contraction of tubular vessels, not by a bulbular heart.

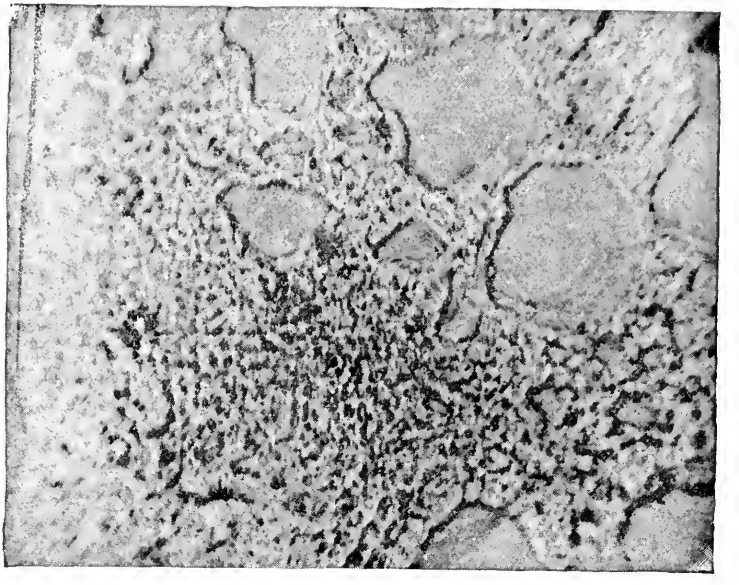
Simple as this formation is, it nevertheless represents the highest form of animal life many ages after organic structures had begun to fill the world, and when the waters were teeming with worms, ciliated larvæ, and yet more primitive forms that were destined, after myriads of years, to lead to what we see around us now. There was no life on land. Remains of the organic forms of those far remote ages are still to be found, in Canada especially, but the soft parts of the minutest organisms have not been preserved, and precisely what they were can only be gleaned by analogy, although there is no reason to suppose that they differed from the forms of the present day. They constituted the basis of the whole of organic life as we see it now, and it is interesting to observe how they originated. They must have come from the simplest beginning, and Professor Haeckel, of the University of Jena, has thrown full light on this part of the subject by actual investigation, first at Nice, and afterwards at Gibraltar, and the Canary Islands.

It is only of late years that we have become acquainted with the monera, which is the primitive form of organic life. The most remarkable was discovered by Huxley, and is found as far as twenty-four thousand feet under the sea, but they are abundant in fresh water also. They are little more than roundish, minute accumulations of mucus-like matter, adhering sometimes to small shells. They vary in color from white to a bright red. They possess no organs, but they float through the water and take nourishment. This is done in a remarkable way. When food becomes necessary, a number of fine thread-like arms are thrown out from the side, which presently enclose the minute particle that serves for

food, and draw it towards the main body, into which it becomes absorbed. This done, the threads disappear. These bodies multiply very rapidly, a number of small globules forming in the anterior, which ere long burst their envelope, and immediately float about in the water, and attach themselves to the first suitable object that comes in their way.

The bodies of these micro-organisms are of such delicate construction that they must be ever changing their shape while in motion, but when at rest they are merely round cellular formations, no differently constituted than are some organic compounds obtainable in the laboratory of the chemist. The next higher form differs mainly from the monera in being able to take solid particles into the interior of a cell, whereas the monera obtains nourishment by diffusion only. But it also multiplies differently. It is a higher organization, and in place of being a mere shapeless mass of mucus, it is enveloped in a membrane, and is therefore a simple cell with a nucleus. This nucleus gradually divides into two, the cell-wall contracts between them, and thus two separate and independent bodies are formed. They take their food by the same process as the others.

Advancing another step we approach a form like that of several of the microbes of the human body and disease. Some of them are simple cells, like the amœba, but others more resemble the whip-swimmers, as they are termed, of this third development. In them we have a cell with a thread-like extension at one end, which gives them somewhat the appearance of certain forms of microbe, especially those known as spirillæ and bacilli. The whip-swimmers are found also in great abundance in both salt and fresh water, moving about by means of the thread-like process at their extremity. Some are provided with fringes or cilia, which further facilitate their movements, but in the forms which are found in man, and those producing disease, these fringes are usually absent. The whip-swimmers are supposed to play a chief part in producing that beautiful phenomenon common in all warm latitudes described as the phosphorescence of the



FROM ULCER ON THE ELBOW.

MICROBES FROM ULCER ON LEG.
(Milk Leg.)

sea, and in fresh water producing the green slime of stagnant pools. All these organizations, so closely allied to the microbe with which we have to deal, do not live in the water. There are some forms at least which exist on dry land, and then they probably exercise fully as important functions as those in the water. Some are more closely allied to animals and some to plants, the difference being based on the presence of nitrogen or lime in their structure.

The skeleton or the solid scaffolding of the body in most genuine plants consists of a substance called cellulose, devoid of nitrogen, but secreted by the nitrogenous cell-substance or protoplasm. In most genuine animals the skeleton consists of either nitrogenous combinations or of calcareous earth. Sea-weeds or tangles existed in primitive times with the monera, but the theory is now generally accepted that fungi arose out of the more simple form. The lowest fungi are those which produce fermentation, and it is not reasonable to suppose that they were a development from sea-weeds, although they exhibit a very close relationship to the lowest algæ.

Not long ago a person writing to one of the newspapers alluded to microbes as animals, and the editor, in a foot-note, said that that was an error, and that they are in reality algæ. Both views were wrong, and the true relationship of these remarkable bodies is as I have described. There are no fossil remains of them.

Fungi differ from all other vegetable organizations, as I hinted previously. Other plants live upon inorganic food, and produce protoplasm by the combination of water, ammonia, and carbonic acid, whereas fungi live upon organic matter and are genuine parasites. Some even propagate in a sexual manner, and for that reason have been placed by a few biologists in the animal kingdom, but the distinction is not universally acknowledged, and they still hold their place in the vegetable kingdom. In the production of diseased conditions the fungus is no less active than the yet more simple forms—in fact, it is probably more active, since it seems to

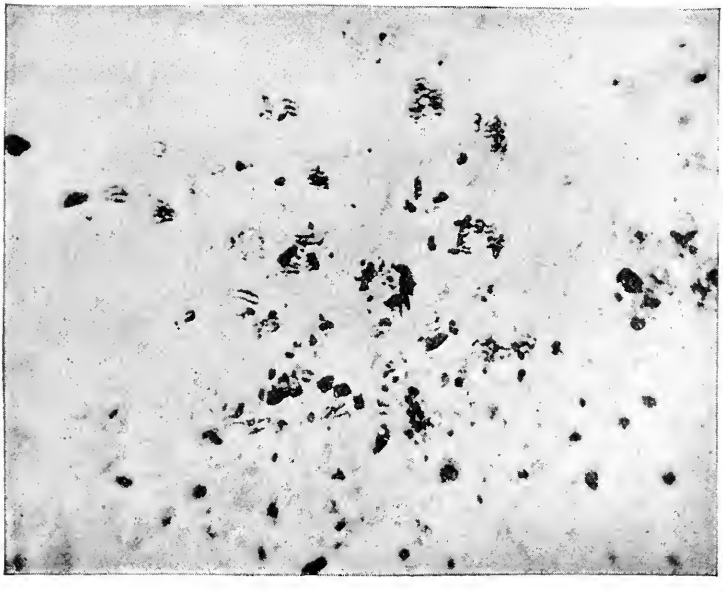
possess a greater power in promoting fermentation. The exact rationale of this process has not, so far as I am aware, ever been explained, but when we know the peculiar difference that separates a fungus from other plants it is not difficult to form a theory. Take, for example, the microbe of intermittent fever. This circulates in the blood. It lives upon the blood corpuscles, destroying their vitality and form, appropriating oxygen and exhaling carbonic acid. The older chemists thought that it was a mere effect of contact, but that idea must be laid aside in view of the certainty that a chemical decomposition takes place, and that the destruction of the properties of the blood is really due to that cause.

The extreme minuteness of these micro-organisms is a feature that must always be borne in mind. Not only are they small, often beyond reach of any but the highest microscopic powers, but their tissues are extremely delicate so as to render them imperceptible sometimes to all but the most practised eyes. For this reason it is extremely difficult to meet with them when they do not afford a sufficient resistance to light to enable us to obtain photographs or any natural delineation.

And it was this difficulty which I had to overcome in producing most of the plates that appear in this work. No attempt had ever before been made to convey by means of such illustrations to the general public an idea of what microbes are, and when it is remembered that they are so minute and so translucent as scarcely to cast a shadow, the reason may be understood. So-called engravings of microbes of la grippe, for instance, and other diseases, which have appeared in the papers, are purely the work of somebody's imagination. They bear no resemblance whatever to the reality.

This peculiarity does not affect the vitality of microbes. Minute and delicate though they are, they are extremely tenacious of life. They cannot be destroyed readily. When my factories were first established I had abundant oppor-

MICROBES FROM A HOLLOW TOOTH.



MICROBES FROM THE TEETH. INFLAMED GUMS.

tunity to make a collection of numerous forms of microbe. My patients brought me bottles of matter, for examination, in a state of fermentation, and sometimes I discovered in one of them as many as from six to ten varieties, showing to me conclusively that that person had as many forms of disease, while the patient may have been treated for but one ailment by his doctor. Sometimes I received matter from the stomach of a patient immediately after he had taken his medicine. This I usually preserved for the purpose of learning whether the medicine would stop the fermentation. I kept the matter in carefully stopped bottles sometimes for twelve months, and invariably I found that the fermentation continued. The microbes were not killed, but they went on multiplying throughout the whole time, showing that the medicine that had been given was utterly useless to destroy the cause of disease. Physicians are well aware of the ineffectiveness of many of their remedies, and they are willing to acknowledge among themselves that the only really powerful drugs in battling with microbes are fatal also to the patient. Of these the principal are corrosive sublimate and carbolic acid, but they must be used in considerable strength. Strong alcohol has no effect on dried microbes, but, especially if used in its fullest strength, it is a powerful agent when the germs are in a moistened condition. Boracic acid, once thought of so much value, has been shown to possess no action whatever, after ten days' trial the germs resisting it most effectually. Iodine has been tried for forty-eight hours, and found also to produce no effect. Chloride of zinc, oil of turpentine, thymol, and eucalyptol have yielded similar negative results. Ointments of iodoform and iodol are equally ineffectual. The strongest iodoform simply retarded the development of microbes after twelve hours' exposure. It did not kill them. Hot water does not destroy them, unless it be raised to near the boiling temperature. Permanganate of potash has been recommended, but the effect here is curious. Instead of the salt killing the microbe, the microbe decomposes the permanganate and renders it ineffectual. Peroxide of hydrogen

is uncertain, and at the best produces very little effect, and chlorate of potash is, for all practical purposes, useless.

In like manner, physicians admit, as the teaching of experiment, that oil of mustard, arsenious acid, and even the much vaunted salicylic acid, are quite unreliable and inefficient. It comes, in fact, to this, that the three most powerful agents used by the doctors are carbolic acid, corrosive sublimate, and strong alcohol. But how can the body be saturated with either of them? One sixtieth of a grain is a dose of corrosive sublimate, yet, to destroy the cause of a disease, it is necessary to reach throughout all the tissues, and long before that point were reached the patient would be dead.

I wish to avoid conveying the impression to even the most unsophisticated reader that I claim any originality in attributing disease to the presence of microbes. That view is fully accepted by the medical profession. The difference is that, whereas physicians attribute only a few diseases to this cause, I aver that it is the origin of all. Every year, too, adds to the doctors' list, and zymotic ailments are gradually becoming more numerous. Even in diseases like smallpox, whooping-cough, and measles, where the special microbe has not been absolutely identified in the blood, its existence is admitted. In this way the whole subject has received attention, and many points of interest and practical value have been obtained.

Some forms of microbes have the power of producing spores, and these are more capable of resisting antiseptics than are the fully developed germs. Diseases, where this form of bacillus exists, are consequently more difficult to cure, and it is more than probable that smallpox comes in this category. Experiments instituted by Professor Koch for the German Imperial Board of Health are among the most important that bear upon the resistance of these organisms, and the effects of various agents. It created no little surprise among physicians when Koch reported that many of the most popular and, as was supposed, the most power-

ful antiseptics or germicides were, in fact, of no use at all. Carbolic acid restrained their growth, but unless used in very powerful form, it was much less efficacious in destroying their vitality. A one-per-cent. solution required fifteen days in which to kill them, and then only when they were kept submerged in the fluid the whole time. It is remarkable, too, that, when the carbolic acid was mixed with alcohol, it had no disinfecting influence at all. Bisulphide of carbon had no effect upon them until a temperature of 176° was reached, which, of course, is far beyond any practical temperature for the body. Bacteria that are free from spores may be destroyed at 212°, the boiling-point of water, but spore-bearing microbes will resist 280°. Excepting the germ of yellow-fever, their bodies are proof against cold as well as against heat. The microbe of typhus withstands a considerable degree of cold, thus indicating a typical difference between that and yellow-fever.

I have succeeded in propagating microbes in different fluids in which some of these medicines, as carbolic and muriatic acids, were mixed. Hydrochloric acid is indeed present in the stomach during digestion, where, being in small quantities, it certainly does not destroy fermentation. I have added to my bottles of microbe culture as much as twenty-five per cent. of mercury, and even with that degree of strength it required from three to ten hours to kill them. All this line of experimenting convinced me that I have to use large doses of medicine, and to carry it through all the tissues, if I would destroy the microbes of disease; but with the medicines that the doctors prescribe, this cannot be done, and with the small doses they are forced to give, nothing but a very imperfect result is possible. I often found the contents of bottles which I carried about with me to be dried up. Nothing remained but a dry, dusty substance, which would break up like the ashes of a cigar. When I added a little distilled water to this, and allowed it to stand for a few days, the microbes would be alive again, multiplying as rapidly as before. Even if I had added alcohol to them in

the dry state, they would not have been killed. Every housekeeper knows that yeast cakes may be kept dry for months, and that, as soon as they are moistened and placed under favorable circumstances, with a sufficient temperature, they induce fermentation. This is nothing more than the yeast plant, which is a fungus or microbe, revivifying and increasing and growing, feeding for the time on the material in which it is placed, and, like an animal, giving out carbonic acid.

Some organisms cease to exist when the process of putrefaction to which they gave rise has attained to a certain excess, as if the results of the chemical changes were themselves sufficient to destroy life. But this condition is beyond my province to notice except as a matter of interest. Disease germs in a state of activity sufficient to reproduce disease may be conveyed, as already explained, directly from the body or discharges, including the exhalation from the skin, also from the clothes or bedding, or through the air or articles of food, or by dust that settles on the walls or floor, or from the soil, or through defects in sewerage. Fire is the only absolutely perfect disinfectant, but other means will suffice if accompanied by proper precautions.

From what I have previously said it is easy to see how germs may be taken into the system from the atmosphere. Those ordinarily there may not be productive of disease, but that is of no practical import. I have shown the danger arising from the too prevalent habit of expectoration. But if we pass from out-doors into the sick-room it is greatly increased. A consumptive patient or any person suffering with diseases such as scarlet-fever, measles, etc., may be the means of allowing microbes to get into the bed coverings. This will dry up and remain there until disturbed, when immediately they float about the air and may pass into the lungs of other individuals. This again indicates two points that are not sufficiently attended to. One is the folly, before referred to, of having draperies, curtains, and hangings about the sick-chamber; and the other the mistake that is often

made in the use of disinfectants after illness, since it is shown that germs in a dry state will resist antiseptics that would be effectual if they were merely moistened. It is for this reason that chlorine and sulphurous acid gas so frequently fail to produce the effect desired. Thus people are often very unnecessarily surprised when, after what they think has been a disinfecting process cholera, yellow-fever, scarlet-fever, or some disease of that kind will break out again often with more virulence than before.

If meat that has been hung a few days in unfavorable weather, until an odor of fermentation can be discovered, be placed under the microscope, microbes may be detected producing fermentation and putrefaction; and thus the nose becomes an organ to warn its owner against a danger which the eyes fail to discover. I have no doubt that considerable sickness is caused by the recent custom of eating meat improperly cooked. Doctors sometimes order their patients to eat raw meat and to drink fresh blood. In these instances the patients take nourishment into the system, and they also take the germs of disease. We all know the terrible effects produced by trichinæ that infest raw pork; how, when taken into the stomach, they soon develop throughout the whole system, and the victim soon dies in indescribable torture. Persons who take raw meat, or eat underdone meat, are liable to a similar evil, if in a less degree. Microbes are not killed except by a very high degree of heat, a degree much higher than that which enters into the substance of meat that is insufficiently cooked.

A temperature of 212° will, as I have stated already, suffice to destroy many germs, but there are some that survive a higher degree of heat unless it is continued for a considerable time. Epidemics are certainly conveyed in milk, but wherever the milk is carefully and sufficiently boiled no disease is ever induced by it. A case is on record where a number of persons were seized with a severe attack of choleraic diarrhœa after partaking of a boiled ham at a public lunch. It was proved that the meat contained numbers of

spore-bearing microbes, which are always difficult to kill, and that it had been insufficiently cooked. In another instance, similar results followed after a number of persons had eaten of well-cooked pork. But in that case the micro-organisms had taken their origin in the food after it had been cooked, a fact which again conveyed a useful lesson.

It must not be supposed that salting meat has the effect of destroying the microbes. Cholera bacilli and some other disease germs are destroyed by salt, but the bacilli of infectious diseases of animals are hardly affected by it, and these are the most important. Meat containing the germs of tubercle can with great difficulty be freed from them. These germs will live in strong brine sometimes for months, a fact which cannot be too clearly remembered by anybody who may suppose that salted and corned meats must be free from germs of first origin. Even cholera microbes require a very strong solution of salt to destroy them.

In freezing, the microbes of meat are not destroyed; they simply remain dormant and cease propagating, as they do in dry dust, but as soon as the meat is thawed they begin again to do their work; they increase and multiply; the process of fermentation begins and that of putrefaction soon follows. It is extremely difficult to kill them. Even where sulphurous acid gas is used, several hours become necessary in which to continue the process, and all atmospheric air must be carefully excluded. The sulphur gas must have access to every crack and crevice, for if but a vestige of microbe life remains it will develop and the fumigation or disinfecting process will have been in vain. To say that microbes may be dissipated or destroyed by firing cannon, building fires, or spraying something into the air, is simply a result of ignorance. I have experimented in that direction and can prove my assertion.

Microbes are known to exist in sulphuric acid and in many other powerful poisons, but they are not of a kind that would produce disease in the human body, because they could not find a suitable nidus there. It shows, however,

what they may be, and how capable they are of sustaining life under conditions where it seems impossible. If microbes from the body be placed in sulphuric acid, they are of course instantly consumed.

The micro-organisms are universal. That fact will have been gleaned from what has gone before, when I have shown that they exist twenty thousand feet under the ocean, as well as in the air, and in almost all forms of organic life. If all were detrimental to the human body, we could not live for twenty-four hours. We inhale them with our breath, take them into the system with our food, and can barely handle any thing without coming in contact with them. Some are even healthful. The yeast plant is one of them, and the fungi that we have in wine, beer, and vinegar are not injurious. It is only disease-producing germs that we have to combat, and those which find a suitable nidus in the human body for propagation.

Sometimes doctors have told me that in destroying disease germs we destroy also microbes that may be useful. To that I can confidently reply that I have destroyed disease microbes in myself and in thousands of other persons, and that if the good ones have gone too they have never been missed; in truth, they are forming in our bodies every day and all the time. But these are injured by the others. An unhealthy tree does not produce healthy fruit, neither does a constitutionally unhealthy person produce healthy offspring. His vitality is destroyed by another microbe, which is out of place and dangerous. But get rid of the disease germs, and Nature will supply wholesome ones that build up the system and produce vigorous health and life-giving powers. When a person tells me that he suffers from nervous irritability or depression, feels weak, and wanting in energy, is unable to bring himself to his work, and is generally incompetent, I know that he must take microbe killer, which will destroy disease germs and leave the useful ones to be reproduced and do any beneficial work for which they are intended. This can only be done when the body has been built

up and the whole system is strengthened, so that the blood, purified and enriched, shall circulate freely and impart vigor and tone to the sensations as well as to the body. For with improved circulation the whole nervous system is strengthened. Irritability and extreme sensitiveness disappear. The nerves perform their legitimate functions and the individual is brought up to a standard of normal health such as the body is fitted for. Water that is not kept in motion becomes foul and stagnant. Fungi grow in it, and fermentation and putrefaction are encouraged. And so it is with the blood. Directly it ceases to circulate freely we have an indication that there is something wrong, that it contains something that ought not to be there. When it is well nourished and clear, so that it circulates freely, no palpitation or nervousness or any pain will worry us. Under that condition we cannot be sick or ailing. The blood is the life. If we can keep it always free from microbes and impurities, and in a condition where it furnishes sustenance to the tissues as it should do, we may prolong our lives till old age ends them. Children and young people who are free from hereditary trouble die, as a consequence of the ignorance of the medical faculty, who mistake or misunderstand the cause of the disease, and consequently err in providing a remedy.

With the microbe killer near at hand sickness is shorn of all its terrors. We need not fear it, for the remedy is with us. We can stop it at once and renew ourselves again, even as a house may be painted again and again to preserve it from fungi, which, of course, cannot attack it as readily as though it were not painted. Precisely the same thing occurs in the body when the microbe killer is applied, as must be evident to those who have followed me through my description of the cures I have effected in chronic diseases. Nothing is more simple than to cure disease when it first begins, provided we deal with it intelligently and according to the directions and principles that I have laid down.

Any one who goes carefully through the foregoing pages will have to admit that I have set down nothing which is

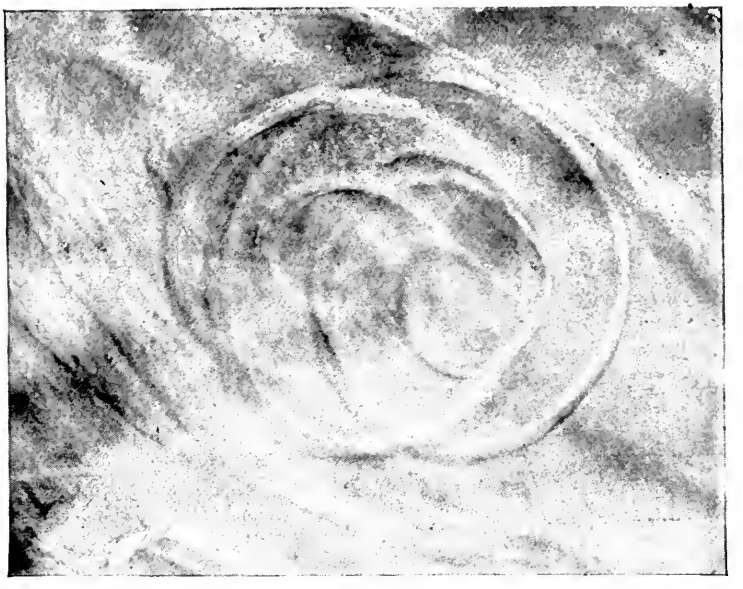
incapable of proof. I deal in no guesswork, empiricism, or theory, but in hard facts; and these, I think, I have made so clear and so convincing that, in the face of them, medical science cannot stand before my discovery. If people would not be content to believe all that they hear and read, but would use their own reason and judgment, they would assuredly realize that we were not born to endure pain and misery, to lead a wretched existence without energy or comfort, to crawl, as it were, through the world and then to sink into everlasting perdition, after making everybody around us miserable.

The world is very much what people make it. Each of us is more or less the victim of circumstances. Perhaps if I had never been sick I should never have discovered the microbe killer. Very often, too, characters are formed by a long series of circumstances over which the individual may have had no control, and yet, if more people would exercise common-sense and intelligently use the abilities that they possess, very much trouble, disappointment, and pain would be prevented, and very many rogues, who now subsist by the ignorance or stupidity of the people, would be forced into earning an honest livelihood. The public faith and credulity about any adventurer who dabbles with drugs and promises, in specious advertisements, to cure some form of nervous debility or disease are astounding. I do not know of one honest man who is engaged in that kind of business. All of them live by plunder and deception and trickery, and they do so because the people they go among will not take the trouble to think for themselves. They invite misfortune. It does not come to them unsought. They lose their money through their own folly, and they receive no relief, because the people who promised to give it them are neither able nor willing to do so. They only want all the plunder that they can get by dishonest means without falling inside the pale of the law.

Man had better never have been created if he was to be destined to everlasting misery and wretchedness. People's

brains are not of equal value or equal force, but everybody has at least one, and, such as it is, he should make the best use of it. It must be a very bad one indeed if it cannot be made available to do a little thinking, if only just enough to take care of the body that it is attached to. The man who, unafflicted by disease or some natural debility, cannot take care of himself can hardly expect that other people will take care of him. People should not be led away by every charlatan who jumps up before them and talks; but as long as the world lasts there will probably be fools in it, and fools are a godsend to rogues. There is a fascination in being humbugged. Make it known to the world that you are going to do some impossible thing, and the world will pay money to come in and see you do it, although well understanding all the while that the thing cannot be done. It is a part possibly of the perversity of human nature, which in practice refuses to realize that talking about something and giving proof of it are two very different things. There are hundreds and thousands of men, aye and women too, who have a great deal to say about disease and medicine who have the stamp of impostors branded on their face. It is not enough that a man shall promise to cure disease, let him give practical demonstration of his ability to do what he says. Until he has done that, he is unworthy of credence or confidence. It is nothing that he writes books and calls it science, and asks the people to pay for it as such. He must show by actual proof that it is not the outpouring of worse than unpardonable ignorance. Genuine science gives facts and proof that they are facts, so that people who will take the trouble may judge for themselves and be satisfied.

That is the principle that has actuated me in my discovery. I religiously abstain from making any promise which I cannot fulfil. I have stated nothing as a fact which I cannot prove. I have given honestly and as plainly as possible, so that all may understand, the whole history of my discovery, how I came to make it, and what it has done, and there is not a single assertion throughout this book bearing upon the



SINGLE TRICHINA SPIRALIS IN FLESH.
(Magnified with $\frac{1}{8}$ inch objective.)

TRICHINA SPIRALIS.

Microbe Killer which is not absolutely true. But to put the whole matter as concisely as possible, the facts which I am especially prepared to prove are these:

I. That I have, by studying Nature carefully, discovered a preparation which is capable of curing any disease, and therefore is calculated to prolong life.

II. That this preparation is entirely harmless to the human system, but death to microbes.

III. That all diseases that have come under my notice have been cured by this Microbe Killer, not even excepting the relief and possible cure of that most dreaded of all affections, leprosy.

IV. That in the short space of two years I have made a reputation for my medicine such as no discovery has heretofore gained.

V. That no medicine or preparation of the kind has had so many imitators as this Microbe Killer.

VI. That it is in consequence of my success that some members of the medical profession decry me and denounce me as surpassing all in the pretentious character of my claims.

I stand upon these six statements, and I ask the people to whom the discovery is submitted to investigate for themselves, and to be satisfied, as they must then be, that every thing I affirm can be substantiated and is sound.

APPENDIX.

CONCERNING THE PLATES.

EXCEPT where otherwise stated all the illustrations of microbes are made from plates obtained from results of my own microscopic investigation, but under extreme difficulty, arising, as explained in the text, from the great translucency of the bodies of these micro-organisms. They are best examined by a reading- or large magnifying-glass. Some persons find them well developed if looked at through an ordinary opera-glass reversed, the plate being held six or eight inches away until a focus is obtained. Whatever appears blurred or indistinct to the naked eye will thus be brought out more distinctly, and will better resemble the photographs obtained directly from the microscope.

The white threads or spots are chains or clumps of microbes, in fact single specimens have defied all efforts thus far to develop them by this method.

Micrographs are generally made with an eighth of an inch homogeneous immersion objective. Taken with one of an eighteenth of an inch, and a four-foot camera and tube such as I used, they would be magnified from five to six thousand times. This, however, is only an approximate estimate, because the slightest vibration would alter the magnitude considerably.

So far as I am aware microbes have never been photographed either in Europe or America, all illustrations being sketches made from the microscopic field, and necessarily

more or less imperfect. The general belief has been that they cannot be taken by microphotography, and my earlier experiences led me to the belief that that was true. I failed for several weeks. If I used too high a power I lost the light, and if I used too low a power I lost the microbe. But perseverance won the day at last. I worked and experimented persistently, and in that way the difficulties were overcome. All the plates lack definition more or less, but they represent the first that have ever been done, and in that way they are of value. Future development of my process may possibly lead to more satisfactory results.

[While pursuing my inquiries I have met with various notes bearing upon the details of my investigations. Many of these are of interest as strengthening my views, or contrasting with the results of my treatment of disease; and a few of them I have deemed to be of sufficient moment to submit to my readers, but in order not to break the uniformity of my previous narrative, I have preferred to collect them under the form of an appendix. They thus appear as supplementary to the text, but they will be found none the less instructive. I shall also avail myself of the opportunity which this arrangement affords me to demonstrate the kind of antagonism with which my discovery has been met.]

THE RELATION OF MICROBES TO DISEASE.

A remarkable paper was read last year on this subject before the American Academy of Medicine, by Dr. Samuel N. Nelson, of Boston, and the Council deemed it of sufficient importance to select it for publication throughout the country. Some extracts are as follows:

The rôle of the micro-organisms called bacteria is at present probably occupying the attention of more scientific men than any other subject in modern science. Great numbers of observers

are at work on both continents in the solution of the *germ theory of disease.* Comparatively unknown till within a few years, on account of their very minute size, these micro-organisms attracted attention and experimentation chiefly when the improvement of the microscope allowed objects of their size to come within the limits of its powers of observation. At first simply recognized as existing, their persistence and universality demanded question as to what they are, their origin, and object.

The history of these micro-organisms is related to that of spontaneous generation, to that of the fermentations, to the pathogeny and therapeutics of a great number of virulent and contagious affections ; and in a more general manner to all the unknown, which notwithstanding the efforts of modern science, still surrounds the origin of life and its preservation.

The bacteria are the lowest of organisms belonging to the vegetable kingdom.

The atmosphere transports myriads of microscopic plants and animals. M. Miquel has pursued interesting studies upon them. M. Pouchet has devised the aëroscope, that bears his name, for collecting dust from the air which contains remnants of articles that we use, existing in the condition of impalpable dust, also pollen of plants, particles of mineral matter, and the spores of cryptogams, the moulds, and algæ. Some micrographers have suggested that germs may be transported by the vapor of water ; but Miquel's experiments show that the evaporation of water from the ground never carries any schizomycetes with it. On the other hand, dry dust, especially from hospitals, etc., etc. is charged with micro-organisms. The greatest labors, however, have been employed concerning a different class of organisms than the algæ and moulds. The plants comprising this group, under the common designation of *bacteria*, in consequence of their extreme minuteness and refractive power, are invisible in the preparations of the aëroscopes, and are recognized only by the higher powers of the microscope.

The first observer who recognized the micro-organisms was Leeuwenhœck, as early as 1675. While examining with his magnifying glasses a drop of putrid water, the father of microscopy remarked with profound astonishment that it contained a multitude of little globules, which moved with agility. During

the following year he observed the presence of bacteria in fæces and in tartar from the teeth.

M. Cohn is a naturalist who has occupied himself very much with the bacteria. In 1853 he published his first researches upon this subject, and twenty years later there appeared a series of "Memoirs" devoted to these organisms. In the first paper he gives an exposition of his researches upon the organization, development and classification of the bacteria, and upon their action as ferments. His classification is :

1. The sphærobacteria, or globular bacteria.
2. The microbacteria, or rod bacteria.
3. The desmobacteria, or filamentous bacteria.
4. The spirobacteria, or spiral bacteria.

This classification has probably been accepted by more germ theorists of to-day than any other classification.

The smaller spherical bacteria may be confounded with various objects, *e. g.*, molecular granules, fat globules, amorphous precipitates, etc. To distinguish these pseudo-bacteria Nägeli says : "There are but three distinctive signs which enable us to recognize with some certainty that the granules under observation are organisms : spontaneous movement, multiplication, and equality of dimensions, united with regularity of form." To which may be added the action of re-agents.

The atmosphere is laden with these micro-organisms. Developing in the organic infusions into which they fall, they soon determine their complete decomposition ; for during their growth bacteria live upon the nutritive material, as all other plants do upon their soil. This is putrefaction, and they are always present in some form or other in fermenting liquids. Fermentation only occurs after the access of particles from the outer world, and it is asserted by the supporters of the germ theory that these particles are organisms or their spores, and that it is by the growth of these organisms in the fermentiscible material that it undergoes alteration. The essentials for the production of new forms are : a putrescible body, water, and air ; while heat, light, and electricity favor the process.

As Sir William Roberts says : "Without saprophytes there could be no putrefaction ; and without putrefaction the waste materials thrown off by the animal and vegetable kigndoms

could not be consumed. Instead of being broken up, as they are now, and restored to the earth and air in a fit state to nourish new generations of plants, they would remain as an intolerable incubus on the organic world. Plants would languish for want of nutriment, and animals would be hampered by their own excreta, and by the dead bodies of their mates and predecessors —in short, the circle of life would be wanting an essential link. A large proportion of our food is prepared by the agency of saprophytes. We are indebted to certain bacteria for our butter, cheese, and vinegar. Our daily bread is made with yeast, and to the yeast plant (discovered in 1836 by Cagniard de la Tour, and also independently by Schwann about the same time) we also owe our wine, beer, and spirituous liquors. As the generator of alcohol, this tiny cell plays a larger part in the life of civilized man than any other tree or plant."

Unfortunately for us, however, they have a powerful potency for evil also, and it is the noble aim of science to be able, by thorough study of the conditions under which that potency is acquired and exerted, to keep it under efficient control.

Much still remains to be determined with regard to the disease-producing possibilities of the germs that in invisible clouds drift in the atmosphere. The more delicate and exact methods of the most recent observers—Koch, Pasteur, Tyndall, Ehrlich, Ogsten, Sternberg, and others—with regard to their nature seem to show that there are many varieties of them, each of which has its own condition of growth, requiring or developing best in a particular soil. Different species multiplying in different media and varying in their susceptibility to different temperatures and to different chemical reagents. Apparent identity of form does not necessarily indicate identity of nature. They are not convertible into each other. Each species produces only itself, and is produced by itself alone, and when introduced into a substance that affords a favorable soil for its growth, always produces the same results. These results are not produced suddenly, but are of gradual development, progressing with the slow and steady multiplication of the organism. They may be cultivated artificially in either solid or liquid media.

It has been a widely disputed question as to whether bacteria ever occur in the animal in a perfectly healthy state ; the affirma-

tive view having been taken by Billroth and some others ; but it is denied by Koch, by Pasteur, and by Ehrlich, who state that they have never detected bacteria in the healthy animal. The failure of putrefactive bacteria, according to experiments, would go to show inability to struggle against the normal cells indigenous to the soil upon which they are planted. Some bacteria showed power of existence only in tissue in which vitality had entirely ceased, while others seemed to possess the power of existence in the presence of the animal cells when the latter suffered from impairment of nutrition, and the tide of life was turning against them. Abnormal composition of the blood seemed to favor the development of some bacteria, after they had found their way into the tissues.

The theory of a causal relation between bacteria and diseased processes has recently received a wide acceptation. In some diseases this relation is established, while in others it is presumed on the ground that bacteria are found in the blood and diseased products. As additional evidence in favor of special bacteria for different diseases, the fact is advanced that bacteria found in different diseases have been discovered to have different morphological and chemical properties ; to which may be added of still greater value, the different appearances presented by the colonies growing upon solid culture media.

Admitting this causal relation of bacteria to disease, it must be demonstrated by successive cultures of the bacteria found to exist in the diseased person, and by the induction of the same disease in man or healthy animals by inoculation, with a reproduction of bacteria. The first discovery of the association of a germ with disease was by Pollender, in 1849, who found certain rodlets in the blood of animals suffering with splenic fever, also variously known as anthrax, charbon, miltzbrand, malignant pustule, and wool-sorter's disease. The specific character of the parasite was afterwards pointed out by Davaine (1863), and subsequently carefully investigated and confirmed by Pasteur and Koch. The bacillus can be isolated and developed in proper cultivating media, and, when inoculated into some animals will produce splenic fever.

Again, in 1873, Obermeyer, of Berlin, discovered a bacterium in the blood of patients suffering from relapsing fever, which has

been named *Spirillum Obermeyeri.* It is found only during the febrile paroxysm, disappearing during the interval. So far, attempts at cultivation have proved unsuccessful.

In March, 1882, Koch, of Berlin, announced the discovery of the *Bacillus tuberculosis*, which he asserted to be the exciting cause of tuberculosis. His results have been confirmed by many observers, and the bacilli have been found in the tubercles and sputa of persons suffering from phthisis. As you all know, they reproduce themselves when cultivated under proper conditions, and cause tuberculosis when inoculated into animals.

The discovery of the parasitic origin of glanders followed closely upon that of the bacillus of tuberculosis. This was also made in Koch's laboratory by Prof. Schultz and Dr. Loeffler; and the results were verified by pure cultures and inoculation.

Birch-Hirschfeld has confirmed the discovery of the presence of a micro-organism of syphilis, already announced by Aufrecht, which consists of oval-shaped micrococci in chains.

In gonorrhœa a micrococcus was discovered by Neisser, isolated, cultivated, and, it is reported, successfully inoculated.

Bacteria have also been found in malaria and in whooping-cough. A micrococcus has also been found associated with croupous pneumonia, by Friedlander. This may occur singly, but it is generally found as a diplococcus.

Von Recklinghausen first described the bacteria of typhoid fever; and Klebs, in 1881, described a large bacillus, which he calls *B. typhosus*, in which spores are found in the centre, and often at the end. This is carried by the blood and lymphatics, and is found in all the organs. It is more generally believed, however, that the *causa morbi* is a peculiar short bacillus discovered by Eberth. This is rounded at both ends, and has spores. It is found in the ulcers, mesenteric glands, and spleen, and has been cultivated by Gaffky. The inoculation of animals has not been successful; but it must be remembered that they do not have the disease spontaneously.

The *Micrococcus vaccinia* is very small, and is found isolated or in pairs, and when cultivated forms chaplets. Cohn regards *M. vaccinia* and *M. variolæ* as different races of the same species, but Magnin thinks them identical. In small-pox, Chauveau (1868) first proved a particular non-diffusible active principle;

and Cohn (1872) first proved that the lymph contains numerous micrococci.

The comma bacillus of cholera (Koch, 1883) has of late attracted much attention. They are found chiefly in the excreta of cholera patients, are slightly curved like a comma or half of the letter U, and occur single or in pairs like the letter S ; when their growth is retarded they form a spiral chain of several members. They are easily cultivated on nutrient gelatine, forming a growth easily distinguished from others, even from those which are morphologically similar. After much experimentation Koch has succeeded in inoculating animals.

In scarlet-fever, Coze and Feltz have found micrococci in the blood, and inoculation of rabbits sometimes produced death.

In measles, Coze and Feltz found bacteria in the blood which were minute and mobile. The rabbits were not killed. Braidwood and Vacher caused children with measles to breathe through glass tubes coated with glycerine, and found sparkling bodies, something like those in vaccinia, but larger. These were most abundant during the second and third days. They also found them in the lungs and livers of two children who had died of the disease.

The individuals of the streptococci of erysipelas are smaller than the micrococci of cow-pock. Lukoinsky found them in masses in the lymphatics, on the border of the erysipelatous zone. Fehleisen also found and cultivated them. He inoculated the ears of nine rabbits, and produced the characteristic rash in from thirty-six to forty-eight hours ; the animals did not die. He also produced typical erysipelas, in from fifteen to sixty hours, in men who were inoculated to produce beneficial results in tumors. I have also cultivated them in liquid media.

Septicæmia and pyæmia have been carefully investigated by Koch ; and these diseases have been found due to bacteria, which he has cultivated and inoculated.

In diphtheria, micrococci are found in the membrane and in the surrounding lymphatics, blood, kidneys, and muscles. They are about the size of *M. vaccinia*, slightly oval, single or in pairs, and in colonies. Eberth showed the particulate character by filtration. Klebs claims to have produced diphtheria from inoculation of pure cultures, and to have found micrococci in the

tissues and blood. Nasiloff inoculated the cornea with enormous multiplication of micro-organisms in the lymphatics of the palate, bones and cartilages, and says that they are the primary step.

The question as to the origin of life has been much disputed, and the exponents of spontaneous generation and of the germ theory still continue the contest.

Extremists in the doctrine of evolution cannot sustain the hypothesis that the whole system of animal life is but a growth of one or more original species, changing into or evolving others through methods of development. The long ages of the past show the universality of the law of life, that like produces like.

Neither the agnostic nor the materialist can account for the origin of matter, much less can they account for the origin of mind. Naturalists tell us that while the animal and vegetable kingdoms are reducible to primordial cells ; that while there is a time when the embryos of species cannot be distinguished from each other by any essential features, yet the variety of structural forms, and the diversity of physiological functions which cells develop, are always according to the special type and construction of their parent cells ; evidencing a unity of plan in their construction and development.

1. The germ theory asserts that no life has been evolved (except in the remotest periods of the earth's history) other than from a living parent or a living germ.

2. The spontaneous-generation theory asserts that now, as of old, life does also spring *de novo* from molecular rearrangements of the atoms of dead organic matter.

No authority, except that of experimental work, can weigh a feather in a balance ; no *a-priori* reasoning can give the victory to either creed. The one condition is, to take dead matter, isolate it from all contact with life, place it under favorable conditions for development, and watch the result.

The first views founded on experiment and observation, apart from mere philosophical speculation, are those of Needham and Buffon, published in 1748. Needham's theory was that vitality is produced by a force setting particles in motion, which he calls *force végétatrice*. Needham was opposed by Spallanzani, in 1777, who repeated his experiments by methods so precise as to overthrow the convictions based on Needham's labors. Schultz made

an important advance by boiling his infusions and using pure air, and was followed by Schwann, Schroeder, and Von Dusch. In 1859, Pouchet, one of the most ardent supporters of spontaneous generation, published his work. He does not look on these organisms as originating from dead matter, though he believes that it is the contact of different bodies which gives rise to the development of proto-organisms. Yet their origin is not due to affinity alone ; vital force must also come into play, which owes its power to certain unknown concomitant circumstances. The essentials for the production of the new forms are, a putrescible body, water, and air, while heat, light, and electricity favor the process. His experiments were performed very loosely, and are subject to many errors.

Appearing shortly after Pouchet's work, and leading to diametrically opposite conclusions, were the researches of M. Pasteur, who begins by attempting to demonstrate the existence of spores in the atmosphere. The greatest blow was given to the views of the heterogenists when Pasteur demonstrated that albuminoid materials are not necessary for the development of bacteria and fungi, but that they can be replaced by crystalline salts, such as phosphates and the salts of ammonia.

The experiments of Prof. Jeffreys Wyman have been largely quoted by the supporters of heterogenesis as proving their view, though Wyman himself expressed no such opinion, having approached the subject with a perfectly unbiased mind. To Prof. Wyman is ascribed great credit by Cheyne, whose results agree with his own.

Dr. Bastian (1872) gives up the theory that organic molecules are derived from previously living molecules, and attempts to demonstrate that vital force and living matter may arise *de novo* under the action of the ordinary physical forces—heat, light, and electricity. This change of front on the part of the heterogenists is clearly brought about by the overwhelming evidence produced against Pouchet's views, and more especially by Pasteur's success in cultivating organisms from dust in fluids containing no organic matter.

The limitation of cases of spontaneous generation which has been gradually taking place is very instructive. Beginning with the higher animals, it became more limited, frogs, flies, etc., being

by degrees excluded, till now it is only in the case of the lowest forms of life that the doctrine is asserted, and even then only in certain cases.

Not long since the people of Boston were invited to listen to a series of lectures which continues the discussion of the much disputed question of the origin of life. The lecturer, although announcing himself as a decided opponent of the germ theory, could not agree with the spontaneo-generationists, and offered views somewhat peculiar to himself. His objective point was the so-called "*ambient organic matter*," of which he could give no definition ; but in a long series of illustrations of what he meant, he showed it to be synonymous with the *bioplasm* of Dr. Lionel Beale. The term bioplasm, as Dr. Beale says, involves no theory as regards the nature or origin of the matter. It simply distinguishes it as *living*, *e. g.*, a living white blood corpuscle is a mass of bioplasm, or it might have been termed a *bioplast ;* a very minute living particle is a bioplast, and we may speak of living matter as bioplasmic substance. It is bioplasm, or ambient organic matter, according to the new view, that is at the bottom of all the functions of life, it having, to a certain extent, a low degree of inherent vitality ; and the results of the various experiments that have been performed are due to the ambient organic matter, which has never yet been separated, it was urged, from the germs.

It was argued that the germ theorists can prove nothing till they can isolate an organism on a needle-point and use it for inoculation, after thoroughly washing and drying. Floating dust of the air, he added, is not germs, but ambient organic matter. He also expressed a desire to introduce some ambient organic living matter into the infusions and see what it would do.

PROOF OF THE RELATION OF MICROBES TO DISEASE CONSIDERED.

In. Dr. Nelson's paper, read before the American Academy of Medicine, it is assumed that the relation of microbes to disease must be demonstrated by successive cultures. This view was supported by Dr. Vaughan at a meeting of the

American Medical Association, held at Newport last year, who formulated it thus: "That before we admit that a certain micro-organism is the cause of a disease, we must isolate from cultures of this organism chemical products which are capable, by inoculation or feeding, of producing the symptoms of the disease."

In a discussion, Dr. W. H. Welch, of Baltimore, dissented from that view.

He thought that, while it is an important addition to our knowledge of a disease to become acquainted with such chemical products, yet this is not essential to a belief in the causative agency of a specific organism. If Dr. Vaughan's condition be accepted as an essential link in the chain in proof, then we have no sufficient evidence that many recognized infectious organisms, such as the spirillum of relapsing fever, the bacillus of leprosy, or even the tubercle bacillus are the causes of their respective diseases. From our present knowledge we are justified in believing that a micro-organism which is invariably associated with a disease, which is found in the lesions of a disease, and in situations which explain the symptoms and lesions, and which is never found except in association with the disease, must be regarded as the cause of the disease. Where, in addition to this, we are able by experiments on animals to reproduce the disease by inoculation of pure culture, this additional proof is most welcome. But in many infectious diseases we cannot furnish this last method of proof, either because we have not been able to isolate and cultivate the suspected organism, as is the case with relapsing fever, or because animals available for experiment are not susceptible to the disease, as seems to be true of typhoid fever and cholera. For this reason Koch has stated that it is not absolutely necessary that we reproduce the disease experimentally in animals by inoculation before we admit that a given organism found associated with a disease under the conditions stated is the specific cause of the disease. The evidence Dr. Welch believed to be conclusive, that the typhoid bacillus is the specific cause of typhoid fever.

Dr. Vaughan criticised the remarks of Dr. Welch as an affirmation that the first of Koch's rules is all that is necessary in order to prove that a given germ is the cause of a disease; in other words, because Eberth's germ is found in every case of typhoid

fever it must be the cause of that disease. He did not think that all the failures to induce the disease by inoculation with this germ are of any significance as to its cause. "When Koch first promulgated his four rules, and pronounced that they must be complied with before the causal relation of a germ to a disease should be considered as demonstrated, the scientific accuracy of such a demonstration won the confidence of the medical world. Now Professor Welch says that three of these four rules are unnecessary. He claims that the presence of the Eberth germ in the altered tissue of typhoid fever is a proof that these germs cause typhoid fever. How does he know that the presence of the germ is the cause and not the result of the disease? He reaches this conclusion by reasoning from analogy. This kind of reasoning may have its value, but it is not scientific. Suppose that an inhabitant of some far-off planet should, by means of optical instruments, be able to discern the inhabitants of a certain portion of the globe. Suppose that the portion of the globe which should fall under his observation to be the frigid zone. Here he would find the inhabitants living in houses built of snow and ice, and, reasoning by analogy, he might conclude that all the inhabitants of the earth live in houses of that kind. The reasoning of Professor Welch is just as unscientific as that in the supposed case of the planetary observer. Condensed, his reasoning would be about as follows: (1) The bacillus of consumption is found in every case of consumption, and the Eberth germ is found in every case of typhoid fever. (2) The bacillus of tuberculosis has been demonstrated to be the cause of consumption. (3) Therefore the Eberth germ is the cause of typhoid fever."

This is interesting as showing differences of opinion among careful observers and physicians of recognized authority in their profession, but the rules laid down by Dr. Vaughan are those most generally accepted. They are more precise in affording the proof which reason and science alike demand.

DISEASE MICROBES EVERYWHERE.

In a recent number of the *Medical News* Dr. William H. Welch gave a brief but interesting summary of the prevalent knowlege of microbes in the medical profession. He said:

No department of medicine has been cultivated in recent years with such zeal and with such fruitful results as that relating to the causes of infectious diseases. The most important of these results for preventive medicine, and for the welfare of mankind, is the knowledge that a large proportion of the causes of sickness and death are removable.

While nothing should be said or need be said to lessen the importance of cleanliness for public health, it is important to bear in mind that hygienic cleanliness and æsthetic cleanliness are not identical. In water which meets the most severe chemical tests of purity, typhoid bacilli have been found. On the other hand, the air in the Berlin sewers, which certainly do not meet the most modest demands for æsthetic cleanliness, has been found to be nearly or quite free from bacteria.

It has always been recognized that some infectious diseases, such as the exanthematous fevers, are conveyed directly from the sick to the healthy. It is not disputed that in these evidently contagious diseases the infectious germ is discharged from the body in a state capable at once of giving rise to infection.

In a second group of infectious diseases, of which malaria is the type, the infected individual neither transmits the disease to another person, nor, so far as we know, is capable of infecting a locality. Here there is reason to believe that the infectious germ is not thrown off in a living state from the body, but is destroyed within the body. In this group the origin of infection under natural conditions is always outside of the body.

In a third group there is still dispute whether the disease can be transmitted directly from person to person, but all are agreed that the infected individual can infect a locality. It is especially fortunate that the bacteria which cause cholera and typhoid fever, the two most important representatives of this group of so-called miasmatic-contagious diseases, have been discovered and isolated in pure culture. These are the diseases about whose origin and epidemic extension there has been the greatest controversy. They, above all other diseases, have given the impulse to public sanitation during the last half century. The degree of success with which their extension in a community is prevented is an important gauge of the excellence of the local sanitary arrangements. A clear comprehension of the origin and spread

of these diseases signifies the solution of many of the most vexed and important problems of epidemiology and of State hygiene.

It is universally admitted that many infectious agents may be transported by the air, but the extent of danger from this source has often been exaggerated. It is a popular error to suppose that most of the minute particles of dust in the air either are or contain living organisms. The methods for determining the number and kind of bacteria and fungi in the air are now fairly satisfactory, although by no means perfect. These have shown that while the number of living bacteria and fungi in the atmosphere in and around human habitations cannot be considered small, still it is greatly inferior to that in the ground or in most waters. Unlike fungus spores, bacteria do not seem to occur to any extent in the air as single detached particles, which would then necessarily be extremely minute, but rather in clumps or attached to particles of dust of relatively large size. As a result, in a perfectly quiet atmosphere these comparatively heavy particles which contain bacteria rapidly settle to the ground or upon underlying objects, and are easily filtered out by passing the air through porous substances, such as cotton-wool or sand. Rain washes down a large number of bacteria from the air.

That the air bacteria are derived from the ground, or objects upon it, is shown by their total absence, as a rule, from sea air at a distance from land, this distance varying with the direction and strength of the wind.

A fact of capital importance in understanding the relations of bacteria to the air, and one of great significance for preventive medicine, is the impossibility of currents of air detaching bacteria from moist surfaces. Substances containing pathogenic bacteria as, for instance, sputum containing tubercle bacilli or excreta holding typhoid bacilli, cannot, therefore, infect the air unless these substances first become dry and converted into a fine powder. We are able to understand why the expired breath is free from bacteria and cannot convey infection, except as little particles may be mechanically detached by acts of coughing, sneezing, or hawking. Those bacteria, the vitality of which is rapidly destroyed by complete desiccation, such as those of Asiatic cholera, evidently are not likely to be transported as infectious agents by the air, if we except such occasional occurrences as their conveyance for a short distance in spray.

The only pathogenic bacteria which hitherto have been found in the air are the pus organisms, including the streptococcus found by Prudden in a series of cases of diphtheria and tubercle bacilli; but no far-reaching conclusions can be drawn from the failure to find other infectious organisms when we consider the imperfection of our methods and the small number of observations directed to this point. The evidence in other ways is conclusive that many infectious agents—and here the malarial germ should be prominently mentioned—can be and often are conveyed by the air. While we are inclined to restrict within narrower limits than has been customary the danger of infection through the air, we must recognize that this still remains an important source of infection for many diseases. All those, however, who have worked practically with the cultivation of micro-organisms have come to regard contact with infected substances as more dangerous than exposure to the air, and the same lesson may be learned from the methods which modern surgeons have found best adapted to prevent the infection of wounds with the cosmopolitan bacteria which cause suppuration.

We are not, of course to suppose that infectious germs floating in the form of dust in the atmosphere are dangerous only from the possibility of our drawing them in with the breath. Such germs may be deposited on substances with which we readily come into contact, or they may fall on articles of food where they may find conditions suitable for their reproduction, which cannot occur when they are suspended in the air in consequence of the lack of moisture.

Let us pass from the consideration of the air as a carrier of infection to another important source of infection—namely, the ground. The ground, unlike the air, is the resting- or the breeding-place of a vast number of species of micro-organisms, including some which are pathogenic. Instead of a few bacteria or fungi in a litre as with the air, we find in most specimens of earth thousands, and often hundreds of thousands, of micro-organisms in a cubic centimetre. Fränkel found the virgin soil almost as rich in bacteria and fungi as that around human habitations.

We have but meagre information as to the kinds of bacteria present in the ground in comparison with their vast number. Many of those which have been isolated and studied in pure cul-

ture possess but little interest for us so far as we know. To some of the micro-organisms in the soil appears to be assigned the rôle of reducing or of oxidizing highly organized substances to the simple forms required for the nutrition of plants. We are in the habit of considering so much of the injurious bacteria that it is pleasant to contemplate this beneficent function so essential to the preservation of life on this globe.

Among the pathogenic bacteria which have their natural home in the soil, the most widely distributed are the bacilli of malignant œdema and those of tetanus. I have found some garden earth in Baltimore extremely rich in tetanus bacilli, so that the inoculation of animals in the laboratory with small bits of this earth rarely fails to produce tetanus. In infected localities the anthrax bacillus and in two instances the typhoid bacillus, so far as it was possible to identify it, have been discovered in the earth. There is reason to believe that other germs infectious to human beings may have their abiding-place in the ground; certainly no one doubts that the malarial germ lives there.

Of great interest to physicians is the behavior of typhoid and of cholera bacteria in the ground. As has already been intimated, the ground is regarded by Pettenkofer and his school as the principal breeding-place of these micro-organisms outside of the body. This view, however, is not supported by bacteriological investigations. Inasmuch as the cholera and the typhoid bacilli may multiply on various vegetable substrata and substances derived from animals, at temperatures often present in the ground, it is evident that here and there conditions may be present for their growth in the ground, but this growth is likely to be soon interrupted by the invasion of ordinary saprophytic organisms and other harmful influences. The typhoid bacilli are more hardy in resisting these invaders than are the cholera bacteria, which easily succumb, but even for the former, so far as our present knowledge extends, the ground can rarely serve as a favorable breeding-place. It is not, however, necessary that these organisms should multiply in order to infect for a considerable time the ground; it is sufficient if their vitality is preserved. As to this latter point, the reports of different investigators are not altogether concordant. Such excellent observers as Koch, Kitasato, and Uffelman found that the cholera bacteria when added to fæces, or a mixture

of fæces and urine, rapidly diminished in number, and at the end of three or four days at the most, had wholly disappeared. In a mixture of the intestinal contents from a cholera corpse with earth and water, Koch found numerous cholera bacteria at the end of three days, but none at the end of five days. On the other hand, Gruber reports the detection of cholera bacteria in cholera dejecta fifteen days old. The weight of bacteriological evidence, therefore, is opposed to the supposition that the bacteria of Asiatic cholera preserve their vitality for any considerable time in the ground or in the excreta.

With respect to the bacilli which cause typhoid fever, it has been shown by Uffelman that these may live in fæces, mixture of fæces and urine, and mixture of garden earth, fæces, and urine for at least four and five months, and doubtless longer, although they may die at the end of a shorter period. He also finds that, under these apparently unfavorable conditions, some multiplication of the bacilli may occur, although not to any considerable extent. Grancher and Deschamps found that typhoid bacilli may live in the soil for at least five months and a half. Unlike the cholera bacteria, therefore, the typhoid bacilli may exist for months in the ground, and in fæcal matter holding their own against the growth of multitudes of saprophytes. This difference in the behavior of cholera and typhoid germs is in harmony with clinical experience.

Manifold are the ways in which we may be brought into contact with infectious bacteria in the ground, either directly or indirectly by means of vegetables to which particles of earth are attached, by the intervention of domestic animals, by the medium of flies or other insects, and in a variety of other ways more or less apparent.

An important, doubtless for some diseases the most important, medium of transportation of bacteria from an infected soil is the water which we drink or use for domestic purposes. It is not the subsoil water which is dangerous, for infectious like other bacteria cannot generally reach this in a living state, but the danger is from the surface water and from that which trickles through the upper layers of the ground, as well as from that which escapes from defective drains, cesspools, privy vaults, and wrongly constructed sewers, or improper disposal of sewage.

In view of the facts presented, there is no sufficient reason, from a bacteriological point of view, of rejecting the transmissibility of typhoid fever and cholera by the medium of the drinking water. This conclusion seems irrisistible when we call to mind that Koch once found the cholera bacteria in large numbers in the water of a tank in India, and that the typhoid bacilli have been repeatedly found in drinking-water of localities where typhoid fever existed. Nor do I see how it was possible to interpret certain epidemiological facts in any other way than by assuming that these diseases can be contracted from infected drinking-water, although I know that there are still high authorities who obstinately refuse to accept this interpretation of the facts.

Pathogenic bacteria may preserve their vitality longer in ice than in unsterilized drinking-water. Thus Prudden found typhoid bacilli alive in ice after 103 days.

Among the various agencies by which infectious organisms may gain access to the food may be mentioned the deposition of dust conveyed by the air, earth adhering to vegetables, water used in mixing with or in the preparation of food, in cleansing of dishes, cloths, etc., and contact in manifold other ways with infected substances.

Fortunately a very large part of our food is sterilized in the process of cooking shortly before it is partaken, so that the danger of infection from this source is greatly diminished and comes into consideration only for uncooked or partly cooked food and for food which, although it may have been thoroughly sterilized by heat, is allowed to stand considerable time before it is used. Milk, in consequence of its extensive employment in an unsterilized state and of the excellent nutritive conditions which it presents to many pathogenic bacteria, should be emphasized as especially liable to convey certain kinds of infection—a fact supported not less by bacteriological than by clinical observations. Hesse found that also a large number of ordinary articles of food prepared in the kitchen in the usual way for the table and then sterilized afford a good medium for the growth and preservation of typhoid and cholera bacteria, frequently without appreciable change in the appearance of the food.

Upon solid articles of food bacteria may multiply in separate colonies, so that it may readily happen that only one or two of

those who partake of the food eat the infected part, whereas with infected liquids, such as milk, the infection is more likely to be transmitted to a larger number of those who are exposed.

In another important particular the food differs from the other sources of infection which we have considered. Not only the growth of infectious bacteria, but also that of bacteria incapable of multiplication within the body, may give rise in milk and other kinds of food to various ptomaines, products of fermentation, and other injurious substances which, when ingested, are likely to cause more or less severe intoxication or to render the alimentary tract more susceptible to the invasion and multiplication of infectious organisms.

It is plain that the liability of infection from food will vary, according to locality and season. In some places and among some races the proportion of uncooked food used is much greater than in other places and among other races. In general, in summer and in autumn the quantity of fruit and food ingested in the raw state is greater than at other seasons, and during the summer and autumn there is also greater danger from the transportation of disease germs from the ground in the form of dust, and the amount of liquids imbibed is greater. The elements of predisposition, according to place and time, upon which epidemiologists are so fond of laying stress, are not, therefore, absent from the source of infection now under consideration.

I have thus far spoken only of the secondary infection of food by pathogenic micro-organisms, but, as is well known, the substances used for food may be primarily infected.

Chief in importance in this latter category are the various entozoa and other parasites which infest animals slaughtered for food. The dangers to mankind resulting from the diseases of animals form a separate theme which would require more time and space than this address affords for their proper consideration. I shall content myself on this occasion with only a brief reference to the infection from the milk and flesh of tuberculous cattle.

It has been abundantly demonstrated by numerous experiments that the milk from tuberculous cows is capable, when ingested, of causing tuberculosis. The milk may be infectious not only in cases in which the udder is tuberculous, but also when the tuberculous process is localized elsewhere. How serious is the danger

may be seen from the statistics of Bollinger, who found with cows affected with extensive tuberculosis the milk infectious in eighty per cent. of the cases, in cows with moderate tuberculosis the milk infectious in sixty-six per cent. of the cases, and in cows with slight tuberculosis the milk infectious in thirty-three per cent. of the cases. Dilution of the infected milk with other milk or with water diminished, or in sufficient degree it removed, the dangers of infection. There is reason to believe that many of the so-called scrofulous affections in children are due to infection from milk derived from tuberculous cows. Probably for adults the danger of acquiring tuberculosis from the use of infected milk is relatively small. Bollinger estimates that at least five per cent. of the cows are tuberculous. From statistics furnished me by Mr. A. W. Clement. V. S., it appears that the number of tuberculous cows in Baltimore which are slaughtered is not less than three to four per cent. Among some breeds of cows tuberculosis is known to be much more prevalent than this.

There is no evidence that the meat of tuberculous cattle contains tubercle bacilli in sufficient number to convey infection, unless it be very exceptionally. Nevertheless, one will not willingly consume meat from an animal known to be tuberculous. This instinctive repugnance, as well as the possibility of post-mortem infection of the meat in dressing the animal, seem good grounds for discarding such meat. The question, however, as to the rejection of meat of tuberculous animals has important economic bearings, and has not been satisfactorily settled. As to the propriety of the rejection of the milk from such animals, a matter, however, not easily controlled, there can be no difference of opinion.

The practical measures to adopt in order to avoid infection from the food are for the most part sufficiently obvious. Still, it is not to be expected that every possibility of infection from this source will be avoided. The pleasure of living would be destroyed if one had his mind constantly upon escaping possible dangers of infection. It is difficult to discuss the matters considered in this address without seeming to pose as an alarmist. But it is the superficial and half knowledge of these subjects which is most likely to exaggerate the dangers and awaken unreasonable fears. While one will not, under ordinary circum-

stances, refrain from eating raw fruit or food which is palatable, although it may not have been thoroughly sterilized by heat, or from using the natural water unboiled, in the fear that he may swallow typhoid or cholera bacteria, still in a locality infected with typhoid fever or cholera he will, if wise, not allow himself the same freedom in these respects. Cow's milk, unless its source can be carefully controlled, when used as an habitual article of diet, as with infants, should be boiled, or the mixed milk of a number of cows should be selected; but this latter precaution offers less protection than the former.

In most places in this country we are sadly lacking in good sanitary inspection of the food, especially of the animal food offered for sale. One cannot visit the admirable slaughter house in Berlin or that in Munich, and doubtless similar ones are to be found elsewhere, and watch the intelligent and skilled inspection of the slaughtered animals without being impressed with our deficiency in this respect. In large cities an essential condition for the efficient sanitary inspection of animal food is that there should be only a few places, and preferably only one place, where animals are permitted to be slaughtered. Well-trained veterinarians should be selected for much of the work of inspection.

DISINFECTION.

The following valuable paper was read last year by Dr. H. Franklin Parsons before the British Medical Association at Leeds. It is deserving very careful attention.

By disinfection I mean the destruction of infection—the destroying of the activity of that matter which, produced by a sick person and received into the system of a healthy one, has the power of causing in the latter a disease similar to that from which the former was suffering. In popular language the word disinfection is used to include the use of substances ("deodorants") which destroy offensive odors, and "antiseptics" which prevent or retard putrefaction, but I shall employ it in its strict etymological sense.

What, then, is the nature of this infective matter which in the interests of the public health we seek to destroy? It is known that it is organic matter, and particulate—that is, solid, not liquid

nor gaseous—matter, although the fine colorless particles of which it is composed may be freely suspended in both water and air. There is reason also to believe that it is in all cases living matter, and consists of microscopic vegetable organisms. The analogy between the life history of infectious fevers and that of the yeast plant in a saccharine solution long ago suggested to Liebig this view —a view embodied in the term "zymotic," often applied to such diseases. Modern research has shown that certain diseases in men and animals are undoubtedly caused by the presence in the system of micro-organisms, and are communicable by the inoculation of such organisms. Among these I may mention two acute febrile diseases—namely, anthrax and relapsing fever ; acute suppuration and various forms of septicæma ; the chronic diseases, tuberculosis and leprosy ; also fowl cholera and infectious pneumo-enteritis of the pig,—"swine fever." The last-named disease has an interesting resemblance to the common human infectious disorders, in that the contagium may be transmitted through the air, and attaches itself to places in which the affected animals are kept. In other diseases, as Asiatic cholera, scarlatina, diphtheria, and enteric fever, certain micro-organisms have been found and have been looked upon with more or less probability as the cause of the disease ; but the connection is not, perhaps, as yet completely established, mainly owing to the difficulty of testing it by the results of inoculations on animals. In other infectious diseases, again, as small-pox, measles, and whooping-cough, no such organisms have, I believe, as yet been identified, but we may probably, for our present purpose, without much risk of error, assume the materies morbi in these also to be a living organism. This assumption furnishes us with a practical means of testing the efficacy of the agents we employ to destroy infection. It is in most cases not practicable to test directly the effect of our disinfecting agents upon the contagia of the ordinary infectious diseases of mankind, for the reason that we cannot make the necessary experiments (including control experiments with undisinfected portions of material) upon human beings ; and these diseases cannot, or cannot with certainty, be produced by inoculation in the lower animals. If, however, we choose the most refractory organism, pathogenic to animals, that we can find, and ascertain how it may be killed, we shall be tol-

erably safe in assuming that the same means will kill the contagia of the infectious diseases of mankind, with which as sanitarians we have to do. Now certain of the pathogenic micro-organisms, bacilli, have the property of forming spores, and these spores are found to be more resistant than the fully developed organism, just as a grain of wheat will survive treatment, such as drying and dipping in poisonous solutions, which would kill a growing wheat plant. Of the pathogenic microbes, the most convenient for the purpose of testing disinfecting agents, is the bacillus anthracis ; it forms, under certain circumstances, spores which are exceedingly tenacious of life ; it can be cultivated, and is easily recognized both by its microscopic character and its appearance when growing ; and, if inoculated into animals, it produces in them with certainty the disease known as anthrax. None of the ordinary infectious diseases of mankind are known to be caused by spore-bearing microbes (though it is possible that small-pox, the contagium of which is very tenacious of life, may turn out to be so) ; and so far as our present knowledge and experience go, we may assume that means which will destroy the spores of the bacillus anthracis may be relied on as efficacious for our purpose, though it does not follow that agents which do not destroy the bacillus anthracis are, therefore, useless against the less-resisting contagia of other diseases.

An extensive and important series of researches upon the efficacy of disinfectants, conducted by Koch and his coadjutors for the German Imperial Board of Health, is in large part the foundation of our modern knowledge on the subject, though his results have been confirmed and extended by other workers, as Dr. Klein in this country, and a committee of the American Medical Association in the United States. Koch employed both spore-bearing and non-spore-bearing organisms of several kinds. Threads steeped in cultures of these were exposed to the action of disinfectants and tested by cultivation or by inoculation on animals. The general result of the experiments with chemical agents was to show the comparative or entire inertness as germicides of many of the substances commonly considered disinfectants. Carbolic acid was found to have a powerful restraining effect upon the growth of bacteria, but was much less efficacious in destroying their vitality. To kill spore-bearing forms it was

necessary to steep them for one or two days in a five per cent. watery solution ; a two per cent. solution only killed them at the end of a week ; while a one per cent. solution did not kill them in fifteen days. Solutions of carbolic acid in alcohol or oil had not the smallest disinfecting effect ; five per cent solutions did not kill spore-bearing bacilli however long they were exposed to their action. Vapor of carbolic acid at ordinary temperatures had no destructive effect on spore-bearing bacilli, though some effect was produced at elevated temperatures. In other cases also it was found that the disinfecting effect of substances in the form of vapor was increased by elevation of temperature ; thus spores of bacilli in garden earth were killed in two hours by exposure at a temperature of 176° F. to the vapor of bisulphide of carbon, although neither a temperature of 176° in dry air nor the vapor of bisulphide of carbon in equal concentration at ordinary temperatures had any destructive action at all on them.

Sulphurous acid gas was found efficacious for the destruction of non-spore-bearing organisms. Exposure to 1 part in 100 of air killed micrococci, if dry, in twenty minutes ; if moist, in one minute. Spore-bearing forms, however, were not killed, even after four days' exposure to a 6 per cent. gaseous mixture of sulphurous acid in air. Chloride of zinc had no disinfecting effect ; spores of anthrax bacillus, which had remained for a month in a 5 per cent. solution, were in no way affected. Absolute alcohol, glycerin, chloroform, sulphates of copper, zinc, alumina, and iron (5 per cent. watery solutions), and boracic acid (5 per cent.) were not found to have any destructive effect on the spores of bacillus anthracis. These spores were, however, destroyed by exposure for one day to the action in watery solution of either of the following substances, namely : chlorine, bromine (2 per cent.), iodine, corrosive sublimate (1 per cent.), permanganate of potassium (5 per cent.), and osmic acid (1 per cent.) They were also destroyed after longer periods by the following substances, namely : ether, oil of turpentine, hydrochloric acid, chloride of iron (5 per cent.), arsenious acid (1 per cent.), chloride of lime (5 per cent.), and quinine (1 per cent.).

Experimenting with heat in the dry form, Koch found that bacteria, free from spores, could not withstand an exposure of an hour and a half to a temperature of a little over 212° F. in hot air,

but that spores of bacilli were only destroyed by remaining three hours in hot air at 284°. He also found that in hot air the temperature penetrated so slowly that, after three or four hours' heating at 284°, articles such as small bundles of clothes and pillows were not disinfected, and that by heat of this degree and duration most textile materials were more or less injured. The results with steam were strikingly superior. It was found that an exposure of five minutes to steam at 212° was sufficient to kill the spores of the bacillus anthracis, and that the penetration of heat into articles exposed to steam took place far more rapidly than into the same articles exposed to hot air.

A series of experiments made by Dr. Kline and myself on disinfection by heat, confirm, on the whole, the results of Koch. The materials experimented with were spore-bearing cultures of anthrax bacillus, anthrax blood free from spores, bacilli of swine fever, and tuberculous pus ; and the results were tested by inoculation on animals. Our results were more favorable to the efficacy of dry heat than those of Koch. We found that spores of bacillus anthracis were killed by exposure for four hours to a temperature between 212° and 216° F., or for one hour to 245°. Non-spore-bearing bacilli were rendered inert by one hour's exposure to 212° to 218°. Anthrax spores were killed by boiling for one minute in water, or by exposure for more than five minutes to steam at 212°. We also found steam heat to penetrate far more rapidly than dry heat. Similar results have been obtained by other observers, so that the superiority of steam over hot air as a disinfectant may be looked upon as thoroughly established. With a view to ascertain whether the advantages of steam could be obtained while avoiding certain inconveniences in its use, we made some experiments with hot moist air, but the result was that, while the moistening of the air aided the penetration of heat, it did not, up to the point of one third saturation, render it more effectual in killing bacilli than dry air.

Burning, of course, is a very thorough means of disinfection.

It is characteristic of the class of infectious diseases that the morbid poison which produces any such disease multiplies in the body of the patient, and is given off again from it, and that it continues thus to propagate itself for a considerable period—often for several weeks. The poison is believed to be especially given

off from the part of the body upon which its local effects are manifested, as from the skin in small-pox; from the skin and throat, and perhaps the kidneys, in scarlet fever; in discharges from the throat and nostrils in diphtheria; and from the bowels in enteric fever and cholera. There is reason to think, also, that the contagia—of some at least of these diseases—can multiply in suitable media outside the body, as in milk, sewage, soiled linen, or moist sewage-contaminated soil; perhaps, also, even in potable water. On the other hand, some of the pathogenic organisms are found to perish as putrefaction advances, either through the formation by them of chemical compounds antagonistic to their own life, or through the competition of the ordinary putrefactive forms, just as in a neglected garden the exotic flowers are choked or stifled by the ranker growth of the indigenous weeds.

Contagia are not as a rule permanently destroyed by cold, though that of yellow fever is so. They also in general are able to survive drying, though Koch states that drying is fatal to the comma bacillus which he finds in Asiatic cholera.

The matters which may act as carriers of infection, and may thus require disinfection, are: 1. The body of the patient, living or dead. 2. The discharges given off from the body of the patient, and more particularly those from the organs specially affected by the disease—for example the exfoliating scarf skin in small-pox and scarlet fever; the discharges from the throat and nostrils in scarlet fever and diphtheria, and those from the bowels in enteric fever and cholera. 3. The air tainted with exhalations from the sick, the poison probably existing therein in the form of suspended particles. 4. The clothes, bedding, and other articles used by the sick. 5. Articles of food, as milk and water. 6. Walls, floors, etc., of dwellings occupied by the sick, especially dust and dirt lodging upon the walls, and dirt accumulating in the cracks of the floor. 7. Collections of filth, as sewage, especially in a stagnant state or deposited in or encrusting the sides of foul drains; foul ground surfaces, and subsoil.

The processes of disinfection applicable to the living body, such as baths, inunctions, lotions, and dressings, come within the province of curative medicine and surgery rather than that of public health.

For the prevention of the spread of infection from the corpses

of persons who have died of infectious diseases, the means usually employed are enclosure in a more or less air-tight coffin with chloride of lime or charcoal, and early burial, and I do not think that any thing more is necessary. I have never found any reason to think that a body lying undisturbed, surrounded by plenty of earth of a suitable nature, is a danger to the public health. The advocates of cremation refer to the observations of Pasteur that cattle grazing in a field in which the bodies of others that have died of anthrax have been buried have contracted the disease; and that the spores of the bacillus anthracis are found in the superficial mould over the graves, being brought to the surface by earth-worms; but, as I have mentioned, the spores of the anthrax bacillus are exceptionally tenacious of life.

It is not of much use attempting to disinfect the infected air of sick-rooms by chemical means, for active chemicals, if present in sufficient quantity to be effective as disinfectants, would render the air irrespirable. It is easier to get rid of it, and let its place be taken by fresh air. The contagia of most infectious diseases appear to be destroyed when freely diluted with fresh air. The poison of typhus fever is notably so, but that of small-pox does not appear to be, as Mr. Power has shown that small-pox may be disseminated through the air for considerable distances around a hospital in which many cases of that disease are under treatment. To avoid this it has been proposed that instead of ventilating small-pox wards into the open air, the air from them should be extracted through a flue and burnt in a furnace; or I might suggest that a steam-blast might be used to extract the air and disinfect it at the same time. A recent invention for ventilating sewers uses a circle of gas burners for creating an up current of air, and passes the extracted air through the flames with a view to disinfect it. The offensive, and possibly infected, vapors from refuse-destructors and the caldrons used in bone-boiling and similar trades are best destroyed by passing them through a furnace.

For the disinfection of the discharges of the sick, chemical agents must, as a rule, be used, though the discharges from the throat and nostrils in diphtheria and scarlatina are best received upon pieces of rag and burnt. It is of prime importance that infectious discharges should be disinfected immediately on being

passed from the body, both because delay will give them more opportunity of causing mischief, and also because if the infected matter be mixed with a large quantity of other organic matters, as in a drain or privy, before the disinfectant is applied, the action of the latter will have to be exerted on a greater mass of material, and its effect will be *pro tanto* weakened; and the chances will also be great that portions of the infective material will escape its action. It is thought by some that germs of enteric fever, for instance, may long lurk unsuspected in defective drains and privies until some accidental circumstance, such as disturbance of the contents, brings them into activity, and that many of the "sporadic" cases of this disease thus arise.

Of chemical disinfectants for the disinfection of excreta, corrosive sublimate is probably the most trustworthy and suitable for ordinary use. In its use, however, three precautions have to be borne in mind. 1. It is very poisonous, and hence, in order to avoid accidents (such as frequently occur with carbolic acid), the solution should be colored, as with permanganate of potassium, sulphate of copper, or aniline blue. 2. It corrodes iron and other common metals and is instantly decomposed by contact with them, hence it must be used in non-metallic vessels. 3. It forms with albumen an inert insoluble compound, but this may be prevented by acidulating the solution. A solution suitable for disinfection of excreta, clothing, etc., is made by dissolving ½ ounce of corrosive sublimate with 1 ounce of hydrochloric acid and 5 grains of aniline blue in 3 gallons of water.

Chloride of lime is a useful disinfectant for excreta, but too strong a solution injures clothing. Carbolic acid is especially an antiseptic, retarding putrefaction, for example, in sewage, but a 5 per cent. solution is recommended by Koch by preference for disinfecting excreta and soiled linen of cholera patients. Creolin, a substance allied to carbolic acid, is said by recent experimenters to exceed it in destructive action upon spores of bacilli, at the same time that it is not poisonous to human beings. Permanganate of potassium is an excellent deodorant, and has the advantage of not being poisonous. It is also, to some extent, a true disinfectant, but its action upon infective matter is much weakened when this is mixed with a quantity of

other organic matter. Green copperas (ferrous sulphate) is a cheap deodorant, but, according to Koch, is not a disinfectant proper. Its habitual use for flushing sewers in time of cholera was strongly recommended by Dr. Budd, and was said at Bristol to have produced excellent results.

With regard to the disinfection of clothing, bedding, etc., used by the sick, it may, in the first place, be pointed out, that for such articles as will stand it boiling in water for, say, five minutes is an effectual means of disinfection. And, since the infectious matters are not actually incorporated with the fibres of the fabric, but merely attached as dirt to their outside, there is reason to think that even a thorough ordinary washing will be a sufficient disinfection, so far as the articles themselves are concerned; but the infectious properties are transferred to the water in which they have been washed. The dangerous properties of such water are shown by the frequency with which cholera is contracted by those who wash the linen of cholera patients, and by cases like that at Mosely, recorded by Dr. Ballard, where an outbreak of enteric fever ocurred among the persons drinking the water from a well into which had percolated the soapsuds in which the soiled linen of an enteric fever patient had been washed. To avoid such risks it is necessary that infected articles which are washable should be disinfected before being washed. This should, for obvious reasons, be done immediately on their being left off. Boiling might be used for this purpose, but boiling water in sufficient quantity is not always at hand; and again, if soiled clothes are boiled, the coagulation of albuminous matters fixes stains in them and spoils their color. Hence it is more convenient to put the clothes to steep in some chemical disinfecting solution, of which a panful should be kept in readiness. A solution of corrosive sublimate is the best for this purpose, as, besides being the most effective, it has the advantage that it does not change or rot the linen. When the grosser dirt has been removed by rinsing in water, the articles may be boiled.

Articles which cannot be boiled in water without injury, such as cloth clothes, blankets, and beds, are best disinfected by exposure to heat, and the experiments which I have quoted show that for this purpose a steam heat is preferable to dry heat for several reasons, especially because a lower temperature and a

shorter exposure suffice to kill infective organisms, and because a steam heat penetrates much more rapidly than a dry heat into bulky and badly conductive articles. Further advantages are that in a steam apparatus the temperature is approximately equal in all parts ; that it can be accurately ascertained, and kept constant at any required degree for any length of time—conditions which are essential to a good apparatus, but which are very difficult to obtain where dry heat is employed. Of dry heat apparatus known to me, Dr. Ransom's self-regulating gas disinfecting stove is the only one in which these conditions are successfully complied with. In several kinds of disinfecting ovens frequently used I found a wide difference, sometimes as much as 100° F., between the temperatures in different parts of the heated chamber ; and the thermometer used to indicate the temperature did not do so by a wide interval, again, sometimes by as much as 100°. Also in ovens heated by coal or coke it is difficult to regulate the temperature so as to keep it near the required point. The result of such defects is apt to be either clothes are scorched and spoiled, or that, on the other hand, with a view to avoid this they are so insufficiently heated as not to be thoroughly disinfected.

With care and in a suitable apparatus most articles can be submitted to either dry or steam heat without serious injury, but leather is instantly destroyed by steam. Books, in these days of free libraries, sometimes need to be disinfected ; it may be done by exposing them to dry heat, the covers being held back so as to open out the leaves and allow the heat to penetrate. Steam is inadmissable, as it would soften the glue and destroy the leather. Letters may be disinfected by heat, but the effect upon sealing-wax and of steam in loosening the gum of envelopes must be remembered.

A process suitable for the disinfection of rags and paper and shoddy mills is a great desideratum ; the requisites being that it shall be cheap, rapid, and effectual, and applicable to rags in the bale without unpacking. An American process attempted to do this by forcing steam into the bale through hollow screws ; but it was found that the heat was not uniformly distributed. The infection from which rag-pickers incur the most danger is that of small-pox, the contagium of which is the most persistent of any

of the common infectious diseases, though I could quote cases which show that the contagia of scarlet fever and diphtheria may retain their activity a long time in articles that are kept shut up and not exposed to the air. Outbreaks of small-pox occur from time to time among workers both in linen and cotton, and in woollen rags, but are most frequent at paper mills where the best writing paper is made, the reason being that such paper is made from white linen rags, the remains of the articles that have come into close contact with human bodies. Unfortunately there are no means of recognizing infected rags except by their effects, which are not manifested until too late for preventive measures to be of any use. It is not practical to insist on the disinfection of all rags, and it is not possible to say which rags ought to be disinfected and which it is not necessary to disinfect. Fortunately, against small-pox—the only disease from which rag-workers incur risk—they have in re-vaccination an effectual protection.

As regards disinfection of food, no one would, I presume, willingly eat or drink articles that he knew to be infected. As, however, one cannot always guarantee the absence of infection in the viands we eat or the water or milk that we drink, it is satisfactory to know that boiling or thorough cooking may be trusted to secure complete disinfection. In the experiments I have quoted it was found even that the very refractory spore-bearing bacilli of anthrax were destroyed by one minute's boiling in water at 212° F., though certain non-pathogenic bacilli found in vegetables and milk require for sterilization a higher temperature or more prolonged boiling, a fact familiar to the housekeeper who makes jam. It is doubtless owing to the efficiency of cooking as a disinfectant that sanitarians in France and Germany, where milk is, I believe, always boiled before use, are sceptical as to the possibility of propagation of infectious disease by that medium; whereas with us in England, where milk is drunk raw, epidemics of milk origin are a matter of almost every-day experience. On the other hand, trichinosis, so common among the Germans, who eat the ham raw, that it has to be guarded against by an elaborate system of microscopic examination of all slaughtered swine, is practically unknown as a human disease in England and France, where meat is always cooked.

The case of the Welbeck outbreak in 1880, investigated by the president of our section, in which a number of persons were seized with acute specific diarrhœa after eating cooked ham at an auction, may at first sight appear to disprove the efficacy of cooking, as the disease was proved to be caused by a spore-bearing bacillus which was present both in the raw ham and in that which had been cooked. The explanation, however, is probably that the cooking had not been sufficient, of which there was evidence; but that the cooking had not been without effect was shown by the fact that experiments made by feeding animals with portions of raw ham were more uniformly successful than those with the cooked ham. It is to be borne in mind that any bacteria left undestroyed would in time reinfect the whole material, and also that a chemical poison produced by the bacteria would not necessarily be destroyed by a degree of heat sufficient to kill the bacteria themselves. A series of cases of "pork-pie poisoning" at Retford, investigated by Mr. Spear in 1887, which presented similar features to the Welbeck outbreak, was found to be caused by a bacillus developing in the pies after cooking. It was found by Dr. Klein that exposure for one moment to a temperature of 153.5° was sufficient to kill the bacillus; but exposure for twenty minutes to a temperature falling from 143.6° to 136.4° did not do so.

For house disinfection, fumigation with sulphurous acid or chlorine gas, the latter preferred, followed by thorough cleansing and scrubbing, removal of wall-paper, and lime-washing, are to be recommended; but these processes, to be effectual, need to be carried out with more thoroughness than is frequently done. A difficulty often met with is to know where the inmates are to go while the house is being disinfected; and it would be useful for this and other purposes if sanitary authorities had power to provide refuges for people whom, although not themselves sick, it might be desirable to remove from their homes.

BENIGNANT MICROBES.

The following brief reference to micro-organisms that seem to effect a useful purpose in the economy of nature appeared in an organ of the druggists and pharmacists:

Since the time when Pollender discovered certain micro-organisms in the blood of animals affected with anthrax, scientists have been busy in biological and physiological research, with a view of establishing a relation between each disease and some specific bacterium present during that disease.

As a result of these painstaking researches we have a bacillus designated as the producing cause of cholera, another as that of typhoid, while the bacillus butyricus, the streptococcus pyogenes, and the mycoderma aceti are as well known to biologists, and almost as readily recognized by them, as are the more familiar plants by the well-versed botanist.

As an offset to this vast array of malign micro-organisms, Weibel has announced the discovery of "putrescence vibrios," which may be termed benignant bacteria. These micro-organisms, according to his observations, play an important part in destroying the more offensive products of putrefactive change.

In this connection it might be well to note the following fact as stated some time since by Smart: "The bacteria of putrefaction elaborate, as products of their vital action, organic substances which are destructive to the organism which determined their formation." E. and H. Salkowski some years since separated two of these products, phenyl-propionic and phenyl-acetic acids, while the fact that carbolic acid is a product of putrefaction has long been known. Nor is the power of these substances confined exclusively to the micro-organism of which they are the product for Klein showed, some four years since, that they were fatal to other micro-organisms as well, though not always so to the spores of these bodies.

While we have not the full report of Weibel at hand, it seems probable that at least a portion of the beneficent action ascribed to his benignant bacteria is due to this elaboration of self-poisoning material on the part of the bacteria of putrescence.

THE INFLUENCE OF DRUGS ON MICROBES IN THE INTESTINE.

Dr. Stieff reviews the experiments and writings of those who have shown that such substances as phenol, indol, skatol, and kreosol, found in the urine, are really products, in the healthy individual, of decomposition going on in the intestine under the

action of the micro-organisms of putrefaction. In individuals in whom there is some putrefactive process taking place elsewhere in the body, owing to some pathological condition, these substances will appear in the urine in excess. There will also be a similar increase when the absorption from the intestine of the normal products of digestion is insufficient or interrupted. He next discusses the experiments which have been made to determine whether the introduction of antiseptic materials into the intestine would not interfere with the decomposition of albuminous bodies there. As he does not regard the results of these experiments as conclusive, and as it is important to possess some substance which has this power of checking putrefaction in the bowel, he himself undertook some investigations on the subject, performed on a series of patients in Gerhardt's clinic. The drugs employed were calomel and camphor, and careful analyses were made of the urine while they were being given. The experiments he details fully, and sums up the results in the following conclusions: 1. Calomel, given in doses of five grains three times a day, exhibited no disinfecting power in conditions of increased decomposition in the intestine. 2. Consequently it can scarcely be recommended for the purpose of checking putrefaction in the intestine on account of the large dose which would need to be employed. 3. Camphor appears to possess a slight restraining power on putrefaction, since, in two cases, doses of five grains three times a day produced a diminution of the intestinal decomposition. 4. This action of camphor does not appear at once, and is only distinct after two or three days.—*The American Journal of the Medical Sciences*, December, 1889.

DISEASE OF THE NIPPLE DUE TO MICROBES.

In 1874 Paget called attention to a chronic affection, apparently eczematous, of the skin of the mamma and aureola, which is almost always followed by cancer of the breast. The numerous authors who have since published such cases enumerate as characteristics of the eruption which distinguish it from common eczema: its limitation by a well-defined line, the parched induration of the skin, the absolute incurability, and finally and especially the complication, after a shorter or longer period, by a

cancer. Histological examinations by Bultlin, Fhin, Duhring, and others did not explain the nature of the affection, which some have since regarded as an eczema which extended to the milk channels, and others as an unknown disease *sui generis*. Darier thinks that the following facts will render it possible to understand the peculiarities as yet unexplained of this type of disease.

If some of the scales are taken from the diseased surface and dissolved in water or in a solution of iodide, whether directly or after maceration in diluted ammonia or bichromate of ammonia, small round bodies, surrounded by a refracting membrane with double contour, are at once discovered among the epithelium cells and often in their interior. These bodies have a diameter which is larger than that of the cells or equally large; their membranes contain a mass of protoplasm or of more or less numerous corpuscles. These bodies are always found in sections or fragments of the excised skin, in all the layers of the epidermis, and especially in the glandular prolongations of the epidermis. The character of these bodies admits the conclusion that we have to do with psorospermæ or coccidix. They are present in all stages of evolution; a mass of protoplasm, at first naked, subsequently surrounded by a membrane, divides itself later on into numerous granules enclosed in a cyst.

The epithelioma of the breast contains similar parasites, and also a large number of elements which cannot with certainty be distinguished from epithelial cells, but which are often enclosed in other cells. Bultlin, who saw this in 1876, thought it an instance of endogenesis. The parasites are probably more numerous than they appear to be. That they play a part in the formation of the tumor seems probable, since there is in each lobe a certain number of coccidix in their characteristic form.

It is a well-known fact that the presence of these organisms in the tissue of the epithelium produces a budding and extension of it. M. Albarran quite recently exhibited epithelioma containing coccidix, and further demonstrations of this kind will soon be quite numerous. It is therefore, logical to suppose that the parasites which produce the epidermic lesion in Paget's disease of the nipples, cause also the epithelial growth of the milk channels which constitute the epithelioma.

The above facts appear important from different standpoints. Paget's disease of the nipple is a parasitical affection; its diagnosis becomes easy by microscopical examination of scales such as Darier made in four cases. Then, also, this disease furnishes a first indication of the nature and the pathogeny of certain epitheliomas.—*La Semaine Médicale*, 1889.

THE DEVELOPMENT OF MICROBES IN MALARIAL FEVER.

There are various forms of this fever, but those where the symptoms return on the third day (tertian ague) and the fourth day (quartan) are the most important. Dr. Golgi finds that both are the result of microbes.

"In the tertian form," he says, "the organism enters the red blood-corpuscles, and then goes through certain stages of development, which, in regard to succession one upon another, and in regard to symptoms, appear with unchangeable regularity. As soon as the infection has taken place, and the typical clinical forms of tertian fever have developed, there is always positive proof forthcoming of a characteristic condition, whether before or during or after the fever attacks. With numerous preparations and drawings Golgi describes the various phases of development, and the different species of parasites in simple tertian fever. He also explains the observations he has made in clinical cases of mixed fevers. Thus, in the blood of a patient with treble quartan fever there were three distinct generations of parasites, which came to maturity always one after another, day by day. The examination of the blood was confirmed by the regular succession of a violent, a medium, and a very slight attack. As to their biological properties, the parasites of the tertian fever are thus distinguished from those of the quartan fever: 1. By the completion of their development-cycle in two instead of three days, as in quartan fever. 2. By the different character of the amœboid movements, which are more active in tertian fever. 3. By the relation of the parasite to the red blood-corpuscle that harbors it. While in quartan fever the substance of the attacked blood-corpuscles maintains its characteristic yellowish-green color until the last

phase of distinction, the action of the parasite of the tertian fever, on the other hand, is very early discerned, the blood-corpuscles losing their color, even when the parasites occupy as yet but a small portion of them. This rapid decoloration appears to be connected with the rapidity with which the parasite sends out its protoplasmic shoots into all parts of the blood-corpuscle—even to its periphery. In respect of their morphological properties, too, the two kinds of parasites differ. 1. The protoplasm of the quartan-fever parasite has a much finer appearance. This is chiefly observable in the early phases of development of each kind. 2. In quartan fever the pigment appears in form of thicker grains and bacilli, which in tertian fever are of extreme delicacy. 3. The process of separation differs in an extraordinary degree in the two kinds of parasites. According to Golgi's views the numerous varieties of intermittent malarial fevers are simply varieties or combinations of the two chief types—the tertian and quartan fever."

THE MICROBE OF TUMORS.

Dr. Verneuil's conclusions as to the presence and influence of pathogenic microbes in tumors are as follows: Tissue of new formation of a malignant character, such as cancer, sarcoma, epithelioma, may at a given moment contain different microbes, of which neither the origin, kind, nor quantity can be accurately determined. The presence of these microbes may for a long time be innocuous, but, on the other hand, in some cases results in the rapid increase in softening and ulceration of the tumor. Microbes are not found in lipoma, fibroma, nor in cancers and sarcomas characterized by an initial slow development, but are almost always detected in softened and ulcerated tissue. These microbes, besides exercising a morbid influence on the surrounding tissues, affect also the general economy, and constitute a febrile element. During excision of the morbid growth, they are communicated to other parts of the wound, and are capable of provoking septicæmia, which may prove fatal.—*The British Medical Journal.*

THE CAUSE OF BALDNESS ALSO A MICROBE.

Dr. Saymonne, says the London *Medical Record* of September 28th, claims to have isolated a bacillus, called by him "bacillus

crinivorax," which is the cause of alopecia. It is, he says, found only on the scalp of man, other hirsute parts of the body and also the fur of animals being free from it. The bacilli invade the hair follicles and make the hair very brittle, so that they break off to the skin. Then the roots themselves are attacked. If the microbes can be destroyed early in the disease, the vitality of the hairs may be preserved, but after the follicles are invaded and all their structures injured, the baldness is incurable. The following is Dr. Saymonne's remedy to prevent baldness: Ten parts crude cod-liver oil, ten parts of the expressed juice of onions, and five parts of mucilage or the yolk of an egg are thoroughly shaken together and the mixture applied to the scalp, and well rubbed in, once a week. This, he asserts, will certainly bring back the hair if the roots are not already destroyed; but the application of the remedy must be very distressing to the patient's friends and neighbors, and in my practice it would not be necessary, since all microbes would assuredly be destroyed by the Microbe Killer, which is neither injurious nor unpleasant. W.R.

A MICROBE THE CAUSE OF CONSUMPTION.

Last year the French Academy of Medicine appointed a commission to investigate tuberculosis in man and other animals, and to report on the danger of using tuberculous milk and meat as food, and also the dangers, if any, of the spread of the disease by infection.

The commission was a most able one, being composed of the following: Drs. Chauveau, Butel, Cornil, Grancher, Landouzy, Lannelongue, Legroux, Leblanc, Nocard, Rosignol, Verneuil, Villemin, and Petit. The report was received and approved by Drs. Bouchard, Brouardel, Potain, and Proust, all members of the Congress on Tuberculosis. Their report is as follows:

I. Of all diseases tuberculosis claims, both in city and country, the largest number of victims. In 1884, a year chosen at hazard, for example, there were 56,970 deaths in Paris, and of these about 15,500—over a quarter—died of tuberculosis. Pulmonary phthisis is not the only manifestation of tuberculosis, as is gener-

ally thought by the public. Physicians have discovered that many diseases may be due to tuberculosis, among others, bronchitis, colds, pleurisy, scrofula, meningitis, peritonitis, enteritis, tumors, osseous and articular lesions, cold abscesses, etc. All these may be directly caused by tuberculosis, and their ultimate prognosis is no more hopeful than that of phthisis pulmonalis.

II. Tuberculosis is a parasitic, virulent, contagious, and transmissible disease, caused by a microbe—*the bacillus of Koch.* This microbe can penetrate into the organism either through the digestive tract by means of food or through the lungs by means of the inspired air, or through the skin and mucous membrane by means of abrasions, punctures, wounds, or ulcerations. Certain diseases, such as measles, small-pox, chronic bronchitis, and pneumonia, and certain constitutional conditions, due to diabetes, alcoholism, syphilis, etc., greatly predispose the contraction of tuberculosis. The causes of tuberculosis being known, the precautions taken to prevent the entrance of the germs into the body are capable of preventing its propagation. We have an encouraging example in the results obtained in typhoid fever, in which the epidemics diminish in all towns where the necessary measures are taken to prevent the typhoid germ from mingling with the drinking-water.

III. The parasite of tuberculosis may be found in the milk, muscles, and blood of animals which serve as food for man (ox, cow especially, rabbit, poultry). Raw meat or underdone meat and blood being capable of containing the living germ of tuberculosis, should be prohibited. Milk, for the same reason, should only be consumed after having been boiled.

IV. Owing to the danger arising from milk, the protection of young children, who are peculiarly predisposed to the contraction of tuberculosis (over two thousand children under the age of two years dying annually of tuberculosis in Paris alone) should specially demand attention of both mothers and nurses. The ideal food for the infant is the milk of a healthy woman. The tuberculous mother must not nurse her child, but should confide it to the care of a healthy nurse, living in the country, where, under the best hygienic conditions, the risks of contagion from tuberculosis are much less than in town. The child thus brought up will have the best chance of escaping tuberculosis.

If nursing at the breast is impossible, the infant may be fed artificially upon cow's milk by means of the bottle or spoon ; the milk must, however, always be boiled. Unboiled milk of asses and goats is infinitely less dangerous.

V. Owing to the dangers arising from the meat of slaughtered animals, which may preserve all the appearances of health even when tuberculous, the public has every interest in being assured that the inspection of meats, as required by the law, is being properly and generally practised. The only certain method of avoiding the danger of meat coming from tuberculous animals, is to cook it to such an extent that the interior portions are as well done as the surface. Only thoroughly roasted, boiled, or fried meat is entirely devoid of danger.

VI. On the other hand, the germ of tuberculosis may be transmitted from the human tuberculous subject to the healthy human subject, by means of the sputa, pus, dried mucous discharges, and all objects laden with tuberculous dust ; it is necessary, therefore, in order to insure security from the transmission of tuberculosis, to :

1. Be known, that the sputa of phthisical subjects is the most formidable agent of transmission of tuberculosis ; there is danger to the public in discharging the sputa upon the earth, carpets, hangings, curtains, napkins, handkerchiefs, clothes, and coverings.

2. Be it well understood, that the use of spittoons should be imposed everywhere and by every one. These spittoons should be daily emptied into the fire, and well washed with boiling water. They should never be emptied upon dust-heaps or in the garden, where they might lead to the infection of poultry, or in latrines.

3. Never sleep in the bed of a tuberculous subject ; to occupy his room as little as possible ; but, above all, do not allow young children to sleep there.

4. Remove from places or dwellings inhabited by tuberculous subjects all persons who may be considered as predisposed to the disease ; the children born of tuberculous parents, those having had measles, small-pox, pneumonia, repeated attacks of bronchitis, or suffering from diabetes, etc.

5. Not to use articles which possibly may have been contaminated by phthisical patients (linen, bedding, clothing, articles of

toilet, hangings, furniture, toys) except after thorough disinfection (high-pressure steam, boiling, sulphur vapors, or lime-washing).

6. Insure that the rooms of hotels, furnished apartments, cottages, or villas occupied by phthisical patients in watering places or winter resorts, are furnished and carpeted in such a manner as to render them capable of undergoing easy and thorough disinfection after the departure of each patient. It would be better if such rooms had neither curtains, carpets, nor hangings, but were washed with lime and the floor covered with linoleum. It is of the highest importance to the public that they should prefer the hotels in which such indispensable hygienic precautions and measures for disinfection are thoroughly carried out.

Dr. Dujardin-Beaumetz, in the discussion which followed the reading of the above report, said that on the whole he approved of the report of the commission, but he must remind them that it was a mistake to think that tuberculosis was more frequent in towns than in the country. Exactly the reverse is true. Further, some of the statements made by the commission were purely hypothetical and unsubstantiated by facts. Contagion by means of milk is absolutely exceptional. For this to take place, it would not only be necessary for the cow to be tuberculous, but also for her to be afflicted with tuberculous mammæ. Again, the transmission of tuberculosis by tuberculous meat had not been proven. However, we know that the microbe dies in a weakly acid solution; hence the ingestion of tuberculous meat cannot be dangerous, since the contents of the stomach are acid.

M. Ducemberg thought milk from a tuberculous cow most dangerous.

Dr. Germain Sée remarked that the commission stated the possibility of the microbe entering the system through the air. This assumption he regarded as false. In the light set forth by the commission, tuberculosis would, indeed, be nothing else than a pest. Koch had demonstrated that the tubercle bacillus cannot live in the air. It can only live and reproduce itself in the organism. Regarding the use of spit-

toons, he agreed with the commission. As long as the sputa is kept moist there is no danger, but when dry it is different. Regarding the infectivity of tuberculous milk, he agreed with Dujardin-Beaumetz. To carry out the views of the commission as to the use of raw meat, he thought impossible. Were all meat cooked according to the requirements of the commission, little of it worth eating would be left. A temperature of 320° F. is necessary for the destruction of the bacilli. Meat is not eatable after having been subjected to a temperature much over 195° F. Moreover, it has been conclusively proved that the consumption of tuberculous meat is devoid of danger.

The further discussion of the report was, as we learn from the *Medical News*, adjourned to the next meeting of the Academy.

TO PREVENT THE SPREAD OF CONSUMPTION.

The following regulations were agreed upon a short time ago by the New York Board of Health, and a large number of copies was printed for general distribution, though but little heed was given to them. They are practical evidence, nevertheless, of the acknowledged soundness of my views:

Pulmonary tuberculosis (consumption) is directly communicated from one person to another. The germ of the disease exists in the expectoration of persons afflicted with it. The following extract from the report of the pathologists of the Health Department explains the means by which the disease may be transmitted:

"Tuberculosis is commonly produced in the lungs (which are the organs most frequently affected) by breathing air in which living germs are suspended as dust. The material which is coughed up, sometimes in large quantities, by persons suffering from consumption contains these germs, often in enormous numbers. . . . This material, when expectorated, frequently lodges in places where it dries, as on the street, floors, carpets, handkerchiefs, etc. After drying, in one way or another it is very apt to become pulverized and float in the air as dust."

By observing the following rules, the danger of catching the disease will be reduced to a minimum :

1. Do not permit persons suspected to have consumption to spit on the floor or on cloths, unless the latter be immediately burned. The spittle of persons suspected to have consumption should be caught in earthen or glass dishes containing the following solution : Corrosive sublimate, 1 part ; water, 1000 parts.

Do not sleep in a room occupied by a person suspected of having consumption. The living-rooms of a consumptive patient should have as little furniture as practicable. Hangings should be especially avoided. The use of carpets, rugs, etc., ought always to be avoided.

3. Do not fail to wash thoroughly the eating utensils of a person suspected of having consumption, as soon after eating as possible, using boiling water for the purpose.

4. Do not mingle the unwashed clothing of consumptive patients with similar clothing of other persons.

5. Do not fail to catch the bowel discharges of consumptive patients with diarrhœa in a vessel containing corrosive sublimate 1 part, water 1000 parts.

6. Do not fail to consult the family physician regarding the social relations of persons suffering from suspected consumption.

7. Do not permit mothers suspected of having consumption to nurse their offspring.

8. Household pets (animals or birds) are quite susceptible to tuberculosis ; therefore do not expose them to persons afflicted with consumption ; also, do not keep, but destroy at once, all household pets suspected of having consumption, otherwise they may give it to human beings.

9. Do not fail to cleanse thoroughly the floors, walls, and ceilings of the living- and sleeping-rooms of persons suffering from consumption at least once in two weeks.

A PAPER ON THE TREATMENT OF CONSUMPTION.

At a meeting of the New York State Medical Society held at Albany this year an interesting paper was read on the treatment of tuberculosis by Dr. Paul H. Kretzschmar, Supervisor-at-Large of Kings County. It will be found on

perusal to be an endorsement of much that has been said in the earlier pages of this book.

At the Congress of American physicians and surgeons held in Washington during September, 1888, writes Dr. Kretzschmar, one of the most prominent members of the profession from the city of New York made the statement that the time had come when pulmonary consumption should be classified among the contagious and infectious diseases, and consumptives should be cared for in like manner as small-pox patients are. At that time the writer entered his protest against any such proposition, but so much has been said since regarding the probability of transmitting the disease from the patient to the healthy that a discussion of this very important subject seems to be advantageous. The fact that the International Congress for Tuberculosis, which will meet in Paris this year, has, among other subjects, the question of "Isolation," on its programme, is evidence that a portion of the medical profession does seriously consider the advisability of such a proposition. Since Dr. Koch first demonstrated the specific cause of tuberculosis, it has been asserted that consumptives are a source of danger to their surroundings, and it has been claimed that many cases of pulmonary tuberculosis are directly traceable to infection by contact only. As long as one hundred years ago the theory, now preached by many that consumptives are liable to infect healthy persons by contact only, was accepted as a fact and appropriate laws were issued. In Naples a law existed during the latter part of last century, for over fifty years, compelling the attending physician to report every case of pulmonary consumption (*l'ulcera pulmonale*), and the fine for the first failure to comply with this law was 300 ducats, to be followed, in case of repeated neglect to report this class of cases, by expulsion from the country for a period of ten years. All poor consumptives were at once removed to a hospital; the clothes and bedding belonging to consumptive patients had to be destroyed after death; the dwellings of all patients who were fortunate enough to die outside of the hospital had to be entirely renovated, and nobody was allowed to occupy them until one year afterward. Similar laws and restrictions were in force in Portugal, without, however, influencing the prevalence of pul-

monary consumption in any marked degree. Rigorous laws, strictly enforced for fifty-six years, would certainly have shown some favorable results, if isolation and public supervision of consumptives were of any practical value whatsoever. In a paper read before the American Public Health Association at its meeting in October last the writer used the following language: "If the advocator of isolation would reflect for a moment and consider the hardship and injury which would follow its introduction, affecting, as it would, a large portion of the human race and seriously interfering with our entire social life, without giving the slightest assurance of better results than those obtained after many years of trial in Naples and Portugal, one would think that they would hesitate to advocate so inhuman a proposition. It will not be denied by them that a very large proportion of consumptives are phthisical subjects long before they themselves are aware of it, and even physicians frequently treat alveolar catarrh as bronchitis until the microscope demonstrates the fact that the patient's expectorations are full of tubercular bacilli. What benefit would be derived by isolating advanced cases of pulmonary consumption, if cases during the early stages are permitted to deposit millions of microbes with their expectorations upon our streets, in our churches, public halls, railroads, and all over their own residences? And finally, what advantage would it be to have isolation enforced in the State of New York and not in New Jersey, Pennsylvania, and other neighboring States, or if adopted in the United States and not in Canada?" Careful consideration of the subject has strengthened the writer's former opinion about the infeasibility, cruelty, and absurdity of any attempt to carry into practical effect the teachings of those advocating isolation of consumptives for the purpose of diminishing or destroying the danger of infection, although it is admitted that, theoretically, the isolation of all consumptives would do much to lessen the quantity of tubercular bacilli floating in the air—and thereby the danger of infection. Practically, the same favorable results would be obtained if the lessons taught by Dr. George Cornet's experiments should be made the basis for proper teachings regarding the expectorations not only of people known to be consumptives, but of all persons suffering from prolonged coughing depending, apparently, upon other deranged con-

ditions of the human system. We know that the source of contagion is contained in the sputa ; we also know that as long as these expectorations remain in a moist state they are not apt to infect anybody, but that the dry sputa, becoming pulverized, allowing the poisonous germs to be carried away into the surrounding atmosphere—are alone responsible for the dissemination of the disease. The short pamphlet issued by the Board of Health of the city of New York regarding this matter gives most excellent instructions, and it seems to the writer to be an act of vital importance for this society to do its share that these instructions, or others of a similar character, be published by every health officer or by every county society of this State. To obtain the views of the most advanced phthiso-therapeutists the writer entered into correspondence with some of them. Dr. Hermann Weber, of London, England, writes, under date of January 2, 1890 : "In answer to your note I beg to say that it would not only be a great cruelty to isolate consumptive patients, but it would also be an impossibility." Dr. P. Dettweiler's answer is dated Naples, December 24, 1889, and reads : "Regarding the effect of isolating consumptives, I can only say, most minute cleanliness, the rigorous use of the spittoon, and the general introduction of the blue flask are the best means to prevent the spreading of the disease ; isolation is unnecessary." Dr. Ernest Meissen, of Falkenstein, Germany, writes, December 19, 1889, as follows : "The isolation of consumptives is cruel, not practical, and unnecessary." Dr. Cornet's investigations have proved the latter. Every possible effort should be made, of course, to destroy the dangerous tubercle bacilli, and thanks to Cornet we are now in a position to do that much more effectually than formerly. The term "intelligent spitting" does not sound pleasant, but these two words express best what will do most to diminish the number of the germs, producing pulmonary consumption, floating in the air which we breathe. If in hospitals and private practice sufficient attention would be given to this most important matter, great progress would be made toward lowering the death-rate from pulmonary consumption. It is our most solemn duty as physicians to see to it that the public is not only duly instructed about the value of intelligent spitting, but also that it is carried into practice. The blue flask referred to by my

friend Dr. Dettweiler is intended for use among consumptives ; it has been devised by him and was exhibited at the last medical congress of German physicians, held at Wiesbaden in April, 1889. The writer fully appreciates the importance of Dr. Dettweiler's invention and takes pleasure in presenting the blue flask to you for your inspection and consideration. There may be room for improvement in the make-up of the flask, but the principle involved in its use is of the greatest magnitude, and it is to be hoped that the lesson which its use teaches will be carried by you into every household where consumption exists, and that the patients will be so thoroughly impressed with its importance that spittoons partly filled with appropriate fluid and frequently cleaned will soon be found in every room, and that patients will know what to do to relieve their friends of the danger of becoming infected by their carelessness. Permit me, at this time, to digress for one moment from the subject under consideration to pay a well-earned tribute of gratitude and admiration to the memory of the late Dr. Hermann Brehmer, of Goerbersdorf. He died just before my letter, asking for his opinion regarding the isolation, reached Goerbersdorf. The medical profession loses, by his death, one of its brightest stars, and those especially interested in the subject of phthisis-otherapy their foremost teacher, writer, and active practical worker. For over thirty-five years Dr. Brehmer conducted his now world-renowned institute for the cure of consumpives in Goerbersdorf. Beginning with almost no capital and upon the smallest scale, his institution has grown to a most marvellous extent, and more than fourteen thousand patients have visited it during the last three decades. Of Dr. Brehmer's writings the most important are: "Chronic Pulmonary Consumption and Tuberculosis of the Lungs—its Cause and Cure," published in 1857 ; "Etiology of Chronic Pulmonary Consumption," 1885 ; "The Treatment of Chronic Pulmonary Consumption," 1886 ; second edition, enlarged, 1889 ; and his latest work, "Communications from Dr. Brehmer's Institution for the Cure of Consumptives in Goebersdorf," 1889. Strongly opposed to isolation of consumptives for the purpose of diminishing the spread of the disease the writer is one of the most enthusiastic advocates of the separation of consumptives from the healthy, and their removal to institutions, properly located and conducted, and conducted solely for the cure of this class of patients.

CREASOTE IN PHTHISIS AND TUBERCULOSIS.

Professor Sommerbrodt, says the *Medical Press* in a recent issue, is an enthusiastic believer in the special virtues of creasote in phthisis and pulmonary tuberculosis. After an extensive use of the drug he gives us statistics of five thousand cases he has treated in hospital. He claims for it the power of improving the appetite, limiting the secretions, and diminishing the irritable cough. Its primary virtue, however, is its anti-bacterian property, which checks the progress of the baneful disorder. He supports his belief by pointing to Guttman's bacterian experiments with the tubercular bacilli, which he cultivated in glycerine and destroyed with a 1:4,000 solution of creasote. From this experiment Guttman himself reasoned that, if he could get this quantity into the circulation without injury to the organism, he might be able to arrest the progress of the bacilli; but when he considered that a man of 60 kilos. (160 pounds) contained 4,615 grammes of blood (9 pounds), that would mean upward of one gramme of creasote to be present in the circulation before any good effect could be expected.

This again bears out my view. There are several antiseptics and drugs that destroy micro-organisms, and creasote, like corrosive sublimate, is among the most powerful, but it cannot be used in sufficient quantities, as I have explained elsewhere, without destroying the patient. When the disease has advanced to a stage where tissues are destroyed, the loss cannot under any circumstances be made good, but the disease may be checked if the microbes are destroyed, and to accomplish that the whole of the tissues must be permeated, as they may be with the Microbe Killer.—W. R.

PROTECTION AGAINST MICROBES.

A correspondent of the *New York Herald*, writing from Paris, said recently:

Microbiological researches are one of the leading preoccupations of the scientific period in which we are now living. The incessant publications to which they give rise are there to witness that this study has not lost any of its popularity

among those who take pleasure in penetrating into the territory of the infinitely small. A Russian savant, M. Metchnikoff, has recently been studying the rôle that animal cells take as regard the microbes in the organism. In his opinion this rôle is essentially a defensive one, and the cells are charged with a function, phagocytosis, which leads toward an incessant destruction of the microbian species. According to this hypothesis, immunity, natural or acquired, is nothing but the result prepared beforehand of the individual influence wrought in this way by the cells. This is an ingenious theory, and one that deserves to take a certain rank, although it is not yet possible to foresee for it any proof either present or future.

Another question very closely related to this one is that of the action that the blood has on microbes. It appears that this influence is a reality, and that it is a distinctive one as regards certain varieties of bacteria, but it only manifests itself under certain conditions. It reaches its maximum when the blood is fresh, and disappears entirely when it is in an opposite condition; it also disappears when the blood has been heated to a temperature of 55 degrees C.

Of the two constituent elements of the blood, plasma or globules, which can claim this action? Some very precise experiments authorize us to pronounce in favor of the plasma. Besides, it seems highly probable that this destructive action is more particularly the attribute of a substance belonging to the class of diastases, and which enters into the composition of this plasma.

However this may be, the established antagonism between the blood and the microbes appears to have a certain importance in connection with general pathology, for we are warranted in believing that this beneficial action of the blood manifests itself in many different circumstances by supplying the organism with means that enable it to fight until the invading microbes are completely destroyed, or, at any rate, until they are finally illuminated (urinary crisis). These methods of indirect struggle might be considered as similar, although on a large scale, to those which medical therapeutics is constantly using; and we may conclude that if the plasma, or liquid portion of the blood, is a destructive agent of the microbes, or if, at least, it paralyzes

their development, therapeutics should have as its principal aim the rendering of the blood plasma, or, better still, of the blood, sufficiently rich and active to insure that the result of the conflict between the microbes and it may not be disastrous.

The richer and more active the blood the greater the chances of its overpowering the microbes which may penetrate into the organism, and of destroying them.

THE MICROBE IN CANCER.

It may reasonably be questioned whether much good, if any, is done by discussing the nature of disease and the properties of drugs in the daily newspapers. The too common use by the people of agents like cocaine, antipyrine, and others has been largely due to that form of publishing information respecting them. Such information must necessarily be limited, and certainly people are unwise to dose themselves with dangerous poisons, or to use them in any way without the advice of some one who is legally responsible and presumably competent to advise.

But sometimes it is possible to pick out of the lay journals notes from men of science which are not without merit. Of such, the following is worthy of quotation here, it having appeared in the Paris edition of the *New York Herald.* The writer says:

Mr. Inglis Parsons, physician to Chelsea Hospital, London, is a particularly energetic opponent of the theory of a microbian origin of cancer. In his opinion, all the cells of our organism possess, but in a latent form, the power of multiplying their number in an abnormal way, and of producing unshapely growths—of creating new tissues, in a word. But in our normal condition this power does not manifest its existence unless the above-mentioned cells are acted on by some wound or form of irritation. But, in such cases as these, the action of the nervous system intervenes; it does so to regulate the formation of new tissue, and to make it pass through its process of development in a normal fashion.

But if, for some reason or other, the nervous system is not

capable of fulfilling this regulating function, the cells acquire an independent existence, and can construct abnormal tissues such as cancers.

According to this theory, then, cancer is a derivative of the normal cells of our organism, but of cells which have eluded the restraining action of the nervous system. This is nothing but pure hypothesis, and has nothing in its favor but the frequency of the occurrence of cancer in persons whose nervous system is depressed.

This theory, it is easy to see, is a great way removed from the doctrine of the microbian origin of cancer. But this idea is not at all calculated to discourage us; quite the contrary, for it will be readily understood that, if we could succeed in finding some means of bringing the cells that are being irritated back into the power of the nervous system by stimulating its action, we might be able to prevent their abnormal development, or, at any rate, to keep it within moderate bounds.

This should give fresh courage to investigators. It is certain that the task is not easy, and that the goal is a long way off, but it is not possible to admit that a disease which causes such ravages among mankind will continue much longer to be such a mystery both as to its cause and as to its treatment. However strange and startling may seem the theories that are in vogue at the present day about the cause of cancer, it is the physician's duty to examine them all, and to carry out experiments whereby their value may be tested. There will be no means of succeeding but this, and it is safe to say that, with the wonderful impetus that has been given to science in our times, nothing will be impossible from now on.

This question of the origin of cancer is so absorbing, since the course of action to be followed in treating this disheartening disease depends on its solution, that I thought it would interest the readers of the *Herald* to know what is thought about it by one of the most distinguished histologists of Paris, Dr. Brault, Chef de Laboratoire à la Faculté de Paris, médecin des hôpitaux; and I give below the memorandum which Dr. Brault has drawn up for me on the subject in reply to my request.

M. Brault's ideas are very suggestive, and come from a man whose competence in such matters is considerable. If the writer

gives no definite conclusions, or, rather, if he ends his article without any practical deductions, at leasthe emits the ingenious theory that cancerous cells may take the part of of microbes, and that the defensive reaction which takes place in viscera that are invaded by them may be directed against these cancerous cells.

Consequently, the adversaries of the microbian theory of cancer, whatever may be the hypothesis they uphold, seem to foresee a means of our protecting ourselves against this disease. According to this idea, after a long period of despair and abandon, we are now about to enter into a new phase—that of hope.

THE ORIGIN AND CONTAGIOUS NATURE OF CANCER.

"There is, at the present moment, a tendency to believe that tumors, and particularly those which are termed cancers, are caused by some parasitic action similar to that observed in the various infectious diseases. On what basis is this supposition founded? Simply on this fact, that it is proved that tumors, in spreading, follow the natural channels of the circulation, and that they are found in the depths of the substance of viscera that are far removed from the primitive seat of the neoplasm.

"This fact cannot be denied, but does it follow that the interpretation usually made of it is a correct one? We think not. In an article published several years ago in the *Archives Générales de Médecine* of 1885, 'On the Non-Bacterian Origin of Carcinoma,' we opposed the idea that has since been defended by Scheurlen and Rapin as to this supposed rôle of the bacteria. We say supposed rôle, as the publications of the writers we have just cited contain no direct proof in support of their theory. In our *mémoire*, after having compared the way in which the evolution of microbian diseases is accomplished to the development of tumors, we ended by the conclusion that these two forms of pathological disorders are in constant opposition from the beginning of their existence to the end.

"Let us see what the distinctive characteristics are of these two forms of disease, considered in their simplest form. In infectious diseases the parasites give rise in the viscera to inflammation, temporary or prolonged—temporary in typhoid fever and in the greater part of suppurative complaints; prolonged in tuberculosis, for instance. The end of these inflammations is

marked by a more or less complete destruction of the viscera that are attacked. Notwithstanding this, restoration can take place and healing can be expected. In running over the long series of microbian diseases, it is easy to acquire the conviction that the entire energy of our organism is represented by the struggle between our tissues and the invading microbes. If the fight lasts on, the viscera become hardened by continued accumulation of materials destined to repair losses or to isolate the foreign body ; materials which are borrowed from the fibrous framework of the viscera.

"But in cancers, on the other hand, what do we see? On the surface of the mucous membranes, or in the interior part of the glands, we find the cells of which they are formed multiplying to such an extent that in a short time they spread beyond the limits of the mucous membranes, or of the walls of the glands. Then the cells, released from all restraint, insinuate themselves into every vacant space they find in their path, reach the vessels, and are carried away by the blood, or by the lymph, to invade the viscera or the ganglia.

"This is by no means an hypothesis, but a fact, the truth of which has been proved, and can be readily checked by any one desiring to do so. In the new spots which they have chosen for their abode, the cells that have been transplanted go to work and construct glandular tubes or flat surfaces of mucous cells, which have the most striking resemblance to the elements of the tissue that gave them birth. We draw special attention to these facts, as the entire discussion is based on them. We say it a second time—what we find in secondary tumors of the liver, lungs, or whatever the organ may be, is by no means an agglomeration of microbes, or bacteria, but cells, cells entirely similar to those of the pancreas, stomach, or skin, according to whether the pancreas, stomach, or skin was the seat of the primitive cancerous growth.

"The introduction of the microbian idea into the problem is certainly powerless to explain the transplantation of cells from one organ to another, and, besides this, the track followed by the elements that have been transplanted can sometimes be followed from their starting-point to their journey's end without a break in the chain. Nor can the rôle of the bacteria be a direct one,

as microbes are unable to produce cellular elements differing from their own structure, and we know by the general law which governs the development of all beings that every cell springs from a cell of the same species as itself.

"Quite the contrary. Whenever bacteria (vegetable cells) find themselves in the presence of the cells of man or of animals a conflict arises between the two, which can only end by the total destruction of the one by the other. There are but few exceptions to this rule, and even they are more apparent than real, but it will not be possible for us to develop this point of the subject as it deserves.

"The multiplication of cancerous cells in an organ situated at a distance from the organ that gave them birth, is always preceded by what might be termed a process of cellular grafting. The cells that have been transplanted on to a new spot develop at its expense, like any other form of parasites. Consequently in cancerous tumors the only infecting and invading agents are the cells themselves. It is against them that the organ tries to defend itself.

"The question of the contagious character of cancer has been discussed latterly to a considerable extent, but the cases that have been published to prove the idea have so far been not at all conclusive, and it will be necessary to await future developments. Still, we must add in closing that, as a firm believer in the process of cellular grafting, we do not see *a priori* that any objection can be made to the idea of grafting by contact; and it is our opinion, *a fortiori*, that some day the feasibility of inoculating cancer will be experimentally proved, particularly if care be taken to experiment with animals of one and the same species.

"Dr. BRAULT,
"Médecin des Hôpitaux de Paris."

M. PASTEUR ON HYDROPHOBIA.

The following article over the signature of the celebrated French experimenter appeared not long since in a New York paper, and it will repay perusal. In every thing connected with the immediate subject of his investigations M. Pasteur's opinions must have weight, and he entirely sustains me in

my theory of the cause of disease. It would have been better if he had omitted the statement that the origin of life is outside the sphere of scientific inquiry, for in that he errs, and his views as to the origin of rabies do not require it. Says M. Pasteur:

Rabies is a disease which has been known from the earliest times. The dog may give it to the man and to domestic animals. Animals, again, may communicate it to each other. At the time of writing this paper, rabies is raging in England in a herd of deer in the park of the Marquis of Bristol at Ickworth. The herd was composed of five hundred animals, and two hundred of them have died already, though the disease still rages. A rabid dog found the way into the park during the month of April last, bit several animals, which died of rabies, but only after they had bitten a large number of their fellows.

A short time ago our knowledge of this disease was still surrounded by many popular fallacies. Old writings, recent papers even, state that rabies may originate spontaneously, and the occasional causes producing the disease are likewise described. In the streets of certain towns one may see along the walls, in the summer-time, small tin vessels filled with water in order that dogs may satisfy their thirst. Many think that unless such precautions are taken, some animals may become rabid. Nevertheless it is a fact that, in whatever physiological or pathological conditions a dog or any other animal is placed, rabies never makes its appearance in that animal unless it has been bitten or licked by another suffering from rabies at the time the wound was inflicted. Every person who is of opinion that rabies may originate spontaneously—an opinion I am even now fighting against—will at once answer: "But there must have been, at some time or other, one first animal spontaneously afflicted with rabies." That answer simply opens up the whole question of the origin of things, a question which is altogether outside the domain of scientific investigations. Whence came the first man? Whence came the first oak tree? Nobody knows, and it is useless to discuss such mysteries. Observation alone shows us that rabies never originates spontaneously. Nobody has ever proved the existence of spontaneous rabies, though many have attributed to it the symptoms of epilepsy, a disease frequently met with in the

canine species. Further, it never breaks out in any country unless introduced there by an animal bitten in another place where rabies is endemic. Many islands in the Pacific Ocean are quite free from it. It is not met with in the wide Australian continent, Norway, or Lapland. And yet these countries will be free of it only as long as they take proper measures to prevent the introduction of dogs which, after being bitten in another country, carry the virus with them in a latent form.

Moreover, it is not difficult to prove that rabies is a disease which cannot appear *de novo* under any physiological conditions, and that its spontaneous origin is quite impossible. We know nowadays that contagious or virulent affections are caused by small microscopic beings which are called microbes. The anthrax of cattle, the malignant pustule of man, are produced by microbes; croup is produced by a microbe. The microbe of rabies has not been isolated as yet, but, judging by analogy, we must believe in its existence. To resume: every virus is a microbe.

Although these beings are of infinite smallness, the conditions of their life and propagation are subject to the same general laws which regulate the birth and multiplication of the higher animal and vegetable beings. They, like the latter, never have a spontaneous origin. Like the latter, they are derived from beings similar to themselves. It has been proved, without the shadow of a doubt, that, in the present state of science, the belief in spontaneous generation is a chimera. If it be said that life must have appeared on this earth spontaneously at some period or other, I must repeat the statement which I made just now, namely, that the origin of all things on earth is hidden behind an impenetrable veil. In short, rabies is not a spontaneous disease.

As it is always due to the direct inoculation of its virus by a rabid animal, it is easy to understand that simple police measures will suffice to stamp out this horrible disease. Two or three years would perhaps be enough to eradicate it, if owners were compelled to muzzle their dogs, or to lead them by a string when in the streets.

Everybody, medical men especially, agree in thinking that rabies, in man at least, is an incurable disease. If a man be bitten by a rabid animal in such a manner that he must necessarily die of rabies, his health may nevertheless remain perfectly good

for several weeks, though the treacherous virus creeps on in his body, carried by the blood or finding its way along the nerves. Lastly, it invades the nervous centres. It is always found there first, and from thence it passes into the salivary glands. The first symptoms now make their appearance : fear of water and of all liquids, intense headaches, spasms of the throat, dilated pupils, haggard eyes, severe pain or mere itching at the seat of the bite. In rare cases the patient tries to bite ; if so, he bites the bed-clothes, but only seldom the people near him. He expectorates frequently, while convulsive movements follow on the slightest breath or draught of air. He is afraid of shining objects, and the slightest noise causes him to start. These are some of the striking signs of the disease. If one or several of these morbid symptoms make their appearance, rabies has fairly begun, and, whatever may be done, it follows its own independent and fatal course. Death, sometimes preceded by horrible sufferings and by indescribable maniacal attacks of fury, shortly follows.

Strange to say, this disease, on which all the resources of medicine have no effect, has been treated in all countries by an endless number of remedies, all supposed to be infallible. There is no country in Europe or America, be it small or large, in which persons are not to be found who are supposed to be able to cure rabies, or in which practices which are said to prevent the occurrence of the disease may not be studied. Such erroneous beliefs are widely spread. The idea on which such practices are based is due to the fact that it is difficult for men in general to apply to their knowledge of facts, which are more or less mysterious in their nature, and the causation of which is unexplained, the precepts derived from experimental methods. The human mind is always struck by any thing which appears to be marvellous. A man, for instance, will often believe the quack who tells him that a stone of a certain kind, or a plant, will prevent the evil effects of a bite from a rabid animal, provided this stone or plant be merely placed in contact with the wound. He may say even that he has personally experienced the good effects of such a practice if rabies has not followed the application of the remedy to one patient. He forgets that to draw such a conclusion must necessarily be a mistake, simply because every bite from a rabid animal is not always followed by the breaking out of the disease in the person so bitten.

Now, suppose a hundred people to have been bitten by rabid animals, how many will die of this terrible disease? It is difficult to answer such a question. Moreover, the number of victims varies, for several reasons. Nevertheless, it is generally supposed that if the deaths taking place among a large number of persons bitten by rabid animals be added up, and if their seat and gravity be next taken into account, the mortality among persons bitten amounts to 15 to 20 per cent. In other words, more than eighty out of a hundred persons suffer no evil effects from the bite. It is easy, therefore, to be deceived as to the value of any preventive remedy. For if we apply it to a small number of persons it will seem to have been successful in four cases out of five. Is that not more than sufficient to warrant a quack, whose advice is taken, to say that his remedy is infallible, and to cause men to blindly share his belief?

The experimental method judges facts more severely. That method teaches us that if we are to believe in the efficacy of a preventive remedy against rabies among persons bitten by rabid animals, it would be necessary, in the first place, to discover a process enabling the experimenter to reproduce rabies in an animal at will. A number of dogs having, then, been inoculated with rabies according to that process, would then have to be divided into two batches, the remedy being applied to one batch, and the disease being allowed to run its course unopposed in the other until death followed. It would be easy to compare the course of the disease in the two lots, and the action of the remedy could thus be conclusively demonstrated, provided rabies and death did not follow on the introduction of the virus into animals treated by the remedy. We have tested in this way remedies which are supposed to be able to prevent the occurrence of rabies, but we have never obtained satisfactory results.

It is not so easy as one might think at first to inoculate a series of animals with rabies successfully. We have already called attention to the fact that if dogs be bitten by rabid animals the disease does not appear in all of them. A direct subcutaneous inoculation of the saliva of a rabid dog is hardly more successful. The saliva contains, together with the microbe of hydrophobia, other microbes of different kinds, which may give rise to abscesses and other morbid complications, and thus prevent the occurrence of rabies. In short, only a few years ago experimenters would

not have known where to find the virus in a pure state, nor to use it in such a way as to produce rabies, and nothing but rabies. Luckily, these two difficulties were solved at the same time by the following discovery: If the autopsy of an animal dead of rabies be made, and if a small portion of the brain, spinal cord, or, better perhaps, of the thicker part of the cord which unites this to the brain—a part which is called *medulla oblongata*, or bulbous —be taken, and if this portion of the central nervous system be crushed in a sterilized fluid, with all necessary antiseptic precautions, and if a small quantity of this fluid be now introduced on the surface of the brain of a chloroformed animal (dog, rabbit, or guinea-pig) by means of a hypodermic needle, after trephining, the animal thus inoculated will contract rabies to a certainty, and that in a relatively short time—that is, in a period not exceeding fifteen days or three weeks.

The method which I published before the Académie des Sciences de Paris on October 16, 1885, resembles in many of its general characteristics the method of prophylaxis against contagious diseases. These methods are based on the inoculation of attenuated virus. The injection of such attenuated virus inoculates animals, and thus enables them to resist the attack of the corresponding virus.

Every virus, or rather all virulent and infectious microbes, may be attenuated by natural or artificial means. The virus of small-pox in man is represented in an attenuated condition by the cow-pox virus of bovine animals. The latter has been produced, I am inclined to think, by accidental and successive inoculations of human small-pox virus on the udders of cows, and its present state of virulence has at last become "fixed" there. In the same way the virus of rabies is greatly modified by successive inoculations on monkeys or rabbits.

Similarly again, the fatal virus of anthrax is modified by the action of air and heat until at last it is thus rendered harmless. It passes through intermediate stages, however, in which it may still prove fatal to animals of small size, but harmless when inoculated into domestic animals, although it inoculates the latter against the attacks of the primitive fatal virus. In the same way the virus of rabies may be attenuated to any wished-for degree by the action of air and moderate heat; and may then, when inocu-

lated into animals, enable them to resist the action of the primitive fatal virus. In other words, one may produce in a dog a state in which it is impossible for that animal to contract rabies. Take a dozen dogs, inoculate them in the manner which I have just mentioned, and then inoculate them at the surface of the brain with the pure virus of rabies. Then perform the same operation at the same time on twelve other non-inoculated animals. Not one of the first dozen will contract the disease, but the twelve other animals will all die of it after exhibiting all the various symptoms typical of rabies, and it resembles in every particular that produced by the bite of a rabid animal wandering about the streets. The experiments which I have just mentioned, and which show that dogs may be inoculated against rabies, may be successfully repeated on other dogs, even if they have been bitten, before the inoculations are begun, by rabid animals, provided too long a period between the time of the bite and that of the protective inoculations has not elapsed. The success of such a course of treatment depends on the usually long period of time intervening between the day of the bite and the time at which the first symptoms of rabies show themselves. The immunity due to inoculation is produced in animals before the epoch at which the acute symptoms of rabies ought to appear. This is indirectly but fully proved by the fact, that if the period of incubation in a dog be much shortened our method may not prove successful in inoculating that animal. If the virus be, for instance, inoculated at the surface of the brain, the disease often follows as early as two weeks after the inoculation. It is noticeable that in order to protect an animal efficiently under these conditions, the whole process of preventive inoculations must be carried on as quickly as possible if that animal is to be efficiently inoculated before the fatal symptoms of rabies appear on the scene.

Several years ago I brought together at Villeneuve l'Etang many dogs inoculated during the year 1884, and placed them in a large kennel. After having demonstrated the fact that in 1885 and 1886 the larger number of these animals, though not all (eleven out of fourteen in 1885, four out of six in 1886), had not suffered any harm from the inoculation of the *rage des rues* (street rabies), even if the virus was deposited on the surface of the

brain, I came to the conclusion that, after all, it was only necessary to know whether such inoculated animals would be able to resist the action of the virus when introduced by a bite. Accordingly, in 1887, 1888, and 1889, inoculated animals were merely bitten by dogs suffering from rabies, and not inoculated under the skull. In 1887 the inoculated dogs suffered no evil effects after being inoculated by the bite of a rabid dog. In 1888, five dogs inoculated in the year 1884 were bitten in the month of July, together with five non-inoculated animals. The five inoculated animals are now (August, 1889) still in perfect health, whereas of the five others three died of rabies and two are living now. At the time of writing (August, 1889) a similar experiment is in progress on another group of animals inoculated in 1884. If these animals resist, and if all or part of the non-inoculated animals die of rabies, it will be a positive proof that the artificial immunity against fresh bites from rabid animals may extend over a period exceeding five years. However great the advances made in our knowledge of the etiology and prophylaxis of rabies among animals may have been, these results were interesting chiefly because they justified us more and more in hoping that the preventive methods against rabies might be successful in the case of men bitten by rabid animals. But the question was how to summon up courage enough to make that trial and to overstep the frontier which separates man from animals.

The following account is due to the pen of one who, in his official position of "son-in-law," has been present through all the phases of that period—a period full of anguish and dreadful perplexities :

"On July 4, 1885, at eight o'clock in the morning, Joseph Meister, nine years of age, the eldest son of a baker, living at Steige (Alsace), was going alone from that village to a neighboring school at Meissengott. He was walking along an isolated path, a school-boy's path, when a dog rushed on him and threw him to the ground. The child did not try to offer any resistance, but covered his face with his arms. The dog bit him, rolled him over and over and worried him. A mason saw the scene from some distance off, and ran to the spot. Armed with an iron bar, he beat the dog over and over again until the animal ran away home only to throw itself on its owner. The owner,

Theodore Vone, a grocer at Meissengott, took a gun and killed the dog. Foaming at the mouth, straw and pieces of wood in the stomach were there to show that the animal was presumably rabid.

"The parents of little Meister thought at first that their son had been attacked by a vicious dog. The day was spent in washing and dressing the child's wounds. But in the evening, frightened at what she heard—the accident the owner of the dog met with, the sudden determination of the owner to kill the dog with a shot from his gun—the mother took her little boy Joseph to Dr. Weber at Vollé. Dr. Weber cauterized the wounds, although twelve hours had elapsed since the accident, and advised Mrs. Meister to start for Paris.

"They came to the laboratory on Monday, July 6. M. Pasteur was greatly distressed and affected, and, although fully convinced of the value of his last experiments, the idea of applying his method for the first time on that child caused him great anguish. He therefore went and told Dr. Vulpian and Dr. Grancher, professor at the Faculty of Medicine, his pupil and friend, of the situation he found himself face to face with. Dr. Vulpian and Dr. Grancher came at once and saw little Meister, and, both of them agreeing, advised M. Pasteur to try on the child, condemned to an almost certain death, the method which had always been successful when applied to dogs.

"A shepherd from the Jura named Jean Baptiste Jupille came after little Meister. This boy had been bitten by a rabid dog, and arrived in order to undergo the preventive inoculations after six days had already elapsed since he had been wounded. M. Pasteur felt rather anxious on account of this delay of six days. But, although he carefully noted the difference between that space of time and the two days and a half which had elapsed from the time little Meister had been bitten to the beginning of the inoculations, M. Pasteur hoped that it was still possible to act. As rabies but rarely breaks out in man before a period of less than one month or six weeks after the bite, it appeared possible that the inoculations might have the time to fully exert their influence, and prevent the effects of the virus of rabies. It is really a question of speed. Rabies is, owing to the relative length of its period of incubation, like a parliamentary

train, whereas the *vaccin*, on account of the large amount which is injected, passes it just like an express train passes a slow train, and, after it has once passed it, prevents the active virus from entering the human economy. *Tout Paris* followed with the greatest interest that second experiment on Jupille. In the press, in drawing-rooms, in cafés, even in the streets, everybody gave his opinion, sometimes enthusiastic, sometimes reserved, sometimes hostile and even abusive, as to the degree of confidence which the newly announced method deserved. Like La Fontaine's shepherd, who had been raised for one moment to the dignity of favorite, he left Paris

"'*Comme l'on sortirait d'un songe*,'

and went quietly back to Villers-Farlay.

"Then bitten persons arrived from all quarters. Nobody could have believed that so many accidents could be due to rabies.

"It was at this time, in the midst of this crowd of people coming to be inoculated, that, on November 9, 1885, a child ten years old, little Louise Pelletier, came to M. Pasteur, after having been bitten thirty-seven days before. A huge mountain dog had furiously attacked her at La Varenne Saint-Hilaire. Not only was there a wound in the armpit, but there was another deep one at the back of the head. * * * The case seemed hopeless. But had there been only one chance in a thousand to save this child it would have still been right to make a trial and apply the method. * * * The treatment had come to an end a few days before, and the child had returned to the lodgings of her parents in the Rue Dauphine, had gone back to the life of a hard-working school-girl, and one might almost have begun to hope she was safe, when the first symptoms of hydrophobia made their appearance. The child refused all fluids. The contractions of the throat allowed no liquids to pass. The spasms of suffocation choked her speech. One might have fancied one heard the last sobs which follow in the wake of a child's fits of anger.

"In the morning of December 2d, a period of calm appeared, which lasted eight hours. A struggle seemed to take place between the disease and the preventive inoculations, which had

been begun again and repeated every two hours. But the virus had already invaded the child too far. Rabies was too powerful. In the evening, the disease, attended by its horrors, hiccoughs, and hallucinations, made further progress. The unfortunate little one said she felt as if water was running all over her body. At times she did not recognize her father, taking him for a stranger; then, noticing her mistake suddenly, she showered upon him her excuses and caresses. She kept calling for M. Pasteur, took his hands, saying to him: 'Stay near my bed; I should be afraid if you went away! Oh! I am so glad to have you near me.' The words came by fits and starts from her panting throat; death was creeping over her eyes—the great black eyes which anxiously watched you—and during these awful hours the sister, who had been removed from the room, went on with her lessons brought from school, in the dining-room, by the light of a lamp.

"On December 3d little Louise Pelletier died. There was at first a rebound in public opinion. From all parts of the horizon certain journalists, birds of evil omen, came running to the spot. They hoped that with the aid of this change of wind they would drown the discovery. Articles were flaunted about bearing as title, 'The Triumph of M. Pasteur.' Not only did they cry aloud that the method was a failure, but they even insinuated that the death of little Louise Pelletier was due not to the bites of the dog, but to the virus contained in the fluid used for inoculations. M. Pasteur was worse than a charlatan; he was a murderer. The calumnies became more and more virulent. Just think! To cause people to mistrust, to despise that discovery, to whisper into the ears of men who had felt a great patriotic joy and a great humane hope, this pessimistic conclusion: 'Well, it appears that all this is untrue.' That, for some people, would be a success indeed. These attacks were isolated, but on that account all the mere insolent. Did they succeed in preventing some people from coming to the laboratory? They caused them to hesitate, at any rate. A Hungarian woman, bitten by a rabid dog, came immediately to Paris to be inoculated by M. Pasteur, but stayed there six days before she summoned up courage enough to knock at the laboratory door. When M. Pasteur asked her the cause of this delay, she answered in return: 'After I had

read all I was made to read, I had no confidence any longer.' At the very moment that the departure from New York of four American children bitten by a rabid dog was announced, these philanthropic papers stated publicly that if the sad ending of little Louise Pelletier had been known in America, the parents would have spared the children a long and certainly useless journey. They came, and went back cured, and hundreds of bitten people followed them."

PREVENTION OF RABIES AT RIO JANEIRO.

The Emperor Dom Pedro of Brazil forwarded to M. Pasteur, in a letter dated September 26, 1889, the statistics of the treatment of rabies from February 9, 1888, to September 15, 1889, at the Pasteur Institute of Rio Janeiro, which is under the management of Dr. Ferreira de Santos.

The treatment by inoculation was applied to 162 persons, but from this number should be deducted:

First, five persons very slightly bitten by animals that were hardly suspected, and who did not complete the course of treatment.

Second, one person that died on the twenty-third day during the course of treatment. The important point in this case is that during these twenty-three days on ten occasions this patient failed to come to be inoculated. Three children who were bitten more than a year ago by the same dog were inoculated and are to-day in perfect health.

Of the remaining 156 persons only one died, probably but not certainly from rabies. The death-rate is therefore 0.64 per cent.

TREATMENT OF RABIES AT THE PASTEUR INSTITUTE.

Dr. P. Muselier published in the *Gazette Médicale de Paris* a few months ago a *résumé* of the proceedings at the Pasteur Institute to that time which is interesting.

The publication of the results obtained in the preventive treatment of rabies at the Institut Pasteur during the period extending

from November, 1888, to November, 1889, produces an impression quite as satisfactory as the one conveyed by the results obtained during the preceding years ; it seems to add an additional title to those which Pasteur's method has already won in the eyes of the public. This time again the death-rate following preventive inoculations does not go beyond a very low fraction—thirteen deaths out of a total of 1,810 persons vaccinated, which represents a portion of .73 per cent.

These figures call forth two remarks—the first bearing on the number of deaths after treatment, and the manner in which it is progressively diminishing. This number is at present less than one per cent., whereas the mortality in cases of rabies that have not been treated reaches the enormous proportion of fifteen per cent. ; the second relative to this fact, that the mortality after inoculation is about identical whether the bites were inflicted by animals proved mad by experimentation or by animals in which rabies was simply suspected.

It should be noted in passing that the latter remark authorizes us to think that the diagnosis of probable rabies in animals that inflict bites and then disappear without leaving any traces is, as a general thing, perfectly justified.

It would seem from this fact that Pasteur's method has triumphed over all obstacles, and that its dazzling superiority is now established beyond the reach of any question. Nevertheless, we feel it our duty to admit the justness of certain criticisms, quite plausible in appearance, which have been made latterly, not so much against the method itself as against a too literal interpretation of the way in which it acts.

In connection with three cases of rabies that had undergone treatment by M. Pasteur's inoculations M. Lancereaux recently published an article which seems to justify the restrictions to which we have just alluded. The victims, three boys, who had been bitten by the same dog, which was proved to have been mad, had gone through the course of preventive inoculation. Two of them felt no subsequent effects, the third died with all the symptoms of rabies.

How can we explain these different results coming from an identical treatment applied to cases which appear to be likewise identical ? Are we to attribute the fatal termination of the first

case to the fact that the wound had not been cauterized immediately after the accident, as had been done in the case of the other two boys? or should we impute it to the depth of this wound, a circumstance which may well have facilitated the immediate penetration of the virus into one of the nervous fasciculi of the region, and its subsequent rapid conveyance toward the cerebro-spinal centre? It would be possible to argue as to the degree of probability of either of these hypotheses; it cannot be denied that the case itself is unfavorable to Pasteur's method. Still, the treatment had been applied at an early date, in accordance with all the rules—that is to say, under the circumstances calculated to assure success.

M. Lancereaux calls attention to these peculiar difficulties of the interpretations. In his opinion, in estimating the value of these cases of failure we should take into consideration a number of factors, among which the depth of the wound and the direct contamination of a nerve fibre by the virus seem to hold the most important rank. He likewise thinks that we should also take account of the absence of cauterization after a bite. This precaution, which was formerly so strictly enforced, has fallen somewhat into discredit since Pasteur's discovery, but we must admit that facts such as those that we have mentioned above furnish in its favor an argument of indisputable value.

Lastly, it is just to remark that reflections based on simple statistics are not sufficient whereby to judge the value of the treatment; it is necessary to examine closely each particular case, and then will be found causes for objections to which a satisfactory reply has yet to be found.

FRESH AIR IN CONSUMPTION.

Dr. Nicaise has recently directed attention to the importance of pure air in all cases of tuberculosis.

A few years ago, it was thought that by increasing the cubic contents of the enclosed space in which a patient breathes, the desired result, an atmosphere of pure air, would be attained. But this procedure is insufficient. The air is still vitiated, and the solution of the problem lies in a continual renewing of the air.

Our dwellings are not constructed on this principle. We are therefore obliged to effect this permanent aëration artificially. M. Nicaise, in speaking of the process of keeping a window partly open, reports the degrees of temperature that he noted during his sojourn on the shores of the Mediterranean, where he spent 106 days during the winter of 1888–9.

His room was on the first floor, had one window and a south-western aspect. The sun entered it during the greater part of the day. The window was supplied with blinds, and the room contained fifty-three cubic metres.

The comparative figures of the minimum temperature out-of-doors and in the room were the following: the mimimum temperature out-of-doors ranged between 2 and 9 degrees centigrade above zero. The minimum temperature in the room varied between 9½ and 15 degrees. Under these conditions, then, there is no risk in leaving a window partly open during the months of December, January, February, and March.

This conclusion can be extended to other climates, but then it would be necessary to heat the room.

The renewal of the air of a room is accomplished by a current of air coming from the outside and by the expansion of the heated air. Under these circumstances the renewal is quite slow, and a sudden lowering of temperature is not to be feared. By the means of blinds with movable slats it is quite easy when desired to regulate the amount of air that enters and to prevent the too rapid lowering of the temperature inside.—*Paris Cor.*

THE MICROBE OF INFLUENZA.

The *Wiener Medicinische Blätter* first announced the discovery of this microbe by M. Seifert at Wurtzberg, in 1884. It was described as composed of micrococci, one or two thousandths of a millimetre in diameter, arranged like beads on a necklace, and is found in the mucus of the trachea, the bronchial tubes, and the nose. It is not to be found in ordinary colds in the head, or of bronchitis.

In January of this year there appeared in the *Evening World* newspaper an alleged illustration of the microbe,

which was purely the work of some imaginative newspaper man. Like many other things that appear in the newspapers nowadays, it was absolutely false in every respect. It did not resemble the microbe of Seifert in any one particular. If the reporter had actually seen any thing like that he represented, he had been ludicrously duped. It needs something better than a boy from the public school, or even fresh from our colleges, to form a judgment on matters of science, and especially upon those of such delicacy as this. But it is a misfortune when, for the purpose of making a sensation, newspapers deliberately deceive the public. The treatment for the disease, recommended in the same paper at the time, was equally absurd.

M. Seifert's discovery was afterwards disputed. It was questioned whether the microbe described by him was actually the cause of influenza, and Doctors Maximilian and Adolph Jolles of Vienna put in a later claim, which is well defined in the following letter written by them:

In our own chemical microscopic laboratory we claim to have discovered the bacillus of influenza. During the epidemic in Vienna our attention was first directed to some very numerous capsule cocci, greatly resembling the pneumonia bacilli of Dr. Friedlander. In spite of the fact that the sputum was of itself also, when microscopically examined, in no way remarkable, showing the general characteristics of pneumonia bacteria, and although many scientific searches have found in normal sputum similar micro-organisms, which, however, differ entirely from the Friedlander capsule cocci as they do not color their surroundings, and, owing to the enormous number in which the cocci were found, made the sputa really appear like the pure culture of the same, we felt called upon early in December to inform practitioners and our scientific confrères of this surprising and unusual find, and to point to the possibility of pneumonia being present in these cases. We continued our investigations carefully, and our supposition that it was a newly discovered microbe organism which stood in connection with influenza grew stronger and stronger.

We then proceeded to the cultivation of the cocci upon gelatine plate cultures on slides, and as soon even as the fourth day we

discovered colonies which resembled strongly Friedlander's cocci. Deep down in the gelatine they look like round, sharply defined, yellowish, minutely granulated organisms. When seen on the surface of the gelatine they present the appearance of infinitesimally small porcelain buttons. Now for comparison with the Friedlander cocci, which they resemble generally, but not when prepared as tube cultures, they showed the characteristic nail shape ; but placed alongside the Friedlander cocci the influenza bacilli appeared less brilliant, more bent and crooked. Subjected to the aniline color test, the influenza bacilli go through it very much like the Friedlander bacilli. By means of watery aniline colors we produced a fine preparation of slides.

Before concluding our statement it may be of interest to add, that in the investigation of the Vienna water supply, which we made December 26th, we discovered, in addition to numerous saprophyten bacteria, some which the gelatine magnified, some which resisted the magnifying process, and also numerous colonies (in German, *nagel colonien*), which, under the microscope, proved to be diplococci.

In regard to the inoculation of animals by the process of attenuating the virus, our experiments are not yet concluded.

(Signed) Dr. Maximilian Jolles.
Dr. Adolph Jolles.

In an interview held about the time of the publication of this letter Dr. Jolles explained the history of the discovery, and it is well always to have such records as a guide to other investigators. He said :

We came upon a trace of the bacilli quite accidentally, about the middle of December, in a sample of urine sent us by a practitioner, who thought that his patient was suffering from kidney disease. Examining the urine microscopically we discovered a bacillus, which, owing to the peculiar cassock formation of the head, we called "the bishop bacillus." It was a bacillus we had never seen before, nor had it ever been signalled by any bacteriologist.

We immediately set to work with a whole staff upon an examination of the defecation and urine of influenza patients in the

general hospital and in private practice, and in every case the bishop bacilli were found in great numbers, while in excretions from various other maladies examined at the same time the bacilli could not be found. This we did to avoid the argument brought against the Mexican, Dr. Cordova, to the effect that the peronospera lutea is found in the blood of all who die in certain seasons at Vera Cruz, whether yellow fever be prevalent or not.

They resemble in no way the cholera microbe, but have many points of resemblance with the bacilli of pneumonia discovered by Dr. Friedlander.

I wish to accentuate the absolute difference in form and nature between the two animalculæ, because it is still popularly believed that influenza is a forerunner of cholera, which belief, I think, we have scientifically disposed of. Now, on the other hand, the influenza bacilli and the pneumonia bacilli are undoubtedly of the same family and analogous.

I have as yet decided nothing about inoculation, but I hope that that process may not be postponed to the Greek Kalends. We have tried the bacilli and attenuated substantially the virus, but our first case of inoculation killed the patient—a rabbit—on which we tried it a week ago. It died immediately of blood-poisoning.

I cannot speak about the experiments upon which we are now engaged except to say that they promise well.

Another curious discovery was made on December 28th, when the epidemic was at its height. I then examined some of the water that comes to the city from the Kaiser Well, a hundred kilometres away in the Styrian Mountains, and I found two hundred and twenty-eight bacilli in every cubic centimetre of water.

When la grippe first made its appearance in Europe the doctors were perplexed. There was more excuse for them than there was for the consternation of the physicians of America, because the disease spread westward, and Americans had the experience of Europe to guide them. In December, 1889, the epidemic was fully prevalent in Paris, and various theories were formulated about it. Some readily regarded it as a precursor of cholera. And here is an example of the value of a knowledge of microbes, since the

bacillus of cholera and that of influenza are so different that any idea of a connection between the two diseases may at once be set aside. A resident in Paris at the time thus described the general nature of the attack:

The influenza epidemic is in full swing. It has captured the Military School of Saint-Cyr. It has attacked the *corps de ballet* at the Opéra. It has made a clean sweep through great shops like the "Louvre" and the "Bon Marché." In fact, nothing since the Eiffel tower has absorbed such public attention as this aggravating and mysterious malady that has swooped down upon us from Russia and to-day holds not less than one hundred thousand Parisians in its clutches.

Dr. Albert Robin, of the Académie de Médecine, described the symptoms as headache, pains in the eyes, soreness over the body, loss of appetite, high fever, and a general sense of lassitude and discomfort. These general symptoms may be got rid of, but they are apt to be followed by bronchial attacks, coryza, sore throat, diarrhœa, pleurisy, or pneumonia, and it is in these that the actual danger rests. The time of the disease was from two to eight days, but the sequelæ might cause it to drag on for many weeks.

Dr. J. A. Villemin, also of the Academy, was disposed to regard la grippe as identical with dengue fever common in Syria and the East and also well understood in some of the Southern States and the West Indies, a fact which Dr. Villemin did not seem to be aware of, though he recognized that it was due to a microbe, and also that that microbe came through the atmosphere and not, as in cholera and some forms of fever and dysentery, through the water.

Dr. Coroil is a specialist on tuberculosis, and he regarded la grippe as of very little importance. But he, too, never questioned that it was caused by a microbe, although neither he nor Dr. Villemin was willing to give credit to Seifert's and Jolles' discoveries. Dr. Coroil, in fact, distinctly denies that the special microbe of influenza and la grippe has been identified. He explains his skepticism thus:

"The saliva of a healthy person contains ten or twenty different kinds of microbes, which are not only harmless, but which are absolutely necessary to the digestion. As soon, however, as a person becomes affected with any disease of a contagious nature the number of microbes in the various bodily secretions become considerably increased, and what makes the task difficult is that "good microbes" and "bad microbes" become hopelessly mixed up, and it takes us years of patient experimenting to separate and classify them."

Nevertheless it is likely that if Doctors Jolles and Seifert had been Frenchmen Dr. Coroil and his colleagues in the Académie would readily have acknowledged the value of their investigations.

LA GRIPPE IN AMERICA.

Nobody with a sense of humor could have failed to see the funny side of la grippe's visit to this country. The people had heard a little about it, and the doctors ought to have heard every thing. But the consternation that it caused on all sides was inexplicable except on the ground of ignorance. The newspapers exaggerated it and alarmed the people, at the same time that they offered methods of treatment which they said anybody might use, but which were worthless and often dangerous. Druggists broke the laws by prescribing, and they helped, in no small degree, by their blunders, to spread the disease as well as to increase the public alarm. Many people thus were induced to think they had it, while their worst trouble was simply cold, and many others who had it were led to neglect it until worse consequences had to be experienced. Between druggists and newspapers, the visitation was intensified at least a hundredfold.

The medical profession, too, as a body, seemed to lose its head. It was confused and bewildered, and did not know what to do. A few foreign physicians, who, happily, are

among us, retained themselves, and smiling at the fuss that they saw around them, they treated their patients on sound principles and were successful. But to most of our local diploma-holders the visitor was a very troublesome and incomprehensible stranger.

To illustrate this I shall not depend upon my own observations, or upon the knowledge that came to me at the time, but will quote largely from some contributions to *The World*, whose management cannot be charged with partiality toward foreign citizens. It must be stated, as a caution to the reader, that physicians in New York are accustomed to such interviews with reporters for the purpose of obtaining an advertisement. Sometimes, like other people, they pay the reporters, or even take their contribution to the office for the sake of getting such an interview. But this does not affect the value of their statements in regard to treatment.

A professor at one of the medical schools, being asked how he treated la grippe, said:

"Thus far I have simply administered antipyrine for the first few days, combined with digitalis; after the bronchial affection has become prominent, a cough mixture containing minute doses of apomorphia and jaborandi, together with the inhalation at night of tincture of benzine in hot water. That is about the amount of my treatment thus far. I have not given a dose of quinine, and do not expect to give any. It is of no service whatever except when the patient has malaria complicated with the disease."

A physician in East Twenty-ninth Street said to an interviewer:

"The onset of the disease is sudden. It is preceded by malaise, then usually a decided chill, which is followed by fever. Great prostration is felt, compelling the sufferer to take to bed. The weakness which it produces over the whole system is distressing. There are also severe pains in the limbs, across the lower part of the back, over the chest and heart, in the head, around the eyeballs, and under the bridge of the nose. The digestive organs are affected, loss

of appetite ensues, accompanied with great thirst, a coated tongue, sometimes colic pains, with nausea, diarrhœa, and vomiting. Sneezing and severe catarrhal symptoms generally develop, but often not until the second or third day, and there is frequently a feeling of suffocation, with marked difficulty of breathing. No two persons are affected alike, and the treatment would have to be suited to the physical condition of the patient. It is not always necessary to administer medicine, nor would the same kind of medicine be applicable in all cases."

A doctor in Forty-fifth Street was serious in his opinion that the outbreak was an epidemic. The first symptoms, according to that gentleman, resembled the onset of typhoid.

"It begins," he said, "with a chill, and in some cases is accompanied by extreme weakness. In the cases of two ladies I attended, this weakness developed so rapidly that fainting fits ensued. A fever usually succeeds, and the temperature rises to as high as 102 degrees. There are also severe headaches, pains in the eyes, back, and limbs, and generally all over the muscular system, accompanied by cold chills running up and down the back. I believe it is a self-limited disease, and the patient who is careful during the febrile stage will recover in an average of three days under proper treatment.

"The treatment must vary. Quinine is useless. I know of one case of pneumonia certainly due to exposure while suffering from an attack of this disease, and until the real nature of the malady has been discovered, people should take no chances or run any risks by neglecting it."

"You think, then, that there is some doubt as to what the disease really is?"

"I do. When the first case came under my notice I did not thoroughly comprehend what it could be. If the symptoms were those of ordinary influenza, I could not have mistaken them, but there are many strange features in the present trouble which raise a doubt in any mind as to what it can really be. It is not certain by any means that this is

the same disease which has visited Europe, and which has become known as the grip. The other day I came in contact with a man who claimed to have had the grip a number of times in Northern Germany, and whose son was afflicted with the disease which has visited us, and he told me that the latter is entirely different in its symptoms from the disease with which he has so frequently been afflicted.

"Under la grippe he never suffered from any fever and had no chills, only a severe coryza, or cold in the head, with more or less muscular pains and a stiff neck. This latter symptom—a stiff neck—is something I have not seen as yet in any of my patients."

"Do you expect that the disease will become as widespread as it has been reported to have been in Europe?'

"If it is the same disease I believe the same results will follow, but whether it is or not I am of the belief that the people are likely to become better acquainted with it during the next few days, and I would advise every man to take to his bed at once and protect himself from exposure as the surest means of preventing subsequent troubles from developing."

A Thirty-eighth Street physician, in answer to a questioner, said: "The extent of the illness, in most cases, is dependent upon the physical condition of the patient. As far as I have been able to observe, the general symptoms of the disease seem to be similar to those that characterize the European epidemic, only it seems to be less virulent in its nature with us than it has been abroad.

"There are some people, of course, who are afflicted more severely than others, but that is the case in all diseases. I should consider that an attack of this influenza on a person suffering from other diseases might be quite serious. This epidemic has characteristics of its own. The cases which I have seen are not, by any manner of means, like the ordinary run of spring and fall influenza. At present I am not prepared to state positively what the disease may be, as that will have to be scientifically determined later.

"As to the treatment to be administered, I do not think that any one method would be applicable in all cases. I have just simply treated patients according to their peculiar requirements; and what I might prescribe in one instance I would vary in another."

A physician, whose name is well known through his writings and what the profession calls legitimate advertising, said that it was a great mistake to suppose that the epidemic was the same as that in Europe. Others declared that it was identical. Many insisted that quinine was useless; others that nothing but quinine would avail. Here is the prescription of a Brooklyn physician:

℞	Quiniæ sulph. . . .	gr. xxiv.
	Antipyrin	gr. xxiv.
	Ext. belladonnæ . . .	gr. ½
	Pulv. opii	gr. iij.

Divide into twelve parts, and take one every three hours.

One man would tell us that belladonna was bad, and another that opium and morphia were dangerous. A physician in Washington described his treatment as "rational." "I would give," he said, "belladonna to control the mucous discharge, aconite for the fever, and quinine and salol rather than antipyrine."

A homœopath has the following remarkable story to tell, and if others of his sect acted similarly, little wonder that the homœopaths were unsuccessful, except in lending encouragement to undertakers.

"I give," said this learned person, "arsenicum where the leading indications are great prostration, thirst, anxious restlessness, burning of nostrils, and running of thin, watery discharge from nose and eyes. Mercurius is indicated where the prominent symptoms are sore throat, fever, with sweating, sneezing, and a somewhat thicker discharge from nose. I give bryonia where vertigo is prominent and patient is unable to raise head except with great effort, and experiences aching of limbs, etc. Gelsemium is the proper remedy when marked symptoms are prostration, aching in limbs, and feeling of heaviness and stupor."

A St. Louis doctor said: "The influenza, or la grippe as it is now fashionably called, is a vegetable parasite, and there is no serious danger attached to an attack of it, provided the attack is not on a very young child or a very weak old person. Its treatment would be a matter to consider after the case has come under professional notice. Like bronchitis, which is not in itself dangerous, la grippe might, through neglect, become a dangerous malady, and finally develop a case of pneumonia."

Another in that town believed there was no such thing as la grippe, and that it was only an exaggerated cold; while a physician in Chicago, who had had experience in Eastern Europe, had no doubt about its being the genuine Russian disease. I quote the interview with the gentleman in full.

"All of the cases I have had," he remarked, "have shown the unmistakable symptoms of Russian influenza, and some of them have developed into very bad cases. The first case coming under my observation was last Monday at a restaurant. An acquaintance came in and sat down to the table with me. His tonsils were swollen, and the air passages of his head clogged with mucus.

"After examining him, I unhesitatingly declared that he was afflicted with influenza.

"There is not as much sneezing accompanying the disease as is popularly supposed. The first symptoms are a feeling of lassitude and weakness, a tightening of the air passages of the head and throat, and, well, a person appears about to be stricken with pneumonia, and if the disease is not arrested, pneumonia will result."

"Do you think the disease will be as severe here as in Europe?"

"It will be over the city in a week or two, and it will be the genuine Russian influenza. There is no mistake about that. I was in Russia in 1875 and 1881, when the disease was so prevalent, and I know from the experience I gained there that there is no use endeavoring to check it, for it can't be stopped. In my opinion the disease will be severe, and there may be some deaths. I have been in London, where the disease is now prevalent, and I cannot see much difference between the climate of that city and

that of Chicago, with the exception of the heavy fogs they have there."

"What about the germs of the disease?"

"They are carried in the air. The first case I spoke of showed the presence of the bacteria in large numbers. While examining the patient, some of the mucus dropped on my coat, and I had a touch of the disease myself, although I arrested it in time. I also examined some of the bacteria under the microscope. They are the most active of living things I ever saw, and are constantly moving. You can imagine what a havoc a lot of those bacteria make when they get into one's system."

"How ought the disease to be treated?"

"The patient must be watched carefully and given proper remedies. The disease must run its course, however. The only thing that can be done when it has become constitutional is to lessen its effect on the system, and the patient must be given remedies that will minimize the suffering."

In Philadelphia the physicians had recourse to quinine and whiskey, and external applications of brandy. One authority there said it was only a common cold; another, who is esteemed a specialist on fevers, held, on the other hand, that la grippe is deadly in its results, unless given prompt treatment, because the varying temperature of the blood is productive of inflammation of the lungs and bronchitis through the inhalation of cold air into the warm body. Philadelphia is also the home of the doctor who traced the introduction of the epidemic into this country to the exposure of a corpse which had been brought from Paris while the disease was raging there!

The Boston people were terribly frightened. Quackery runs rampant there, and there were several deaths. One man, who boasts a large number of patients but denies any medical association, said it was nothing more than rheumatism plus a cold in the head. A doctor there identified it with dengue fever, yet another thought no two cases were alike. The Christian Science people recommended prayer as the only possible cure. Nothing but prayer to kill microbes! Another medical sect of Boston believed in rum

and did not care for prayer. Rum was to be used internally and externally, chiefly internally, and rum was to be put into a bowl and set fire to, and then the patient's feet were to be plunged into it and held there.

Dr. Yee Joe, a celebrated Chinese doctor, scorned the idea of his people being affected with la grippe because "the Chinese wear their clothing loose, thereby preventing the moisture due to overheating from rendering the body liable to cold." Dr. Yee Joe added that he treats a cold by the sweating process, using water steaming hot, with ginger and pepperment added.

The prescription of the New York Board of Health, as given by a physician connected with it, was:

"Pure vaseline to bathe the nostrils and to be drawn up like snuff. Small pills composed of quinine, camphor, and belladonna, taken internally four or five times a day"; but several officials in that department, who were taken with the epidemic, gave the assurance that nothing was better than good gin, and plenty of it.

LEPROSY.

A long discussion took place at a recent meeting of the New York Academy of Medicine where attention was especially given to the danger likely to arise in this country from the spread of leprosy. Dr. Morrow who has studied the disease closely said that in his opinion the danger was not such as seriously menaced the public health, as the disease would spread very slowly, if at all. At the same time it should be borne in mind that leprosy is a disease in which the resources of medical science prove altogether futile, and measures should therefore be taken to stamp it out. It is probable that there are more cases in this country now than ever before. The report of 42 cases in New Orleans last year was a surprise to every one, and the propriety of legislative enactment for the suppression of the disease is unquestionable.

Dr. C. W. Allen said that his convictions on this question were very decided. Two years ago, in a paper read before

the Medical Society of the County of New York, he had contended that lepers should not be admitted into this country, and that those already here should be segregated. There were at the present time, as has been stated by Dr. Morrow, many more lepers in the United States than ever before. Two years ago he had placed the number at 250. This number, he had reason to believe, was too small at that time, and he thought there could be no doubt that there had been a considerable increase since then. When we considered the large number of cases all about us, and the increased likelihood of the spread of the disease from the increasing facilities of modern travel, etc., this question became one that we would no longer shut our eyes to. It was true that thus far very few cases had developed here (almost all being imported from other countries), yet some instances had been reported by Dr. Bulkley and others. Of the 42 cases reported in New Orleans, where no leprosy was supposed to exist, 29 were natives of Louisiana, and 22 of the city of New Orleans. One of these had been a nurse in a hospital where a leper was under treatment for some time. The evidences of the contagiousness of the disease were positive, and as long as a single leper existed anywhere he would constitute a source of danger to those about him.

Dr. L. Duncan Bulkley said he regarded this as one of the most important questions ever brought before the Academy. He thought no one could fail to see that whenever leprosy has been allowed free scope it has spread; while, on the other hand, whenever proper measures have been taken in time against its spread it has been exterminated. About twenty years ago he saw in the New York Hospital a very bad case of leprosy. Since then he had seen two or three cases every year in New York. He had met with one case in a patient who had never been many miles from Poughkeepsie, where he lived, and another in one who had never been far away from New York. Leprosy always comes from leprosy. He differed from Dr. Morrow, however, in the opinion that the bacillus lepræ does not exist in soil, water, etc., and believed that it may be left there, like other disease germs.

Dr. H. G. Piffard said that ten years ago he had read a paper before the Academy in which he discussed the question raised to-night. The points for which he contended at that time were, *first*, the contagiousness of the disease; *second*, the segregation of lepers; *third*, that it was the function of the National Government to attend to the matter. Since then his views had not altered. At that meeting a committee was appointed from the Academy to investigate the subject of leprosy in this country, and the committee so appointed performed the work required of it so far as it was possible for it to do so. It did not succeed, however, in tracing out more than forty or fifty cases in the United States. Many cases unquestionably escaped observation, and there was no doubt in his mind that at the present time there are at least five times as many lepers in the country as there were then. That segregation was necessary was shown by the fact that wherever this has not been practised the disease has increased, not in arithmetical, but geometrical progression. To the question, Whose charge is it to attend to this segregation? he would answer, The National Government. The Government should, in the first place, prevent the entrance of all lepers into the country; and, secondly, induce, as far as possible, all lepers now here to go to properly appointed lazarettos. It should be the duty of each State to place its own lepers in these lazarettos.

Dr. Morrow, in closing the discussion, said it was an important fact, he thought, that the spread of leprosy in the Sandwich Islands had occurred under conditions of high civilization, the state of the population being greatly superior to what it was fifty years before. The people there are in reality infinitely better off than the great majority of the poorer classes in this country. For one thing, they are very cleanly in their habits and are accustomed to bathe four or five times a day. Yet, notwithstanding their improved condition, the scourge of leprosy had attained the most fearful proportions among them.

In regard to the contagiousness of leprosy, to his mind, the evidences of contagiousness abounded and super-

abounded. He did not wish to be considered an alarmist, but in regard to this disease he believed that a wholesome dread was better than a false security.

At the conclusion of his remarks Dr. Morrow exhibited, under the microscope, specimens of the bacillus lepræ which had retained their vitality for a very long period.

In the *New York Sun* of August 18, 1889, some interesting particulars were given arising out of the death of Father Damien, from which the following extracts are taken:

The death of Father Damien, the heroic priest who went among the Hawaiian lepers at Molokai, and as a leper himself perished, again illustrates the fact that the true and historic value of a hero's life is apt to be quite concealed from the hero and to be very different from what the hero imagines it to be. Damien found the lepers cast upon a grim strip of rock which shot out into the blue ocean from a prison wall of cliffs three thousand feet high.

The lepers had no decent food, no decent water, only miserable huts for shelter, were abandoned to death and suffering in its most awful form. Damien pleaded and thundered away at the Hawaiian government until ships began to touch at the leper colony with clothes and good, clean food in abundance and supervising officials who had hearts in them. He made explorations along the coast and up among the jagged hillsides till he found springs from which flowed pure water: and this he brought down to the lepers in pipes which he made the government lay. He caused good houses to be built for the sufferers, and founded schools and hospitals. When he died he left the once bleak home of the lepers almost a garden, a fair and really beautiful spot, in which men were industrious and to a certain degree happy, tilling their little plots of ground, living in neat cottages, and sending their children to school.

When Damien died the story of his life thrilled the world, it is true; but it also drew the attention of men of science, of physicians, of princes, and newspapers and churches to the terrible disease by which and for which Damien died. In England the excitement over Damien and interest in the disease amounted to a furor. Thousands of pounds sterling were subscribed for the

lepers, and grave commissions of medical men set out to investigate the dread disease anew. Old reports on the subject, tales of travellers and sea captains, were examined anew. The Prince of Wales caused a panic by declaring that he knew positively of a leper who was employed in one of the great London abattoirs. In this country by far the most valuable and interesting contribution to the literature of the subject was an address by Dr. Prince A. Morrow before the Academy of Medicine in this city. In his address, Dr. Morrow set forth the startling fact that leprosy, so far from being an extinct and purely historical disease, was, in fact, gaining ground, and prevailed to an alarming extent in the United States.

Few have heard of the afflicted country of Tracadie, which lies between the Baie de Chaleurs and the Gulf of St. Lawrence, on the River Tracadie, on the south shore of the Gulf of St. Lawrence. About one hundred and thirty years ago, as tradition has it, a ship from the Levant, was wrecked on the coast. Some of the sailors were rescued and received hospitality from the settlers, the Acadians from France. Some women were the first to contract the malady; but no precautions were taken against its spread until 1817, when Ursula Landry died of the disease, and then all took alarm. In 1847 the government of New Brunswick established a lazaretto in Tracadie, and there are now many cases there.

When the Acadians were transported to Louisiana they took the disease with them. There are now hundreds, if not thousands, of lepers in Louisiana. There are two leprous centres in the Teche River district of Louisiana, at St. Martinsville and at Bayou Lafourche. Dr. Morrow says that he learned of many scattered cases along the line of the Southern Pacific Railroad, and that he saw cases in the San Pablo Hospital of Mexico and in the streets of the city. There are now very many cases of leprosy along the southern Atlantic coast and on the sea islands there, these cases being brought by emigrants from the West Indies. There are said to be forty-two cases of leprosy at New Orleans and one hundred at Key West. The Scandinavians have made leprosy not particularly uncommon in the Northwestern States. Chinamen have brought the disease to the Pacific coast, so that there are now over a score of known cases there and many more which are suspected and concealed.

Leprosy now exists in almost every part of the world. Its ravages are particularly violent in the Sandwich Islands, in Japan and China, in India, Palestine, Brazil, Norway and Sweden. There is no civilized region of the globe where isolated cases may not be found. In 1870 there were said to be one hundred and twenty thousand cases of leprosy in India. In the Sandwich Islands there are now over two thousand cases of leprosy known and many more suspected. The spread of the disease threatens the extinction of the entire Hawaiian race. In each country where it exists the history of its spread is the same. The history of the Acadian lepers is a perfect illustration. Starting from a single case, brought to the land in some chance way, the presence of the disease is unnoticed until its virus is fairly in the veins of a generation. The segregation and imprisonment of lepers are then ordered, but it seems almost impossible to stay the slow creeping of the disease among the people.

It is not too much to say that leprosy is the most interesting and horrible malady known to man. The most ancient of diseases, it is the one about which science knows the least. It is absolutely incurable, and all the remedies which have been applied to it so far have been merely experiments. The way in which it is transmitted from man to man is a perfect mystery. It cannot be said to be hereditary, because in families where both parents had the disease the children were perfectly healthy, and none of their descendants has shown the slightest signs of the malady. On the other hand, in families where one or both of the parents are lepers one child may be a leper, while its brothers and sisters are not attacked, and among the descendants of all of these children leprosy appears at random. Old as the disease is, the doctors have never yet been able to settle whether or not it is contagious. Thousands of instances may be cited where men, of no especial ability to resist contagion, have passed their lives among lepers, mingling with the lepers in the most intimate manner, and have remained perfectly free from the taint of the malady. Just as many instances may be cited of people who have become lepers on very slight exposure. A leprous man may marry a healthy woman and the woman never becomes a leper, and *vice versa*, while, on the contrary, the marriage of a leper to one not a leper often produces terrible results.

Undoubtedly the first exhaustive investigation into the mysteries of the disease was that made by Drs. Danielssen and Boeck, in Norway, in 1848. In Norway most of the cases of leprosy occur among the very poorest classes of the inhabitants, and especially among those living around the shores of the deep bays or fiords on the west coast. The huts of the people generally are of one low, narrow room, in which all the family live, with a small window that is not made to open, and are usually planted down in a damp site and surrounded by filth. Physicians in Norway and Sweden maintained for years that leprosy was hereditary, and that it flourished especially among people living on a fish diet, like those referred to. In these districts fish, frequently in an uncooked, salted, or dried form, is the staple article of food. Yet this does not account, of course, for the extreme prevalence of the disease in places where fish is seldom or rarely eaten ; or for the fact that numbers of people who largely consume fish, and even stale fish, never develop leprosy.

In the American *Medical Record* of August 16, 1884, Dr. Greddings, of Aiken, S. C., says :

"Isolated cases of leprosy have been observed in Charleston and its vicinity for many years, the present being the latest of a series of twenty that have been brought to my notice during the last twenty-five years. . . . In none of these cases was the disease hereditary, although in one instance a mother and daughter were affected at the same time."

A few years ago the question of the contagiousness of leprosy was made the subject of an elaborate report to the Board of Health in Hawaii by the physicians in charge of the leper settlement there. Prominent among those making the report was Dr. Edward Arning, a German expert who was employed by the Hawaiian government to study the disease. The investigations made by Dr. Arning resulted in confirming the discovery of Dr. Hansen, of Norway, that leprosy was the work of a bacillus known as the "bacillus lepræ." Dr. Arning made some interesting experiments on a human being, inoculating with the bacillus lepræ the condemned convict Keanu. The sentence of Keanu was commuted to penal servitude for life for the purpose of the experiments, the prisoner himself assenting to the arrangement. Keanu was inoculated with the leprous germ in September, 1884,

but he has never developed the disease. As the result of all his experiments, Dr. Arning made the following statement of what he regarded as proved :

1. The bacillus lepræ is a parasite limited to the human race.

2. It must be transmitted either directly from individual to individual, or

3. Run through a stage of intermediate life (spore condition), which we are at present unable to detect, but which may be present in the soil, water, or food, but can only get into them from the diseased tissue of the leper.

4. Accepting either theory, the direct or indirect transmission, we must look upon every individual leper, whether in the incipient or advanced stage of the disease, as a dangerous focus of the malady, he multiplying and nursing the germ in his tissues.

5. As every seed requires its peculiar conditions of soil, atmosphere, etc., to allow it to strike, and, when struck, to grow up to be itself a seed-bearing plant, so does the leprous germ require a certain disposition of the human soil to strike and thrive. What this peculiar disposition may be, we are at present unable to define. It is evidently a disposition which may coexist with apparent good health, as many examples of strong, robust men developing leprosy show us. This disposition may possibly be transmitted by heredity. I desire not to be misunderstood on this particular point. I do not believe that leprosy itself is in any case congenital ; but I do believe that a certain weakness to resist its attacks may be transmitted.

This was as definite as Dr. Arning would put things. It amounted to saying in plain words that leprosy was sometimes contagious and sometimes not, "requiring a certain disposition to thrive." Dr. Arning had a disagreement with the officials of the Board of Health, in consequence of which he resigned his place and left Hawaii in the latter part of 1884.

Dr. Fitch declared that the spread of the disease was due to heredity. Superintendent Mouritz, of the settlement, said that all this talk was rubbish in view of the enormous spread of the disease. In 1847 there were no cases of leprosy in the Hawaiian archipelago, and there are now there fully two thousand five hundred. Heredity cannot account for this. Dr. Mouritz's remarks are very interesting. He says :

The whole history of leprosy in the Hawaiian Islands, from its propagation to its present rapid spread and development, verily proves that it can only be accounted for by regarding it as a contagious disease. Whatever else may be said of its being non-contagious in other ancient countries where the disease exists endemically, these statements do not apply, or should not apply, to the disease in the Hawaiian Islands.

That leprosy did not prevail on these islands until many years after they were open to foreign intercourse receives great confirmation in the fact that no true aboriginal word is in use for the name of the disease. I consider this a most significant illustration of the rapid spread of leprosy within a comparatively short era. I believe it perfectly safe to affirm that, did leprosy exist among the ancient Hawaiians, they would not call it, as the present race do, "Chinese sickness." Whatever defects the Hawaiian language may have, a very casual observation shows that it was in the highest degree, and is, a language of minuteness and exactitude; and it can scarcely be imagined that naming a slow, progressive disease like leprosy was beyond the power of their intellect, and yet this is really what those who claim to trace a hereditary development alone of the disease ask us to do.

Dr. Mouritz refers to the fact that the Hawaiian name for leprosy is "Mai Pake," or "Chinese sickness." That leprosy was brought into the archipelago by Chinamen is the common belief and statement there. In the second place, Dr. Mouritz very pointedly asks those people who deny the contagiousness of leprosy to account for cases like those of Father Damien. Writing in 1884 (Father Damien having, of course, died since), Dr. Mouritz gives this history of his case:

Father Damien arrived at the settlement in the year 1873, and has lived there continuously ever since. He is a Belgian, of good physique, and when he arrived was thirty-four years of age. During all the period of his residence he has been daily and hourly in contact with lepers of various grades, and many very severe. Until 1884 he felt fairly well. In that year pains in the left foot troubled him; these continued to get worse, and, in the absence of any other signs, were attributed to rheumatism. Toward the end of the year 1884 he consulted Dr. Arning, and to this gentleman must be given the credit of diagnosing the dis-

ease in its very early stage, as certainly not until six months afterward did external manifestations of leprosy develop. In May, 1885, there were no striking changes in his face when examined by Dr. Arning and myself. In August, 1885, a small leprous tubercle manifested itself on the lobe of the right ear, and, from that date to the present, diminution and loss of eyebrows, infiltration of the integument over the forehead and cheeks, are slowly but certainly going on, so that the case of Father Damien is a confirmed tubercular one, the symptoms and signs now present placing it in that class.

I believe the majority of cases of leprosy at the settlement, had they been rigidly watched, would fall in the same category as Father Damien's. Most cases of leprosy are recorded between the ages of thirty and fifty years, so heredity is scarcely possible.

I am also clearly of opinion that leprosy is contagious at the beginning and all through its course, and that the "exhalations" from the leper are the main agencies at work.

Dr. Mouritz is of opinion that leprosy is both hereditary and contagious. He believes that leprosy may be communicated by the various chance kinds of inoculation, as well as by inhalation.

The ancient idea about leprosy was that it was highly contagious, and the cruel ways in which lepers were put apart from their fellow-men are familiar to all readers of history. It is undoubtedly true that very many people—perhaps the majority of people—are impervious to the contagion, and that the disease indeed requires a "certain disposition to strike and thrive." But in this view all lepers are dangerous. Of the reports made by the physicians at the leper settlement of Hawaii, that of Dr. Mouritz seems full of sense, and to rest upon the great truth that against a fact the gates of theory cannot prevail. If the heroic Belgian priest who offered up his life at Molokai shall have been the means of notably proving that the horrible disease of which he died is actually communicable from man to man, he will indeed be worthy of canonization by his Church, and will have built for himself an eternal fame.

VALUE OF MILK ANALYSIS.

A strong infant, four months old, was shown to Dr. Corbeau, a Paris physician. He was told that it had lost two hundred

grammes in a few days and displayed symptoms of general weakening, and at the same time of quite copious vomiting. He was informed that the nurse, who appeared to be a buxom girl with a bust as ample as could be desired, was indisposed for the second time since she had been nursing the child. During the interrogation the physician learned that the woman had now been nursing for about a year. Still it must in justice be said that M. Corbeau admitted that except during the previous two weeks the infant had developed most satisfactorily. But since the child was complaining now, what could be the cause of it? An idea came naturally to his mind, old milk. This expression, by its very vagueness, did not much improve matters. Furthermore, the nurse protested, and called to witness the excellence of the previous services that she had rendered to the child. Two samples of the suspected milk were taken, and M. Maquart, druggist, formerly attached to the Paris hospitals, subjected them to a most scrupulous examination. They were analyzed by four different processes, which all gave absolutely identical results:

Density, 10.30 and 10.35.
Fatty substances, normal.
Caseine, only slight traces.

The conclusion to be drawn was self-evident, and the nurse had to be discharged; another one took her place, and as she offered all the necessary requisites, the child was seen under her care to regain its former state in almost no time.

NECESSARY QUALITIES IN A STOVE.

The legislation of the French authorities is as paternal in some things as ours is vexatious in others, and so the Academy of Medicine have sought to lay down the rules that should govern the stove-makers. The following is a copy of the resolutions agreed upon by that body, and although the subject would hardly be thought of sufficient magnitude for the consideration even of a legislature that has made it a statutory offence to feed a sparrow, yet they are well worth attention:

First.—The sale of a stove should not be authorized unless its draught is sufficient to transform the carbon into carbonic acid.

Second.—No pipe of a movable stove should be allowed to be fitted to any chimney unless the chimney has a suitable and adequate draught.

Third.—An examination of the neighboring chimneys should be required before setting up a stove, to avoid the gases from one chimney being driven back or filtering into another, and to preserve the interested parties or their neighbors from being poisoned at a distance by oxycarbonic gas.

Fourth.—The public should be warned of the danger that is incurred by having, during the night, in an adjoining room, one of these slowly burning stoves.

ANIMAL PARASITES.

One of the most interesting papers recently published on this subject appeared last year in the *Journal of the American Medical Association*, from the pen of Dr. Bayard Holmes, Director of the Bacteriological Laboratory at the Chicago Medical College. It is deserving very careful perusal. Dr. Holmes is a most industrious investigator and his observations are eminently practical.

There are very few students of nature to-day, wrote the doctor, who are not imbued with the philosophy of evolution. Every isolated fact in the life of an organism takes on an added interest when viewed in its relations to the great principle of natural selection. From the standpoint of the evolutionist, the subject of parasitism is a very extensive one, and the relations of the pathogenic micro-organisms to their host occupy only a limited district in this great province of thought.

It can be fairly presumed that those relations of conviviality which we see existing between mutualists, between messmates, and between host and parasites, are subjects for natural selection. Indeed, the study of the fertilization of flowers shows us the most intimate dependence of a large number of plants upon their animal parasites, and this, too, accompanied by changes in the essential organs of those plants which produced forms most con-

fusing to the earlier botanists. So mutually beneficial is the association of certain species, that they have been called mutualists. These relations are so far-reaching and intricate that they surprise us into the belief that the destruction of a single parasitic species would overthrow the equilibrium of animal life and result in changes little short of a biological revolution. I may cite the classical observation of Darwin:

"In several parts of the world insects determine the existence of cattle. Perhaps Paraguay offers the most curious instance of this; for here neither cattle nor horses nor dogs have ever run wild, though they swarm southward and westward in a feral state; and Azara and Reuyger have shown that this is caused by the greater number in Paraguay of a certain fly, which lays its eggs in the navels of these animals when first born. The increase of these flies, numerous as they are, must be habitually checked by some means, probably by other parasitic insects. Hence if certain insectivorous birds were to decrease in Paraguay, the parasitic insects would probably increase; and this would lessen the number of navel-frequenting flies—then cattle and horses would become feral, and this would certainly greatly alter (as, indeed, I have observed in parts of South America) the vegetation; this again would largely affect the insects; and this, as we have just seen in Staffordshire, the insectivorous birds, and so onward in ever-increasing circles of complexity."

The greater number of parasites are found among the lesser plants and animals. This is as we should suppose. The parasite deriving its support from a smaller organism would soon destroy its host, and itself perish in turn. It is secure in its position of parasitism only while it takes from its host no more than can easily be spared. The condition of parasitism then exists best when the assistance which the parasite demands can be granted without material injury to the host, or, when the parasite is actually beneficial, or even essential to the existence of the host species.

There is scarcely any end to the variations and modifications which an organism may undergo by natural selection, provided a sufficient time be allowed for the changes to be undergone. And, moreover, there is no part of an organism which may not be modified by this agency if such changes become advantageous to

it in the struggle for existence. When, therefore, we find an adaptation of great complexity we must assume that the relations requiring such adaptation have been in action proportionately a long time. This is not only the case in the adaptations of an organism to its lifeless environments, but it is in the same degree the case in the adaptations existing between host and parasite or between messmates.

One of the most remarkable of these convivial adaptations is related by Charles Darwin in regard to the slave-making ants.

"This ant (*Formica rufescens*) is absolutely dependent on its slaves; without their aid, the species would certainly become extinct in a single year. The males and fertile females do no work of any kind, and the workers or sterile females, though most energetic and courageous in capturing slaves, do no other work. They are incapable of making their own nests, or of feeding their own larvæ. When one of the old nests is found inconvenient and they have to migrate, it is the slaves which determine the migration, and actually carry their masters in their jaws. So utterly helpless are the masters that when Huber shut up thirty of them without a slave, but with plenty of food which they liked best, and with their own larvæ and pupæ to stimulate them to work, they did nothing; they could not even feed themselves, and many perished of hunger. Huber then introduced a single slave (*Formica fusca*), and she instantly set to work, fed and saved the survivors, made some cells, attended to the larvæ, and put all to rights."

Such an adaptation of a whole species to an artificial condition would be wholly anomalous and unexplainable were it not for the fact that related species have been studied in distant localities that show a less complete adaptation to any dependence upon the condition of slavery. This complicate social arrangement probably arose by accident. The larvæ of neighboring colonies were stolen for food. They were hid away until hunger should require them, some of them hatched out and were fed and brought up, aud proved useful servants. The workers of such colonies had more time for warfare and pillage, and so the number of slaves went on increasing from generation to generation with further adaptation to the new mode of life until the instinct for robbery took the place of the instinct for work. It must have required a

long time to change the habits and instincts and structure of a whole species in this way. Among the Swiss *Formica rufescens* slaves are a necessity to the existence of the species. In England the *Formica sanguinea* has slaves only as a convenience, and its workers attend to a large share of the work themselves. Among other species in all parts of the world slaves are tolerated only as waifs and they enter very little into the economy of the community.

Time, then, is a most important factor in the action of natural selection, and any condition of parasitism is a very ancient one indeed which is so perfectly developed that the life of the parasitic species or the life of the host species is dependent upon its uninterrupted perpetuation for its existence.

The antiquity of the parasitic condition, however, does not correspond exactly with the complexity of the morphological adaptation between species, for we find that among the flowering plants adaptations have been secured limiting the fertilization of a species, which adaptations render the extinction of a single species of insect in a neighborhood equivalent to the extinction of the same plants in the same area. It is evident that the variation of the more complex plants is much more rapid and extensive than the variations of lower forms, for we find that some of the lowest forms of plants and animals have existed from the earliest geological epochs, while the more complex forms rarely present evidence of so great a longevity.

We are accustomed to look upon chlorophyl almost as an essential to vegetable existence, yet there is a great number of thallogens which are perfectly devoid of this substance. Those plants which contain chlorophyl are able to elaborate from the stable inorganic constituents of earth and air, with the help of that force which they derive from the sun's rays, organic, unstable, compounds of a very complex molecular condition. Those plants which are devoid of chlorophyl must depend for their vital force not upon the sun's rays, but upon the energy released by the decomposition of those molecules of unstable equilibrium which have been built up in the growth of the chlorophyl-producing plants and in that of animals.

Thus we see that by their very nature those plants devoid of chlorophyl are eminently adapted to a saprophytic or parasitic

existence ; in fact any other mode of life is shut off to them. In this class are found the bacteria.

While adaptations of a most complex character are granted in the case of such large parasites as the tape-worms, the flukes, and the itch insect, the same possibilities have been denied to such unicellular plants as the bacteria. The micrococci average about one micron in diameter. To the best objectives they have about as much individuality as a single star had in the field of the telescope before the introduction of the spectroscope. Does this prevent the greatest morphological and physiological complexity? Not at all. The spermatozoa of man is not much larger, and yet it carries with it peculiarities of form, color, voice, and psychological functions which are as complex as human life. Surely if this is the case, we do not need to question the possibility of sufficient room in a microbe for all the complexity of structure and function which the argument of this paper demands.

That there is no corresponding differentiation of structure to be seen by the most powerful microscope does not matter, for light is so gross a thing that nothing more could be expected. The extreme diameter of a micrococcus is say one micron ; the length of a wave of light in the middle of the visible spectrum is about ½ a micron (E = .5269 microns). What more can be expected with such a measure? Our only hope in this direction lies in the use of much shorter waves which are far above the lavender and at the limit of photographic recognition.

When a parasite is wholly dependent upon its host for its existence, it is said to be an obligate parasite ; when a parasite is able to live outside the host species upon dead animal or vegetable matter only with difficulty, it is called a facultative saprophyte ; and when a species which ordinarily lives a saprophytic existence is able under favorable circumstances to become a parasite it is called a facultative parasite.

I will here refer only to obligate and to facultative parasites, for, although there are equally interesting relations existing between the facultative saprophytes, in the consideration of one of them I have already occupied some of the time of this society.

Our tape-worms are examples of obligate parasites. They cannot live outside the bodies of their hosts. They depend for their existence upon the fact that the carnivora devour the herbivora.

The eggs of the tape-worm are innumerable. They are scattered by the carnivorous host in its fæces. The rains wash them into little pools and brooks, and scatter them upon the foliage and grasses. The herbivorous host takes them into its stomach in the water it drinks, or on the grass it eats. The warmth and secretions of the stomach free the embryos from the imprisonment of their egg-shells. They cling to the wall of the digestive tract until they gain strength to force their way into the blood currents. There they remain until they are carried to the smallest capillaries, in which they establish themselves, and, for some unknown reason, they prefer the muscles. Here they go into a sort of pupa state, to await the time when their herbivorous host will be overtaken and devoured by a carnivorous enemy. In the stomach of the carnivorous second host, the wall of the pupa is dissolved. They are provided with hooks which attach themselves to the villi, or deeper structures of the intestines. Here they are bathed in a well-digested nourishing material until they grow to a relatively enormous size and produce from each segment of their bodies millions of eggs to pursue a similar struggle for existence. What an enormous number of eggs perish because they never come into the proper host, what millions of encysted pupæ die in their calcified cocoons, what thousands pass through the intestinal canal without finding a proper place to attach themselves, all that a single mature and sexually perfect tape-worm may find a place in which to vegetate and procreate! What a wonderful cycle of existence is this, and what innumerable ages must it have required to develop out of the accidental ingestion of living independent articulate such a complex and obligate parasite! And what can be said of the parasites of the cat, which live the first part of their existence only in the mouse, and of the tenias of the dog and wolf, whose cysticercus form is found in rabbits. How long did it require these specific forms to develop from original generic species? Unfortunately we can never know, but we must assume that it has been a very long time.

The relation of man to the domestic animals furnishes us the only approximate measure of the rapidity of these changes. Under domestication a few mammals, birds, fishes, insects, mollusks, and some vegetables have become so modified that they cannot be referred to any undomesticated species. How far

back must man have begun to cultivate the banana, which now is seedless and would perish as a species without his care? Surely so long ago that we need some other measure than the century. But to have evolved a parasite with such complex and limited relations as those of the tenia must have taken a much longer time. And how shall we explain the fact that the *Temocephala chilensis*, a small parasite on the legs of certain fresh-water crustaceans of Chili, occurs identical in species in the Philippines and in Java on other articulates? Wallace has justly observed that such cases ought to be regarded as proof of the hypothesis that those types which have occasioned the similarity of remote faunas must have had a very long historical duration, persisting, very likely, through *many geological epochs*.

This, perhaps, calls forcibly enough to our minds the antiquity of these forms of parasitism. Let us for a moment consider the origin of such forms of parasitism as tuberculosis and the other acute and chronic infectious diseases of man and animals. While some of them are still under dispute, tuberculosis, syphilis, and measles are recognized as entities, and they are considered by all fair-minded and unprejudiced scientists and physicians as due to distinct and specific parasites. These parasites are, so far as we know, specifically different from any non-parasitic organism to which they are generically related. Nor can it for a moment be supposed that the parasitic bacteria are in any other category in relation to the influence of natural selection than the parasites which belong to more highly differentiated orders of life. Indeed, the very fact that the lowest and most slowly varying vegetables have become obligate parasites is evidence of an association greater in time than we should consider necessary for the evolution of a much more complex relation existing between the more rapidly varying articulates or infusoria.

It appears that the bacillus of tuberculosis is unable to grow on any accidental or artificial media under any presumable natural conditions of temperature and external surroundings. It is able to multiply in man and in some other mammals, and in a few related vertebrates. Therefore, we may presume that, should it be deprived of a living host even a day beyond the few months during which its spores might retain vitality, the species would become wholly extinct, and the world would be free ever after-

wards from the ravages of this dreadful scourge. The bacillus of tuberculosis is then an obligate parasite of the warm-blooded animals. When we consider what specific difference means, and how perfectly the bacillus of tuberculosis manifests this difference, and when we see how great is its geographical distribution, we are compelled to go back far into the present geological epoch, and probably beyond it, for its origin.

In the bacillus of syphilis we have a still closer obligate parasite. It is confined to the Primates alone. All attempts to convey it from man to animals other than the Quadrumana and to artificial media have been equally unsuccessful. Here, then, is a peculiar parasite which finds in the intimate structure or other bodily conditions of all animals except a limited class such conditions as are altogether inimical to its reproduction. Since it is a parasite of as simple structure, and since it varies as slowly, as tuberculosis, we must look still further back into the past for its origin in independent forms.

In measles we have an example of a parasite which is not only confined to a single species, but for the most part to the young of that species. Perhaps the most unexplainable feature of this parasitic disease is the fact that one attack renders the host immune to subsequent invasion. This fact is phenomenal and, so far as I know, wholly without explanation.

Looking upon these obligate parasites of man as of such ancient association, going back beyond the present geological epoch for the beginning of syphilis, tuberculosis, measles, scarlet-fever, small-pox, whooping-cough, leprosy, and every form of tape-worm, how is it possible that man has been able to withstand the attacks of so many enemies for so long a time? The very fact that he has survived, and that these parasites are unable to exist in any other media than his living body, is conclusive proof that they are not essentially destructive parasites; for with the destruction of the host species occurs the destruction of the obligate parasite. Such a proposition appears to be axiomatic, but axioms occasionally need to be formulated. Given abundant opportunity of contagion, a destructive obligate parasite is inconceivable. It is possible only when its destructiveness does not interfere with the reproduction of the host species, as after the reproduction act has been performed.

How different from the mild course of syphilis, tuberculosis, leprosy, and the acute infectious diseases is that of tetanus, anthrax, malignant œdema, and other forms of gangrene and the various wound diseases. Among domestic animals, when encouraged by overcrowding and filth, the saprophytic bacteria produce equally destructive diseases. Take, for example, Texas fever, hog cholera, and ranch-brand. So, too, is it with yellow-fever, Asiatic cholera, malaria, and diphtheria, which are doubtless facultative parasites of man. To these rare and accidental parasites we have in our skin and mucous membranes a most careful and adequate protection. By the action of natural selection the door to invasion has been closed, but within we have no adequate means of defence; so when infection does accidentally take place and the usual saprophytes become parasites, the chances are greatly against the host in the conflict that ensues. The facultative parasites may or they may not be destructive, and it is probable that against but few of them has the action of natural selection rendered us indurate.

While we are accustomed to look upon syphilis, tuberculosis, and leprosy as excessively destructive diseases, a moment's consideration is enough to clear our minds of this traditional notion. Syphilis, in the strong and healthy Caucasian, frequently runs the first and second stages of its course without recognition, and does not, therefore, interfere with procreation. When the infirmities of age confine the patient to unfavorable surroundings and habits of life, the tertiary symptoms come on with the reduced vitality and nutrition. Fatal or destructive syphilis in the otherwise well and healthy is rare. In children and in poorly nourished young people, and in those suffering from chronic diseases, it frequently appears as a terminal affection.

Tuberculosis in the lymph glands of the neck, in the bones and joints, in the ear, and even in the peritoneum, is not very destructive. It is frequently followed by recovery. Even in the lungs tuberculosis may run a chronic and rather harmless course, and interfere very little with the reproduction of the species. It is only after pyogenic infection of the tubercular tissues of the lungs or other areas that sepsis and symptoms called "hectic" appear. This sepsis is then the destructive factor, as it is in wound reaction.

Leprosy is the closest obligate parasite of man so far observed. The bacillus of leprosy bears a remarkable morphological relation and staining reaction to the prime factors of tuberculosis and syphilis. It is almost never a destructive disease, and it appears only in those who could have already accomplished the reproductive act; therefore it does not interfere with the perpetuation of the species. It is conveyed by contact, but only with difficulty, and there is evidence that it is not necessarily hereditary; that is to say, healthy children may be born of those who are suffering from leprosy. The attendants on persons suffering from leprosy are not often affected with the disease, but often enough to demonstrate its contagiousness.

In certain of the infectious diseases one attack protects from subsequent invasion. This is the case not only with the obligate bacterial parasites, but in a greater or less degree with the facultative parasites. It is interesting to compare the destructive power of our principal infectious diseases, the ease of infection, and the acquired immunity to succeeding invasion. In measles we have a comparatively harmless disease, the greatest ease of infection, with subsequent immunity. Scarlet-fever is not so harmless, is less contagious, and equally protective. Small-pox is more destructive, less contagious, and equally protective. Yellow-fever is far more destructive, and far less contagious, and equally protective. Leprosy conveys no immunity, for the disease rarely terminates in recovery, but the infection is accomplished with the greatest difficulty, and the spread of the disease is slow. Syphilis is not very destructive, it has a difficult but certain method of infection, and one attack does not so surely protect against subsequent recurrence. Instances of this kind could easily be multiplied, bringing in other factors which act in producing immunity or protection or physiological resistance, all brought about by the obvious necessities of the law of the survival of the fittest and that of heredity.

If a few indulgent and patient readers have followed my arguments to this point, the suggestion of a possible practical application will be redundant. It is obvious that a comprehension of these limitations of parasitism would not only direct future biological research, but materially assist in suggesting therapeutic measures. They also furnish a perspective in which limited data

may be studied by the side of more complete facts, and they offer the greatest promise of a rich harvest in a neglected field of thought.

However we may look upon some of the minor points of this argument, or whatever exceptions we may take to the illustrations, we may fairly agree upon the following predictions :

1. All obligate parasites are without exception examples of very ancient parasitism, and what is of more practical moment, they are necessarily non-destructive to the host species.

2. The destructive action of the obligate parasites is only manifested towards the weaker individuals of the race, and therefore they are a factor in the evolution of a strong and wise and morally temperate nation.

3. The dangerous consequences of secondary infection with destructive facultative parasites is emphasized, and the physician is taught that as happy results may be expected in the antiseptic treatment of the infectious diseases as have followed similar indication in the treatment of wounds.

4. The great field of expectant medicine lies in the treatment of diseases due to obligate parasites, while the great field of preventive medicine is to be found in providing against infection with facultative parasites.

5. The use of quinine in malaria and the efficacy of mercury in syphilis will always encourage a careful look-out for specifics for other parasitic diseases, especially in those that manifest symptoms of infection of the blood-currents.

6. The artificial immunity to small-pox which is acquired by vaccination is suggestive of possibilities which will be applicable to all those diseases in which one attack protects from subsequent invasion.

7. Some of the obligate parasites are shared by man with the domestic animals, and it is possible, and even probable, that in some diseases they are the most frequent source of infection. The study of the diseases of animals is indicated, and there can be little doubt that it will be followed by a diminution in the number of cases of those diseases which are common to man and domestic animals.

8. Conditions which clinically seem to be entitled to a single place in our nosological catalogue may not be entities or identi-

ties, and therefore conflicting biological studies of parasitic findings in these cases may be harmonized by a re-arrangement of our nomenclature.

9. Alarmists have nothing to fear in new contagious diseases, for it is probable that all unrecognized obligate parasites are harmless, though perhaps exquisitely contagious or epidemic.

YELLOW-FEVER.

Few physicians on this continent have had more experience with yellow-fever than Dr. Wolfred Nelson, C. M. of Quebec. He was for some years a member of the Board of Health at Panama, where he had ample opportunities of studying the disease in its worst form, and last year he gave an outline of his views before the State Medical Society of Arkansas, which I shall present to my readers. The paper is valuable from a practical point of view, but also as showing the errors that have been committed by the medical faculty and the endorsement of all I have said in preceding pages on this terrible disease.

Dr. Nelson, addressing the President of the Society, said:

In what follows, I shall refer to my own experience of this dread disease at Panama, on the Pacific, and Colon, on the Atlantic, both ports of the Isthmus of Panama; my studies and observations on the west coast of Mexico, where I studied and traced its epidemics of 1883 and 1884; my experience in the hospitals of Cuba; and finally my visit to Florida, in the fall of 1887, when I deliberately forecast the epidemic that swept Jacksonville in 1888. My letter of warning to the people of Florida was published in the *Times-Union* of Jacksonville, November 30, 1887, and was recalled *when the disease was upon them.*

Now, to return to the Isthmus of Panama, where I lived and practised from 1880 to 1885. I was back there twice in 1886, and twice in 1888, thus, to use an expressive phrase, bringing my knowledge down to date.

The yellow-fever of the Isthmus of Panama I describe thus: It is an acute infectious disease, a specific fever, ordinarily not

contagious; but under certain atmospheric conditions, not yet fully explained, the disease undoubtedly develops contagious properties and epidemics result.

Yellow-fever is ushered in in a variety of ways. It may be preceded by languor or malaise. The invasion may be abrupt. Generally characterized by a chill, often very severe, lasting one, two, or three hours; the duration of the chill having a marked significance, severe chills marking nearly all fatal cases. Again, the disease may be ushered in by sudden nausea and faintness, without any warning, as in my own case during the Isthmian epidemic of 1880. Headache is always met with. I know of no exception to this statement. Frontal headache, a flushed face, and gastric irritability in new-comers within the yellow-fever zone, is always very suspicious, a fact specially referred to in Dr. Belot's admirable book, "La Fièvre Jaune à La Havane." Generally the headache is frontal; it may be bi-parietal and occasionally occipito-frontal, but, to repeat, marked headache always. In dealing with specific yellow-fever of the Isthmus of Panama, which, if respectability depends on its antiquity, is the oldest, most respectable, and fatal variety known—a history of constipation obtains in nearly all cases. I can recall but a single case as an exception to this well-known rule, and it was a case in my practice where the disease had been preceded by a malarial diarrhœa. No condition of health gives immunity. It aims at all, be they healthy or unhealthy. It has a specific rôle. From early youth to advanced age it pursues its death-dealing mission. It is true that the mortality among children is less than at puberty and beyond. Pains in the legs and sacral region, the latter often intense and agonizing. I shall never forget my own experience. It seemed as if a legion of fiends were trying to dig out—if I may use the expression—my sacrum with red-hot pincers. The pain is excruciating and indescribable. In the majority of patients, the face was red, just like the face is in scarlet-fever—the boiled-lobster color. The eyes at first were clear, providing that there had been no antecedent hepatic disease; later they became suffused, injected. The skin was hot and dry. In many cases a peculiar biting heat was felt (like the *calor mordax* of pneumonia). It produced a strange sensation, resembling a current of electricity playing over the extended head. Pulse hard and slow,

varying from sixty-five to eighty. Temperature, first stage, 100° to 103°; where the cases proved fatal, in the first stage, rising to 104°, 106°, and 107°, the latter being the highest temperature noted by me in my practice; to fall slightly just before death. In the second stage, or "period of calm," as it is termed, it feels a remission only. At the beginning of the third stage, or the stage of "secondary fever," it rises again. Respiration, as one would expect during the "hot stages," is hurried. At times a peculiar moaning respiration of indescribable sadness. It fills the room and the vicinity. The respirations varied from thirty to forty per minute, and at the close of the third stage fifty to sixty, becoming less with the fall of the temperature just before death. Great thirst, nothing appeases it. Restlessness, no position giving any ease. Urine, at invasion, normal but high-colored. In the majority of cases on the Isthmus of Panama the patient died during the first stage, such was the blood-destroying intensity of the disease when all, or nearly all, of the symptoms detailed and to be detailed, appeared. They do not appear in any stated order.

Within twenty-four hours of invasion all the symptoms are intensified. Sacral pain and headache increasing; gastric disturbance and epigastric tenderness developing early in many cases, the slightest pressure over the stomach causing intense pain and eliciting sharp cries. In cases where the brain symptoms were very marked, in some where patients were unconscious, the slightest pressure produced a contortion of the face and body, If deep-seated pressure was made they writhed on their beds, but the instant that it was removed they became quiet again. Next, nausea and vomiting, at first a clear fluid, well named "white vomit" by Surgeon-General Blair, of British Guiana, South America. Tongue at first slightly coated. I am dealing with complicated cases. In patients who had suffered from intermittents, or bilious remittents, what is termed the characteristic tongue of yellow-fever was not found. As stated it was slightly furred, later the fur increases from behind forward, the tips and edges take on a deep red. Gums also become a fiery red, also the mucous membrane of the mouth and throat. The whole mucous tract suffers. Later, in the majority of cases, sore throat is complained of, due to stripping of the mucous membrane.

Blood oozes from the denuded tongue and gums, giving an indescribable fetor to the breath; at times it collects on the teeth. In some cases a peculiar and characteristic odor is exhaled from the patient's body. Once recognized, it never will be forgotten. It somewhat resembles *l'odeur du cadavre* of French authors. The late Dr. Stone of Louisiana was the first American writer, I believe, to recognize it. As he states, it is a very bad omen.

When patients die in the first stage, the urine always shows a large amount of albumen. The temperature remains high, 104° to 107° F. Delirium, often quiet, marks the latter temperature. In some cases extending over more time—beyond the fourth or fifth day—the albumen does not appear until the close of the second or the beginning of the third stage. Albumen is a *sine qua non*. I know of no yellow-fever without it, nor do any of my many friends practising within the tropics. It never was absent in Isthmian cases. I never have seen or heard of a case of specific yellow-fever without it; never, either in the practice of Dr. L. Girerd, late Surgeon-in-Chief Panama Canal Company, in that of Dr. Didier, of the same service, or in the cases seen by my brother, the late Dr. George W. Nelson, at one time my partner, and later Resident Surgeon at the Canal Hospitals, Huerta Galla, Panama, giving a combined experience of hundreds and hundreds of cases. During an epidemic at Colon, in the fall of 1883, it swept the shipping, over one hundred and fifty cases, nearly all fatal. Again albumen in all cases. Suppression of urine is a late, and generally among the last symptoms. Where it is marked, they seldom recover. The bowels, if freely acted upon by the sulphate of soda, to be referred to, may not furnish any early information, diarrhœal motions produced by the soda being followed by "black-vomit motions" in many fatal cases. These motions may precede or follow black vomit. No rule is absolute, or such material, well named, may only be seen at the autopsy. Black vomit follows the constant retching and the "white vomit" of Blair. Black vomit is happily named, and shows innumerable fine particles or flocculi named black vomit or "coffee-ground vomit," or the *marc de café* of the French writers, whose books on yellow-fever are among the latest and very best. Frequently patients, without the slightest warning, commence violent vomiting. It pours forth from mouth and nostrils, often threatening to

choke them. I have seen a patient resting quietly on his back after the subsidence of the gnawing sacral pain, when a perfect flood of black vomit has spurted from his mouth and nostrils up into the air, over bedding, mosquito curtains, and the nurse. An old and intelligent writer on yellow-fever, Dr. Dowell, has been singularly happy in his remark, that it is *per saltum*. So it is.

Here, I must pause and divide my yellow-fever cases into two classes, and shall state that such are met on the Isthmus of Panama. One class I took the liberty of naming "uncomplicated," the other "complicated." By uncomplicated, I mean the disease occurring in new-comers. In these, brain symptoms and delirium were common. Such, almost without the classic exception, died. I never knew one to recover. The possession of full health meant rich blood and a better culture-fluid for the germs that destroy it—the absolute destruction of the blood being but a matter of three or four days. I can best illustrate this by a case in the practice of my valued friend, Dr. L. Girerd, to-day a retired practitioner living in Paris. In the case referred to, on the fourth day of the disease, he failed to get a single red corpuscle in the blood—not one. The heart was driving a fluid through the vessels—one incapable of nourishing the brain tissues. A fluid wholly devoid of the life-sustaining oxygen carried by the red corpuscles. His crucial microscopic work revealed a fluid, and in it the *débris* of corpuscles; or, to use the old-time word that I have applied to this condition in yellow-fever, a necremia, or death of the blood. His patient, a titled foreigner, a magnificent specimen of manhood, who stood six feet four inches in his stockings, died a few hours later. The "complicated" cases occurred in those who had been on the Isthmus from six months to sixteen years, and of course were profoundly malarious. I say of course, as no man, woman, or child there escapes intense paludal poisoning. Sixteen years had failed to give the so-called acclimation to an American, Captain Dean. Specific yellow-fever cut him off; he was my patient. An elderly Italian, M. Georgetti, after thirty-seven years' residence at Panama, died of specific yellow-fever. I personally know a French gentleman in Guaymas, Mexico, who has spent over forty years on both coasts of Mexico. He went through epidemic after epidemic unscathed, but in the thirty-sixth year of his residence, after passing through the

Guaymas epidemic of 1883, he came down with the disease in 1884, when a few cases appeared, as is usual following *all epidemics within the tropics*, and just escaped dying. He in person related his experience to me. Acclimation is only so-called ; it is a myth, but quite in keeping with a lot of our gross ignorance regarding yellow-fever. Nothing, absolutely nothing, protects against specific yellow-fever, except having had the disease, a fact well known to all close students of the disease within the tropics.

With this digression as a preparatory statement I shall next consider the second stage, or "period of calm," as it is termed. There is a marked fall of temperature, but merely a remission, and most deceptive and dangerous it is. I can best illustrate this by actual cases. In two cases, both mine, during the epidemic of 1880 ; new arrivals ; just married ; he a Frenchman and Consul for France ; she a Portuguese, aged seventeen. They had passed the first stage. His temperature had run up to 106° F., hers to 105° F. Then came the deceptive "period of calm ;" they felt so well that, despite my emphatic orders, they got up and walked about. He was in one room and she in another. In the woman's case, the secondary fever came on that night, together with a copious "vaginal hemorrhage," practically the equivalent of black vomit. She died within twelve hours of her walking about her rooms. His temperature again ran up. He died the next day. She, poor girl, was laid out in her wedding finery. They occupy a single grave in the Foreign Cemetery at Panama. Such, gentlemen, is malignant yellow-fever as I know it.

As I have stated, yellow-fever may be a disease of a single "access" or paroxysm. When it is so, the patient dies or enters on convalescence, such being the milder cases in Panama. Thus, it resolves itself into a sharp, clearly defined fever of a single paroxysm, or "access," as the French so expressively term it. As nearly all attacked died, the milder cases were the exceptions. In the great majority the "period of calm" was deceptive, the slightest imprudence on the part of the patient ending in death later, the remission—I have seen the temperature as low as 99° F.—lasting from twenty-four to thirty-six hours ; in cases marked by long chills, but twenty-four hours to merge into the third stage of the disease, or that of "secondary fever." I have faced three epidemics of small-pox, one at home in Montreal, and

two at Panama. The severe chills in that disease, initiating the severe and confluent cases, the high primary fever, the second stage, to merge into the high temperature of the secondary fever, consequent blood changes, and death. These cases, so familiar to me, have caused much thinking in connection with my studies in yellow-fever and its blood changes. In a fatal case of confluent small-pox at Panama, without the slightest warning, I have seen a fluid that to the eyes was identical with black vomit, spurt from the mouth, high in air, over every thing, staining the bedding just like black vomit; it was *per saltum*. To our life-currents we must look for information.

In the "third stage" the albumen appears, that is, if absent at close of "period of calm," it is invariably met here. Black vomit and black-vomit motions, suppression of urine, brain symptoms, etc., in cases ending fatally in this stage, all the symptoms, crowd each other, and death closes the scene.

In "uncomplicated" cases, or where violent delirium may be met, many painful scenes result. A young Englishman, the picture of health, as attested by his magnificent physique and rosy cheeks, was stricken on landing. He was my patient. The case closed with furious delirium. Four men had to take turns in holding him, until death closed one of the saddest of sights.

A few remarks regarding the "fever of acclimation" of some writers. This, mark you, is generally preceded by a slight chill, a rapid pulse, a flushed face, suffused eyes, with a trace of albumen in the urine—in a word, it is a very, very mild form of yellow-fever, the febrile movement lasting twenty-four to thirty-six hours, the mildest type of an "access." Failing a trace of albumen, it is not a fever of acclimation—that is, to a tropical physician—and without the other symptoms, no subsequent protection may be expected. In fact, some profound students of the disease within the tropics consider it but a temporary protection; that in seasons of epidemic, while such are exposed in a lesser degree still they are liable to contract the severe type.

Such, briefly told, is yellow-fever on the Isthmus of Panama. I have seen and attended it, in both cities, Colon and Panama. I wish to add that it and other tropical diseases have caused, at a low estimate, fully twenty thousand deaths on the line of the Panama Canal. The *New York World*, of May 18, 1889, credits

the French Consul at Colon with saying that fifteen thousand Frenchmen have died. This probably is a mistake. I believe twenty thousand, all told, will be a generous estimate. The heaviest dying known to me was in 1884, during that epidemic at Colon, in the shipping and on the Isthmus. In an article in *Harper's Weekly*, of July 4, 1885, I placed the death-rate for that month at six hundred and fifty-three officers and men of the Canal Company. I obtained the figures from an inside source. The Canal Company's statements, as published in *Le Bulletin du Canal Interocéanique*, were as mendacious as they were misleading. De Lesseps' last ditch, that absurd creation of a man in his second childhood, has cost twenty thousand lives, over $200,000,000 in gold, has ruined hundreds of thousands of petty investors in France. Up to the hour of the crash, De Lesseps in person, while knowing the full truth, unblushingly told his fictions. Since 1884 he has known the whole truth. He is a wicked old man, who should be buried alive under his fictions.

Many of our *confrères* have fallen in the Isthmus. Some noble fellows are buried there—yellow-fever, dysentery, and pernicious fever. Yellow-fever must be seen and studied in its own habitats. The Isthmus is one of the earliest.

My visit to Tampa, in November, 1887, impressed me in many ways, but what greatly interested me was to hear of cases of *non-albuminuric yellow-fever*. These cases of so-called yellow-fever, I believe, furnish that class of people who have had yellow-fever two and three times. As may be inferred, I have no faith in any yellow-fever without the invariable presence of albumen in the urine. I have yet to meet with or read of a well-authenticated case of secondary yellow-fever. Nor do I know a single physician who has seen one.

Now I come to the subject of treatment; and here I most emphatically state that yellow-fever has no treatment properly so-called. The host of so-called treatments justify my statement. How can a disease, according to the old view, characterized by the symptoms described by me, have one? Four centuries seem to have taught the profession nothing, or next to it. All that has been known with absolute certainty is that people got yellow-fever and died; the world heard of the dying, and that from Cuba it makes periodic invasions of the Sunny South. The treat-

ment of yellow-fever is purely symptomatic, my early treatment up to 1884, and was that of the "Old School." May God forgive it for its ignorance and charlatanism! Many authors have made a *réchauffé*, or rehash, of the experience of others, they never having seen a case themselves. They are responsible for much ignorance, *if not worse*. Having tried all the so-called orthodox treatments, I, previous to the fall of 1884, settled on the following: On being called to see a patient at the outset, I played a trump card and made quinine the diagnostic agent. We must bear in mind that a few hours in such cases may mean a life saved or lost. The following was the mixture:

℞	Quin. sulph.	ʒ j.
	Acid. sulph. dil., B. Phar.	ʒ ij.
	Sodæ sulph.	℥ j.
	Tinct. Card. co.	ʒ ij.
	Aq. ad	℥ viij.

Misce fiat mistura. Sig.: Take a quarter at once and repeat in two hours.

This mixture, given French fashion, in potions, or portions, well diluted with water, made a perfect solution and was readily absorbed. It was my "multicharge gun." It gave me the best results. Hot baths. Pilocarpine in one case, aconite, etc., were in order, to produce free action of the skin. If the cases were purely malarial, the quinine and sulphate of soda met all the indications. The sulphate of soda acts like a charm, free, bilious motions following. Every dose contained fifteen grains of quinine and two drams of sulphate of soda. If after two doses the temperature remained high, 100° and upward, with the usual symptoms, yellow-fever was the verdict. Valuable time had been saved; the bowels freely acted upon, a most important indication. Later, I added to this treatment the following: A phosphoric-acid mixture every hour or two, largely diluted with water; gave it and it only, purposely to bring about an acid condition of the blood. In a few words to make it wholly uninhabitable to the germs. I adopted this course only after serious thought, and said to a medical friend: "My next patient with yellow-fever gets well or dies on phosphoric acid." I explained it to two friends, Dr. L. Girerd and Dr. Arthur Gore, who saw my cases; also to Dr. Bransford, United States Navy,

who crossed the Isthmus on his way to Nicaragua. Previous to my adoption of this purely acid treatment, following the quinine-and-soda mixture, my patients kept on dying in a way that was simply appalling. Not that I lost more than my *confrères*. Our helplessness dazed me. As stated, after mature deliberation, I settled on phosphoric acid, well diluted, for life or death. Three cases so treated, all in succession, got well, an absolutely unheard of thing there. I had friends see them, knowing as I do what unbelief and professional jealousy will do. My reasoning was sound. The acid did not destroy the oxygen-bearing function of the red corpuscles, while the germs of the yellow-fever did, and so killed my patients. By rendering the blood acid these germs could not live and reproduce. They were destroyed *in situ* and the blood ceased to be a culture-fluid. Any student of medicine familiar with bacilli and their cultures, knows full well that even faintly acid solutions are fatal to the propagation of bacilli. Such was my reasoning as far back as 1884. I have the notes on those cases, taking full notes on all, as I had been taught to do while a student at the Montreal General Hospital, 1868–72.

The blood is the habitat of the germs of yellow-fever. When my first case in the series of three demanded my attention, alas! I could not procure a reliable phosphoric acid, when I had to fall back on a formula published on p. 93 "United States Dispensatory," being that proposed by Mr. James T. Shinn, *American Journal of Pharmacy*, October, 1880, thus: *Liquor Acidi Phosphorici.* A similar preparation, under the name of Horsford's Acid Phosphate, has a large use in this country. The formula is as follows: *Liquor Acidi Phosphorici* (without iron); Calcii phosphat., 384 grains; Magnesii phosphat., 256 grains; Potassii phosphat., 192 grains; Acidi phosphorici (60 per cent.), 640 minims; Aq., q. s. to make a pint." As stated, not being able to procure a reliable phosphoric acid, I was forced to use Horsford's Acid Phosphate. It, as I knew, was a standard preparation of uniform strength and excellence. I strongly object to employing a patent preparation, so to speak. Its contents or make-up was known, and it was "Hobson's choice." The preparation did all that I anticipated, and I give its formula as found in the "United States Dispensatory." I knew what I used. It is essentially a strong acid mixture.

To repeat, having given my quinine and sulphate-of-soda mixture, thus securing free motions from the bowels, the malarial element being eliminated by the non-effect of the quinine ; I then treated for yellow-fever, thus : To bring about free action of the hot and burning skin was absolutely necessary. As stated at first, I tried hot baths, aconite, etc., and abandoned them, using a simpler and more effective means, in a vapor-bath, named in Peru as "Dr. Wilson's treatment," being that of an English physician who used it with great success during an epidemic there in 1854, and later. The patient was placed on a chair—one with a wooden seat—all clothing being removed ; he was covered with blankets tucked in closely under the chin. A spirit-lamp was lit and placed under the chair, thus furnishing heat and vapor. To Dr. Wilson's vapor-bath I added a foot-bath, all under the blankets, the water as hot as the patient could bear it. Finally I grafted on some Jamaican treatment, giving a pint of hot lemonade or orange-leaf tea. Under this triad, a profuse perspiration followed, usually within ten minutes ; it fairly ran off them. As soon as it was freely established they felt better. The scarlet hue of the face faded. The hard pulse became softer. If the bath caused faintness, that was guarded against by a shorter exposure. With this I had no unpleasant symptoms, but with nitrate of pilocarpine, profound pallor and faintness in a well-nourished man caused me alarm. I tried it in but a single case, and that was previous to my knowing of Wilson's vapor-bath. The necessary exposure being made, ten to fifteen or twenty minutes, the patient stood up, the chair was slipped from below the blankets, and he was lifted into bed *en masse* to prevent any escape of heat or moisture. More blankets were put over him. In some cases the perspiring lasted one or two hours, to the marked relief of the patient and the lessening of all the symptoms. After a variable time, the skin again became hot and dry, when the same procedure was repeated, as often as necessary. Thus, two highly important indications were met at the very outset. First, under the quinine and soda, free motions from the bowels were secured ; remember the marked constipation in these cases, often extending over three or four days, while the man had been eating as usual. Secondly, full and free action of the skin. According to my way of thinking and reasoning, the patient was

placed under the most favorable conditions for fighting the disease. Generally large quantities of fecal matter were voided, and the pores were thoroughly opened. Next, the rest of the treatment was in order. It was of the simplest. A teaspoonful of the acid phosphate in half tumbler of water, every hour or two, day and night, for the first twenty-four hours. It never caused nausea. I continued it for two or three days, according to temperature of patient and symptoms. The bowels continued to act freely—bilious motions. Later they became very dark under the acid. Previously I had used sinapisms and a lot of things recommended by the books, and those supposed to be experienced in treating the disease. The sinapisms were placed over the stomach to try and check the distressing vomiting. At times they were beneficial; again useless. Diet in these cases is a matter of very small importance. They were too busy with the disease. I fail to recall a single case where food of any kind was asked for. The highly irritable stomach must be remembered. Iced milk and beef broth in very small quantities, at frequent intervals, *if the stomach tolerates them.* Iced lemonade and pure soda water. Small pieces of ice allowed to dissolve in the mouth. I gave champagne a fair trial, and abandoned it. I am satisfied that the purely acid treatment is ample. The simpler the treatment the better. The quinine and sulphate-of-soda mixture, vapor-baths *à la* Wilson, and the acid meet all requirements. I abandoned the old-time treatment. As I have already informed you, I had three recoveries, one after the other, all in infected premises where the previously attacked had died. These recoveries were in the fall of 1884. Early in the spring of 1885—March—I left for my annual holiday, visiting Nicaragua, when I returned to the Isthmus, to leave it, April 25th, for New York City.

Three swallows do not make a summer, nor do I claim that three successive recoveries are every thing; but as nearly all attacked died, I do earnestly claim that three successive cases getting well furnish food for thought. Personally I am satisfied that by persistently acidulating the life-currents they ceased to be blood-heat culture-fluids for the germs of yellow-fever. I say germs. The following facts, I believe, will strengthen my claim that three successive recoveries were absolutely unheard of at Panama. A few words regarding the dying from yellow-fever

thereaway. I can recall twenty-seven admissions to the yellow-fever ward of the Canal Hospitals, Panama, with but a single recovery. My brother, the late Dr. George W. Nelson, then resident surgeon, furnished me with the figures. Of forty-two cases sent to the Charity Hospital, Panama, during the epidemic of 1880, when I had the disease, not a single recovery. As a concluding statement, I could amplify them to any extent—the Dingler expedition. Mr. Dingler and Mrs. Dingler, accompanied by Mr. and Miss Dingler, and a party of canal engineers—all told, a party of thirty-three—arrived at Colon in October, 1883, Mr. Dingler being the new Director-General of the canal works. Within six weeks of landing Count de Cuerno and Mr. Zimmerman were dead—specific yellow-fever. Within fifteen months of the landing of that party of thirty-three, fourteen had had yellow-fever, and but one recovered, Mr. Dingler losing his wife, son, and daughter. He was very patient, and had been on the Isthmus previously. His regular life, no doubt, was the factor that saved him. Contrast three successive recoveries with the above—my cases were specific yellow-fever.

As previously intimated, yellow-fever spares none. While it is quite true that total abstainers have been swept away by it, it is equally true that, even in the severest cases, they have recovered, where the moderate drinker was lost from the start. Time and again, my own experience has confirmed this. The regular life, particularly within the tropics, is its own reward. In "Ziemssen's Enclyclopædia," vol. ii., in the article on yellow-fever, much valuable information will be found on this very subject—the value of total abstinence. "Panama in 1855," Harper Bros., New York. "The Handbook of Panama Railway," 1860, Dr. Otis, Harper Bros. Dr. L. Girerd's work on "Panama," published in 1883, in French, in Paris. All contain much information regarding that land of pestilence and death, as well as "Five Years in Panama," 1889, Belford, Clarke, & Co., New York.

In reference to the inestimable benefits of total abstinence within the tropics, it simply confirms the opinion of a valued friend at Panama, the Consul-General of the United States, who, when asked, "How do you live in the tropics?" wittily replied: "It all depends on the *liver*." So it does. An alcoholic liver in yellow-fever means death.

The time allowed for the reading of this paper necessitates my leaving out much that I should like to discuss. I must ignore the interesting history of the disease and hasten on.

A few words or points on the after-treatment. The treatment during convalescence calls for constant watchfulness. It is here that malarial symptoms crop up in the cases of those who have been at Panama a few months. Dr. L. Girerd examined the blood of hundreds on arrival, and found it normal, in no case showing the malarial bacillus. After the first month he re-examined scores of them; the blood of all these showed it, simply confirming the statements to be found in Dr. Tomes' work, "Panama in 1855," statements amplified in Dr. L. Girerd's work.

To return to the stage of convalescence. I have known a beef-steak to cause death on the tenth day. During convalescence such patients are simply ravenous. Well do I recall my own intense hunger. Slops are in order, fluid food, given at short intervals, not to overload the stomach. Its irritability lasts for weeks and weeks. Bathing, a thorough washing of the patient's body and hair daily in a weak carbolic bath, the thorough disinfection of the patient's effects and room.

The majority of cases were fatal on or before the fifth day, closing with black vomit, suppression of the urine, etc. In such patients it was a fever of single "access," or paroxysm. Other cases passed through the "period of calm" and died in the third stage, or that of "secondary fever," from the sixth to the ninth day. Cases of a typhoid character were rare. I saw but one, being that of my friend Dr. Arthur Gore, now in San Francisco, California.

The sequelæ: Boils, pimples, parotid swellings, and intermittent fever. Jaundice—It was of a rich canary color. It lasted a whole month. People were never curious about it, or anxious to ask me questions—not any.

Now for a very brief reference to *post-mortem* appearances. My small experience under this heading simply confirms what an old and clear-headed American writer has stated: "Yellow-fever has no pathology." I refer to Dr. Grenville Dowell, whose little *brochure* contains a mine of information, or what the great French undertaker, M. de Lesseps, calls "an arsenal of facts."

The *post-mortem* findings are so variable in patients cut off by the same symptoms that no reliance can be placed upon them. I deem it a blood disease, pure and simple, and if my view is accepted, absence of any marked pathological changes, save in the blood itself, must be expected.

The liver : It presented a variety of conditions. I have found it fatty ; again, fatty on section, showing an immense quantity of oil-globules ; again, perfectly normal in size and color. The chamois-colored liver is supposed to be the characteristic liver. I never saw but one, and it was the only one found in nearly one hundred autopsies made at the Canal Hospitals, Panama, by Dr. S. Didier, a gentleman profoundly versed in yellow fever. He was born in one of its habitats, the island of Martinique, French West Indies.

The kidneys : Nothing constant. I met them large and small ; again, perfectly normal to the eye.

The stomach : This organ presented signs of acute inflammation. Generally its coats were thickened ; it contained more or less black vomit ; I saw nearly a pint in one case ; its inner surface showing innumerable pink points or *foci* of congestion, and small deposits of blood. Dr. Castellanos, a physician to the Charity Hospital, Panama, a Spaniard, and formerly a hospital surgeon in Cuba, told me that it was the only constant condition found by him, and he, while there in Cuba, had made nearly one hundred and fifty autopsies.

The brain I never examined. Dr. L. Didier found nothing worthy of remark in his large experience. Nothing.

The blood : I always found it in a perfectly fluid condition. Remember the destruction of the corpuscles and the great amount of albumen eliminated by the kidneys. Its specific gravity, taken by me two hours after death, was nearly normal. To this fluid we must direct our whole attention. To repeat, I deem it a blood disease, pure and simple, and have held this view since 1884. Death in these cases is due to a true necræmia. If this view, which I believe is peculiar to myself, be proven, we have an explanation of the majority of symptoms of yellow fever, and, as already stated, it explains the absence of any characteristic pathological changes, save in the blood itself.

The brain symptoms are due purely and simply to the destruc-

tion of our oxygen carriers, the red corpuscles. The great Virchow attributes loss of consciousness to their failure to carry oxygen. By rendering the blood uninhabitable to the germs that prey upon and destroy the corpuscles, we triumph. Much remains to be explained about yellow-fever. Many honest and patient toilers are at work on this great problem. I believe that with the discovery of the specific germ by Dr. Domingo Freire, of Rio de Janeiro, Brazil; by Dr. L. Girerd, at Panama, and its discovery by Dr. Carlos Findlay, in Havana; to his and the work of his friend, Dr. Delgado, of that city; add to this our knowledge of the truly wonderful strides made by these gentlemen in their bacteriological studies and inoculations; to the above, by acidulating the blood, as I have done, where it has invaded the system: with such factors the future seems full of hope to me. May it prove so. Having digressed, I must get back to the *post-mortem* findings.

The bladder: Generally a few drachms of highly albuminous urine were found. Remember the suppression.

Black vomit has a peculiar odor, and is slightly acid to the taste. To clear up a vexed point in my mind, I collected some in one of my cases and tasted it. It required a little courage, but I was in earnest and working for results. I may state, *inter alia*, that it will never compete favorably with other beverages. The "vomit," on settling, deposits coffee-ground "particles," the fluid above being the color of weak black tea. Black vomit is not bilious vomit. I tasted it to clear up this very point. Black vomit, as a symptom, is of grave import. It indicates advanced blood-changes, the beginning of the necræmia. While at Panama I sent friends specimens of my late patients. My rooms were miniature graveyards. Some "black vomit" sent to my old classmate, Dr. William Osler, then Professor of Clinical Medicine in the University of Pennsylvania, with other material, furnished *pabulum* for a lecture on "Vomited Matters." To-day he is Professor of Practice of Medicine in the Johns Hopkins University, Baltimore, Md., and Physician-in-Chief to the magnificent hospital of the same name.

To recapitulate: Now that Drs. Freire, Girerd, Findlay, and Delgado have found the same germ, Dr. Domingo Freire being the first investigator and its discoverer, to him the honor and

credit are due. He caused others to work. Now that this has been accomplished, I firmly believe a new era is at hand, and that soon this constant reproach to our profession and much-vaunted modern civilization, the sway of yellow-fever, is about to receive its *coup de grâce*. Inoculation will protect man against this awful disease as vaccine does against small-pox. Dr. L. Girerd proved his good faith in such a vaccine, if the term is permissible, by making attenuated cultures of the microbes of specific yellow-fever, and by inoculating himself; and without carrying it to the full protective influence, he allowed himself to be bitten by mosquitoes (Dr. Carlos Findlay's discovery) that had been feeding on a man in the yellow-fever ward of the Canal Hospital, a case of specific yellow-fever; the fifth day the mosquitoes were disturbed and allowed to bite him. The result was a mild yellow-fever. I translated his report, and it was published in the *Canada Medical Record*, Montreal, in the fall of 1886, together with an editorial.

DOES SALTING MEAT DESTROY MICROBES?

Professor J. Forster of Amsterdam has published (*Weekblad v. Niederland Tijdschrift v. Geneeskunde*) an account of some investigations made in his laboratory by himself and Herr de Freytag, having for their object the determination of the effect of the common process of salting or pickling meat on various forms of bacteria. It was found that cholera bacilli were soon destroyed under the influence of abundance of salt, usually in a few hours; but that typhoid bacilli, pyogenic staphylococci, the streptococci of erysipelas, and the bacilli of porcine infectious diseases frequently retained their vitality for several weeks, or even months, in spite of the presence of abundance of salt. The same was also true of the bacilli of tubercle. In some cases these bacilli were found alive after being two months in pickle, their vitality being proved by their capacity for infecting new cultures. Portions of the viscera of a tuberculous animal, preserved for a considerable time in salt, were found capable of causing tuberculosis in a healthy animal when introduced into its peritoneal cavity. Experiments on the spleen of an animal which had died of malig-

nant anthrax showed that salt possessed the power of destroying the bacilli of this disease in about eighteen hours. These, as well as cholera bacilli, were found to require seven and one half per cent. of salt to destroy them. From these facts it would appear that salting or pickling has but little destructive effect on many of the more common forms of bacilli liable to be found in diseased meat.

AN ESSAY ON INFLUENZA FROM INDIA.

A Baboo in India applied to a gentleman for an appointment worth not more than a trifle of twenty-five rupees a month, and as a proof of his qualification for the position he was required to write an essay on influenza. A copy of his composition reaches me as these pages are in the printer's hands and it will be found of interest in more ways than one. It reads thus:

"Sir,—As I am requested by your honour to write an essay on influenza, all I can say is that this Infernal Epidemic, which has fallen on our mother country like a great calamity, is caused by the concentrated efforts of minute bacus of the animalculæ tribe of unforeseen microscopical animal life. Like the old plagues of Egypt, it is deteriorating in the extreme, carrying its venomous degenerating contamination through every household families, not excepting your humble servant, who has suffered too much the details of fever in its augmented state with a pertinacity that would have done the heart of Euscapalius good to have intervieud. Notwithstanding, nevertheless, I am now all square, your honour, enjoying salubrity of heath hence my ability to write this hard subject matter. Although this infernal, inhuman disease, is not dangerous except for the old decrepid one foot in the grave sort of paralytic people, yet is frought with too great after consequences, such as Pneumonia, Bronchitis, Catarrh, et hoc genus omne (you see I am versed in few Latin terms) causing thereby some care to be taken with ourselves afterwards. It is great great pity your honour asked me to write such kind of great difficult, inexperienced task, no B.A., I am sure, would be spritely enough to attempt to undertake such eccentric task without pur-

loining his intellectual faculties to the utmost tension. Your honour will kindly excuse my writing to a greater length, although I could give much information on the statistic of this great and downfelling disease on bed with all items of fever and nose running all day and night my wife is still suffering, but I am earnestly working the oracle with the Gods to minimise the malady by giving alms and all things to poor helpless beggars asking much, from your humble servant who is at present greatly impecunious from want of job, two children besides wife and myself to feed and one more child coming soon yet unborn owing to wife's fault. Hoping to be favoured by your kind consideration."

THE EDUCATIONAL POVERTY OF PHYSICIANS.

The remarks that I found it necessary to make in the earlier pages on this subject present nothing more than the opinions of the best members of the medical profession. It is admitted on all sides that young men are given the degree of M.D. who are utterly incompetent to practise medicine. Many of them are deficient in all the qualities that go to make a gentleman, and if there be any occupation where these qualities are essential, it surely is in the man who as physician or surgeon has access to our homes and is entrusted with the inmost secrets of the family. The majority of those who gain admission at the medical schools are also sadly deficient in the groundwork of even an ordinary education. They have little or no classical knowledge, although that is of the utmost importance, and their general information is of the scantiest and most superficial kind. As a necessary consequence of this their minds are narrowed, their realm of thought is restricted, and much of their thinking is perfunctory. They go forth into the world when they receive their diploma not only unfit to be entrusted with the delicate and responsible duties of a physician, but unqualified even to be granted permission to begin the study of it. Very few of them can write a prescription accurately, and scarcely any know enough of the effects of drugs and of their reactions

when combined to be able to prepare a formula that is unquestionable. Their experience in compounding medicine is generally nil.

In cities the pharmacist often saves a patient from serious consequences of the doctor's incapacity, and in the country, practitioners, cognizant of their own ignorance, fall back upon proprietary combinations rather than risk the—to them hazardous—experiment of devising one of their own. It is difficult to take up a medical paper and not find examples of badly written prescriptions. It is fully as difficult to find one that is properly written; and as a result of this inefficiency the country pharmacist has to keep a large stock of proprietary preparations and have an otherwise unnecessary amount of capital lying idle. To the inadequate education of physicians much mortality is due, and also much of the inefficient treatment of disease. For this reason it has come within my province to refer to it, but I do not care to have the charge rest entirely on my own authority. Evidence of the truth of what I say is so abundant that it can be found everywhere and every day, but I can do no more than adduce a few illustrations.

In one instance a dram of morphine was ordered in a prescription. The druggist very properly referred it back to the doctor before dispensing it. He then learned that instead of a dram a grain was intended, but the physician, a young man, did not know how to write it.

Here is a literal copy of a prescription that was ordered in 1888 in a town in Connecticut:

" Sulphur..... ℥ ii.
Quicksilver..... ℥ ss.
Cream tartar..... ℥ i.
Nit. potassa..... ℥ ss.
Molasses..... ℥ viii.
Take one tablespoonful before going to bed."

The following, especially ordered to be put in a two-ounce bottle, is from Laramie City:

" Potass. iodidi..... ʒ ss.
Sodii: carbonat..... ʒ vi.
Sodii salicylat..... ʒ i.
Aquæ q. s.....ad.. ʒ ii."

The doctor who wrote that thought the solids occupy no space and would remain in solution!

In another instance the physician wanted a certain number of drops of a tincture to be used, so he wrote " gtt ivc," but how many drops were intended is unknown.

This is from Connecticut:

" Potass. of chlorate ..... ʒ i.
Glycerine ..... ʒ i.
Tinct. of iron sesquiklor..... ʒ iii."

The following are also from New England:

" Tinct. Hullim..... ʒ ii.
Teaspoonful before meals."

" ℞ Tinct. Rudullis..... ..... two drams.
Teaspoonful every three hours."

" ℞ Acid nitric, strong.
Glycerine.....of each one ounce.
To be used externally."

Similar examples are to be found in every druggist's prescription book, but I need not multiply them.

Referring to the number of medical graduates who have appeared before the Virginia Medical Board, Dr. Wood writes in the *Therapeutic Gazette* as follows:

" From 1877 to 1887, inclusive, 36,097 graduates from medical colleges have entered practice in the United States. If these had all been efficiently examined according to the results just given, 8,300 would have been rejected, or about one fourth the number. Our own opinion is that this proportion of rejections is less than it ought to be. We have gone over the class-books of the Medical Department of the University of Pennsylvania, and find that one third of those who entered that institution failed to get their

degree. Practically, all of these people graduate at one college or another, and our own belief is that at least twenty per cent. more go through the university examination than ought to. Can any one estimate the amount of damage that nearly nine thousand improperly educated doctors can do in ten years?"

In the *Medical News* of November last year there appeared the following article, which is both instructive and suggestive. I quote it in full but it needs no comment:

"At the present time, when the power of evil legislation seems to have the upper hand, and the endeavors of the regular profession to obtain a State Medical Examining Board have been thwarted in the State of Pennsylvania by certain opponents of professional high standing, the following abstract from the *Brooklyn Medical Journal* may carry to the public a sufficient idea of the frightful dangers which they allow to exist under the present law. It is very easy for a man, as brutally ignorant as some of these men seem to have been, to mistake the symptoms resulting from one of their poisonous doses for evidences of disease, and in this way to fail absolutely to attempt to remedy the evil which their criminal negligence has brought about.

"The Virginia Board of Medical Examiners received the following answers to questions put to graduates of medical colleges, who, under the Virginia law, applied for licenses to practise medicine in that State:

"Describe the larynx. *Ans.* The larynx is composed of cartilage. The œsophagus passes through the larynx.

"What is the function of the liver? *Ans.* Do not know.

"Give tests for arsenic. *Ans.* Sulphuretted hydrogen is one. Don't know rest.

"Give test for mercury. *Ans.* Do not remember.

"Give dose of tartar emetic. *Ans.* Ten grains.

"Give dose of sulphate of atropia. *Ans.* Hypodermatically (sic) ten grains; by mouth sixty grains.

"Give dose of corrosive sublimate. *Ans.* One grain.

"How would you treat placenta prævia? *Ans.* I don't know what it is.

"Give dose of powdered cantharides. *Ans.* Forty grains.

"What is the source of iodine? *Ans.* It is dug out of the earth in blocks like iron.

"Describe dengue or break-bone fever. *Ans.* By four applicants: A fever that comes on soon after the bones are broken. By one applicant: The patient should be cautioned against moving, for fear the bones should break.

"Describe the peritoneum. *Ans.* It is a serous membrane lining the belly and extending into the chest, covering the heart and lungs.

"Anatomical ignorance is bad enough, but the ignorance of doses of powerful drugs is terrible in its results.

"It is hardly necessary for us to point out that the doses of atropine here given are sufficient in the one case to poison over twenty men, and in the other instance to kill, perhaps, over one hundred adults. The proper punishment for the man who would order forty grains of cantharides would be the administration of the drug in consecutive divided doses, lest the one should kill him too soon.

"For every candidate applying for the right to practise medicine in the State of Virginia, where the people are intelligent enough to protect themselves, fifty similar and worse dealers in human lives enter this and other States, where no examination frightens them away; and it is worthy of remark that the candidates in Virginia were not only ignorant of medicine, but were ignorant enough of their own mental state to dare the terrors of an examination. The provision of a State Medical Examining Board is not a measure to be engineered through the Legislature by the medical profession. It possesses far less importance to us than to the laity, for one doctor can generally grasp the calibre of another and protect himself. It is the people who suffer in silence, instead of protesting against such fearful homicidal practitioners. To-day the writer of this editorial read of a case where ergot was given in the early part of the second stage of labor, and yesterday he heard of a woman killed by a great, burly brute who was ignorant of the most simple form of obstetrical procedure. Yet with the perversity of human nature, the apothecary who dispenses poisons must be examined, and the man who orders the poison prescription goes unendorsed. Two means of remedying this crying evil are possible. The first, is to prevent

the entrance of the money-grasping ignoramus into the sacred guardianship of life, home, and family. The other is for the laity to inform themselves of the standing of surrounding medical schools, and refuse to recognize the degree of an institution turning out unqualified men or of one of which they know nothing. When the people become educated well enough to know when their wives, children, and those dearest to them are killed because of the employment of a miserable charlatan, then, and not till then, apparently, will an effort be made to prevent this 'yearly sacrifice.'"

Ex uno disce omnes. The above is but an example of examinations that occur in every medical school in this country, and the greater is the misfortune.

A DOCTOR'S CRITICISM.

Fair and reasonable criticism of all new remedies must be expected. It is a duty which physicians owe to the public. Directly any new agent is offered to the profession, with certain properties alleged to it, a careful test of its value should be made. This can only be done by means of its administration and carefully noting its effects. If it prove to be all that was promised for it the community will benefit by its retention and use. If it turn out worthless it should be laid aside and forgotten.

Examinations of this kind must be made, however, by persons qualified by education and experience. Several valuable agents have been introduced, such as cocaine, antipyrine, salicine and others, which through the ill-advised exploiting of the newspapers have fallen into popular use, and dangerous and sometimes fatal results have followed. That is quite a different thing from tests made by competent persons and under proper conditions.

When my discovery was first put before the public I fully expected that the Microbe Killer would be made no exception to the general practice of the medical profession. I solicited investigation. I courted inquiry, and wished phy-

sicians to test its merits in a legitimate way, and I was prepared to abide by their judgment as well as my own experiments. Many physicians did test it, and they were just and honorable in expressing themselves candidly on the value of the medicine. But, as I have in a former part of this book shown, some of my critics did not act with as much fairness. They who opposed me in Texas did not offer gratuitous opposition. They were not without some personal motive, and I cannot lay all that to the charge of the doctors as a body. It was reserved for a New York physician to attempt against me the most uncalled-for act of injustice.

Some twenty years ago, or it may be less, one Dr. Newton, now dead, originated a small paper which he called *The Druggists' Circular and Chemical Gazette.* He left his interest to a young lad, who, having neither the capacity nor the inclination to maintain it, soon sold his property to others, and since then the paper has been characterized by some peculiarities. It depends largely upon its advertising patronage, and to its advertisers it evinces marked politeness. I am not one of its advertisers.

A frequent contributor to the columns of *The Druggists' Circular* is a person named R. G. Eccles, an M.D., I believe, of Long Island College Hospital, a small medical institution in King's County. That gentleman is probably employed by the paper, and a part of his duty seems to be to supply articles for publication on new remedies. In those articles I have not met with one that was favorable to the subject of it, nor have I seen among the subjects any that were advertisers in the columns of *The Druggists' Circular.* On one occasion Dr. Eccles' production worked to the public advantage, and if he were actuated by more discretion and impartiality he would probably not have fallen into some of the errors that seem to lie at his door.

In September last year Dr. Eccles undertook to test the Microbe Killer, not as a physician should do by noting its effects upon the human system, but by sitting down in his own room and examining it. Although such a method is

manifestly insufficient, and one upon which it would be worse than unjust to found a judgment either of praise or condemnation, the public for whose benefit such examinations are supposed to be made might be willing to take it for what it is worth. They would certainly do this if they found the examiner was impartial. They would even overlook any incompetency that might be evinced if there were at the bottom a genuine spirit of fairness and a desire to get at the truth. It is much to be regretted that these motives are not apparent in the alleged inquiry which Dr. Eccles made the basis of an article in his paper, wherein his zeal for his employers got the better of his judgment, and he allowed himself to use language which, to say the least, was neither accurate nor moderate.

Dr. Eccles puts forth pretensions, if I am correctly informed, to being besides a doctor of medicine an analytical chemist. He was not likely to risk his reputation, for presumably he considers it of some value, by writing a detailed description of a new remedy without having by close analysis determined its composition. And this is what he said as a result of that examination :

If the reader will mix the following together he will have a product identical with Radam's wonderful "Microbe Killer" (No. 1, there being four strengths) at a cost of less than five cents per gallon :

Oil of vitriol (impure)	4 drams.
Muriatic acid (impure)	1 dram.
Red wine, about	1 ounce.
Well or spring water	1 gallon.

Now before I proceed farther I wish to say that the Microbe Killer is prepared with none of the ingredients that Dr. Eccles names, and if he be, as he says he is, a practical chemist it is marvellous how he arrived at the result which caused him to make such a statement—if he did arrive at it. For to my thinking it has much more the appearance of guesswork than of science. To strengthen my statement on this point the following affidavit is on record.

STATE OF NEW YORK,
CITY AND COUNTY OF NEW YORK.

William Radam, being duly sworn, says, I am the inventor of the Microbe Killer. I have never bought nor used one dollar's worth of sulphuric or muriatic acid to make my Microbe Killer, nor have I given the formula referred to to my companies now manufacturing this preparation.

WILLIAM RADAM.

Subscribed and sworn before me
this 24th day of December, 1889.
N. R. COTTMAN,
Notary Public.

Thus from Dr. Eccles' own statement it is apparent that he does not know the composition of my discovery, yet in his ignorance he goes on to condemn it, and in his over much zeal he attacks me personally, and uses language which is as unwarranted as it is vulgar. I do not propose to imitate his style of vituperation, but must follow up his observations for the information of the public.

He sneers at my knowledge of botany and plant life, at my love of Nature and her operations, and at my not being a physician. This I can pass almost without notice. Pasteur is not a physician. Many persons who by their inventive genius have contributed largely to the progress of surgery are not surgeons. It would, however, be well if American physicians knew more of botany and Nature's laws than they do, for that subject is not a part of their curriculum, and very few of them are acquainted with the sources whence many of the agents that they use on their prescriptions are derived. A medical graduate of a foreign university told me that he once asked a doctor of medicine of a prominent American school something about the plant that produces aloes. He found him absolutely ignorant of the subject, and was so astonished that as opportunity offered he repeated his inquiry until he had catechised twenty physicians. Not one of them could tell him any thing about it. In the face of facts like that it comes with ill grace from an "alumnus" of

such a school as the Long Island College to utter expletives against a man who happens to know more about plants than the average physician, even though the doctor is dependent on them for the most important articles in the Materia Medica.

Taking his stand on the blunder that I make the Microbe Killer with sulphuric and muriatic acids, Dr. Eccles goes on to show the danger of those things. He says:

Sulphuric acid or oil of vitriol is a slow but certain cumulative poison. The kidneys are unable to excrete it, and after absorption from the stomach into the blood it has to return back to the alimentary tract lower down, and pass off with the fæces. Stillé, in his "Therapeutics and Materia Medica," vol. i., p. 301, says of it:

"By habitual use this acid becomes very injurious to the teeth, even when greatly diluted; it whitens them, indeed, but also corrodes them. It also, sooner or later, enfeebles the digestion, produces colicky pains and diarrhœa, and impairs nutrition. Marasmus, and even death, may be the ultimate result of its use."

I cordially endorse all this. Sulphuric acid is a poison, and for that very reason I object to the doctors using it as they do. I have shown before that most of the agents used in the practice of medicine are powerful poisons, and therefore objectionable. The Microbe Killer contains no such ingredients.

Dr. Eccles next admits that physicians know that they have no remedy that kills microbes, and he rashly ventures the assertion that the "hope of ever discovering a universal microbe killer, harmless to man, is positively ridiculous." Fifty years ago it would have seemed equally ridiculous to such men as Dr. Eccles appears to be, to think of sending messages across the Atlantic in an hour; nevertheless, the observatories of Montreal and Greenwich can communicate with each other in three quarters of a second. It is rash to prophesy nowadays, even for persons of far higher capacity than the doctor. But he is not content with

prophesying. He lets his notion carry him so far that he plunges presently into the following funny sermon:

It is, he says, a common delusion of the ignorant that the word microbe applies to one common thing, whereas it is a general name for many things, just as is the word beast. Lions, tigers, dogs, horses, hyenas, rabbits, deer, and camels are all beasts. What will kill one may not kill another. What, however, will kill twenty unrelated kinds is pretty sure not only to kill all beasts, but all humans into the bargain. As the conditions of microbe existence are far more varied than that of beasts, the hope of ever discovering a universal microbe killer, harmless to man, is positively ridiculous. There are microbes that thrive in dilute acids as their natural home. These are destroyed by dilute alkalies. There are others that thrive in dilute alkalies, but perish in dilute acids. Every conceivable condition, where life is at all possible, has been made the favorite home of some kind. Some can stand more heat than man, while others can endure greater cold. Some live in water, some in air, and some on the surface of the water. Liquids of every kind have been invaded by them, and their conditions of life adapted to the same. The most appropriate conditions for the survival and propagation of one kind prove destructive to many others. There are some that would be totally unable to thrive in the intestinal tract of man, but which would propagate rapidly therein after taking "Radam's Microbe Killer" a couple of days. A universal microbe killer would necessarily be a universal life destroyer. Long before the strength could be reached of heat or cold, electricity or chemical agents, capable of destroying all microbes, the preparation would surely destroy the life of man. Their adaptations to unfavorable conditions transcend ours in every known way, because we are but one kind, and they a multitude of kinds. Our range of life singly transcends any of theirs.

Such a diàtribe as that shows the need there must be for this book. Mr. Eccles must read it. He will learn from it much about microbes that he evidently does not know now. It is indeed surprising that a physician, and one who wishes to be considered as a little more than a physician,

should have made such an exposure of his own lack of information. He terms me a quack; he declares that I am ignorant, and he uses other arguments (?) of like kind to sustain himself. I am content to let any impartial, competent person read this book, and then the above quotation from Dr. Eccles' article, and let him decide whether the epithets mentioned are more applicable to Dr. Eccles or to me.

Having of his own action thus succeeded in showing, first, that he is altogether mistaken about the composition of the Microbe Killer, and that in truth he does not know what it is; and, secondly, his deficiency in knowledge concerning micro-organic life, he has the astounding audacity to go on in this most amusing fashion:

Radam's claim is simply laughable to all who know the nature of microbes. If the man had ever known anything about the subject, so lamentable an aberration of mind would be clear proof of insanity, but in this case, reasoning without knowledge is at the bottom of the trouble.

This pleasant assumption by Mr. Eccles that he knows the nature of microbes is particulary ludicrous after reading his own testimony to the contrary, and I scarcely think it worth while to contend with him as to his assertion of my ignorance since this book speaks for me as well as for itself. If Dr. Eccles had ever learned what the Microbe Killer really is, and if he had tested its properties and found it wanting, he would not have seen the necessity of seeking to prejudice it by making personal attacks upon me. It may, under the circumstances, have been the only expedient open to him, but it was a wretchedly bad one; for it proves nothing except the worthlessness of his own case.

Dr. Eccles is an utter stranger to me. His attack upon me was wanton and unwarranted. Unless the fact that I do not advertise in *The Druggists' Circular* can be accounted a crime against me, I have never offended either him or his employers. He may have been only obeying orders when he made

his personal assault upon me in print. Of that I know nothing, and it is a matter of perfect indifference to me. But I have a right to protest against his action and his methods too, and I present them and the gentleman himself to the public as an illustration of the means and the men that have been employed to turn the attention of the people into wrong channels. They have failed, it is true, but their failure was due to my rectitude, not to the weakness of their efforts.

The work of Dr. Eccles is not without its value when seen in this light. As a chemist and a physician he began his investigation of the Microbe Killer evidently predetermined to condemn it. It was probably not his wish to be impartial. A just weighing of the merits of my discovery would perhaps not have suited the purpose of the conductors of *The Druggists' Circular*. So if he had been actuated by an overpowering spirit of justice he probably would not have undertaken the alleged investigation. He had orders to curse, and he dared not bless; at any rate, that is the most plausible explanation I can find of his conduct. He therefore began by declaring that the Microbe Killer is something which it is not. On that false assumption he proceeded to tell us that the things he himself suggested, not the ingredients of the medicine, recollect, were poisonous; and he probably trusted to the inadvertence or the ignorance of his readers not to detect the trick. It was unfortunate for him that he did not withhold the evidence of his own want of knowledge of microbes, but it was a happy slip for me, since it pointed to the small value of any opinion that he could found on his own knowledge. He has, however, furnished a fair average example of the way in which attacks upon any new discovery that is in the shape of an innovation, are made. He illustrates in his own person the kind of men who are engaged to make them. He shows how little reliance should be placed upon them when they appear under the circumstances and conditions that exist in this instance. And he demonstrates the too common trust in popular ignorance of a certain class of operators to have their assertions believed.

My own experience in the world has led me to a sense of confidence in the fairness and intelligence of the public. I am assured in my own mind that even if such attacks as that made by Dr. Eccles upon myself gain credence for awhile they are cast to the winds by popular opinion directly their true character is exposed. If they serve to create a sensation for the moment, their permanent value is found in the additional strength that comes to the reputation of a discovery when they are proved to fail. It is not by such efforts as those of Dr. Eccles that the public is deceived,—and if they have any effect at all it is in a direction diametrically opposite to that which was intended.

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