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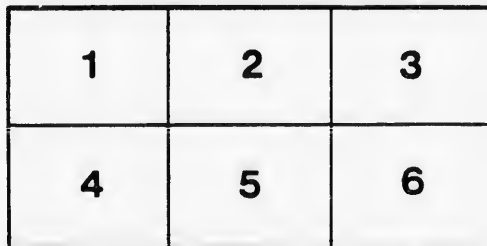
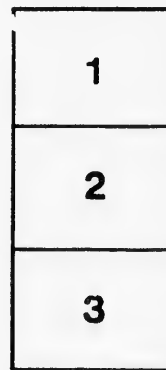
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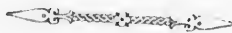
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THE GERM THEORY IN RELATION TO THERAPEUTICS.

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THE GERM THEORY IN RELATION TO THERAPEUTICS.*



The theory of demoniacal possession was very popular during the early and middle ages; and has been whenever and wherever medicine has been under the control of theological practitioners. An elaborate classification of demons was first made by the neo-platonic philosophers, whose leaders, accepting the doctrine of their great master that these creatures, forming a connecting link between the divine and the human, between the spiritual and the material, "inhabit the air, wander through the sky, hover o'er the stars, and tarry on the earth," arranged and classified them according to ideas drawn both from Oriental and Grecian mythology.

There seems to have been some uncertainty, and considerable diversity of opinion, as to the precise shape and conformation of these demons. But it was admitted that they might be infinitesimal in size—even to such a degree that—as one authority expressed it, a million of them could dance on the point of a needle. At the same time individual demons might be found possessing powers of expansion equal to those of the Genie in the Arabian tale, who could be confined in a bottle, but when the cork was drawn could spread himself to gigantic proportions.

To the maleficent influences of demons were attributed the evils that afflicted humanity, mental, physical, and moral; and the unfortunate man or woman who became the subject of demoniacal possession was submitted to a course of treatment, consisting of charms, prayers, exorcisms, purgatives and flagellations. If these failed, more heroic remedies could be applied. A course of Hydropathy, by the submersion of the possessed in a duck pond, would sometimes expel the demon—at the expense of the patient's life; while as a *dernier resort* the actual cauterization was available, and after a judicious *antemortem* cremation the devils would disappear, and also the body of the subject—the remaining ashes being found in a perfectly healthy condition.

In later days, as the dividing line between Theology and Medicine became more distinct, the belief in a universe of all pervading microscopic demons gradually died out; and instead of looking upon disease as a something—either living or dead, spiritual or material—which had to be expelled from the body, it was considered to be a disordered state of ultimate structure which had to be corrected in order to restore health.

*Read before the Can. Inst. Hom., June 15th, 1886.

But it is possible for the processes of human thought to revolve rather than to progress—to move in a circle rather than to go forward; and the apparently exploded doctrine of a by-gone age will sometimes undergo a resurrection into newness of life—coming back to us in the same form it held in centuries past, or through a process of metempsychosis returning with a new body animated by the old spirit.

The popular theory to-day is called the "germ theory." It assumes that diseases are due to the presence of minute organisms, which like the demons of old, not only "inhabit the air and tarry on the earth," but take possession of the bodies of men, women and children, working their way down the respiratory passages, floating in the blood, burrowing in the tissues, and wandering at their own sweet will over the corporeal system, inllicting upon it all the diseases to which flesh is heir.

When Pasteur was first investigating the character of his *anvrobes*, as he called them, he did not know whether they were animal or vegetable, and did not seem to care. Said he, "whether the progress of Science makes the *vibrion* a plant or an animal is no matter. It is a living being endowed with motion, that exists without air." Scientists to-day pronounce all these creatures vegetable: though to the nascent mind they present the characteristics of animal life; and one who clings to ancient ideas might take the language descriptive of germs and use it to picture microbial demons.

Like their prototypes, the infernal microbes of past days, these germs are represented as of varied and varying forms; while a certain indefiniteness attaches even to the names employed in speaking of them. *Bacteria* is the general term, used synonymously with *Microbes*; though experts tell us this title belongs to a distinct genus. According to the classification of Cohn they are divided into *Micrococci*, *Bacteria*, *Bacilli*, and *Spirilla*. The first are minute drops of protoplasm, 1-25,000 of an inch in diameter; the second are short rod-shaped bodies about 1-10,000 of an inch in length, with a breadth about half their length; the third are also rod-shaped, but their length must be more than twice their breadth, and they may be ornamented with tails, or be tail-less; the fourth are elongated bodies, twisted and spiral.

While individually so minute that it takes forty billions to weigh one grain, yet their powers of development and expansion exceed that of the jar-imprisoned genie. Dividing and sub-dividing as it grows, a single bacterium will in twenty-four hours increase to fifteen million: and in three days its progeny would weigh 800 tons—that is if it had sufficient space and food to allow its development undisturbed.

But we must not accept the general classification of germs as definite; for some observers tell us they have seen micrococci elongating and becoming bacilli, while bacilli sometimes break up into fragments that can not be distinguished from micrococci.

And as their shapes are variable so also does their character vary, some being harmless, and some extremely dangerous. Some are the bacteria of putrefaction, which are agents of corruption, and are injurious by poisoning the system, when introduced in any quantity; others are germs which always produce certain specific diseases; while some appear to be perfectly innocent, and may swarm around the body and in it without having any apparent effect.

We who are not experts may be pardoned if our ideas are somewhat vague in this connection, even after a most careful review of the observations of these microbiologists who have been investigating germs. For while one observer will find microbes of a certain kind only in connection with certain diseases, another will find them in conditions where there is no disease whatever.

Salisbury of Cleveland, Cruelli of Rome, and Krebs of Prague, established to their own satisfaction that they had found a germ belonging to malaria; and the *Bacillus malaria* was duly labelled and certified as the cause of ague. Subsequently, however, equally competent observers found those organisms swarming in the mouths of people who never had ague, and who refused to take a chill. When the cholera broke out in Europe a few years ago, a German Commission of Scientists, with Koch at the head, found microbes of the kind called the *Comma Bacillus*, which they considered peculiar to the disease, in all the infected districts; while a French commission declared that they could find no specific relationship between the germ and the disease; and Prof. Lewis, of the Army Medical School, Netley, England, reports the finding of a comma bacillus identical with Koch's cholera microbe in the mouths of perfectly healthy people. Yellow fever, it was thought, was due to microbes; but in 1878, yellow fever prevailed extensively in the Southern States, and the National Board of Health, aided by European experts, investigated and explored, without being able to find a germ in a yellow fever patient that could not also be found in people who had no yellow fever. In 1883, Koch announced the discovery of the *Bacillus Tuberculosis*—the actual cause of consumption. I do not know that anyone has so far reported the discovery of this specimen elsewhere than in tuberculous subjects; but I shall not be surprised any day to hear that it has been found or cultivated in situations where it can have no possible connection with tubercle.

Some excuse must be made, however, for differences of opinion among even the most skilled observers, when we consider the difficulties that surround the study of these mysterious organisms. Some of them are not only so small but so transparent that the unaided microscope cannot detect them, and they only appear when the tissues or fluids are subjected to some staining agent which colors the bacteria different from the normal cells. And it takes more time to find the proper dye than it does to find the germ. Then, having discovered a microbe, it must be separated from the body without injuring it; some suitable fluid must be found in which it can be cultivated; and then to find its real relationship to disease it must be planted in some

perfectly healthy body, on which can be noted its development or disappearance, as the case may be.

No wonder that there should be differences of opinion among even the most skilled observers, not only as to the localities which microbes infest, but as to the relation they bear to disease. Admitting, for example, that micrococci are always found in pyæmia. Are they the cause of the disease, or a result of it? Do they produce pyæmia, or does pyæmia produce them? Eminent observers are found taking opposite sides on this question.

But another inquiry of importance arises. Are not these minute organisms, found in the body and detected in the air, only forms of disintegrating tissue? Admitting it to be true that certain specific forms are always found, and only found, in connection with certain diseases; may not that fact be explained on the theory that tissues decomposing under certain conditions always assume certain microscopic forms?

It may be said that the weight of evidence goes to prove that the microbe is a living organism, and is not dead tissue. It is quite possible, however, for it to be a living organism, and yet the product of decomposing tissue. Chemical compounds decompose both in the body and out of it, and are resolved into simple elements, and these unite to form new compounds differing from the original. So, also, as living tissues disintegrate into ultimate structures, these may well appear as living cells of peculiar shape and character.

The processes of life and death are indissolubly joined together in the human body. Every moment tissues are breaking up and are re-forming; old cells are dying, new cells are springing into life; the death of one elemental structure is but the birth of another.

Scarcely wise is it, then, to dogmatise on the origin or character of minute organisms, with whose nature we are but imperfectly acquainted, and in regard to which the most experienced observers differ so widely.

I for one am not prepared to admit without further and more conclusive evidence that these microbes, whether they be living matter or dead, are such potent factors in the product of disease as has been claimed. I am quite willing to admit that there are specific poisons having their origin in connection with the processes of life and death which will cause disease; and so are there inorganic and organic chemical compounds which, taken into the system, will cause disease. But whether infinitesimal germs or palpable compounds, there is one course that all must take.

The seat of life is the ultimate cell. In the cell-wall exists the power of attraction and selection; and life is simply the exercise by each cell of its inherent attractive and selective force. When this process is deranged there is disease; and whatever extraneous influence causes this derangement

causes disease. Poisons, whether in the shape of organic germs or inorganic compounds, will disturb the cell-wall's normal action; so will variation in temperature, over-work of body or mind, excesses in diet, mental emotions, violent shocks, external injuries. The most that can be said for a microbe is that it is only one of many causes of disease; and that it exerts its evil influence on the system just as other causes do, by deranging the cell-wall's attractive and selective power.

I am more inclined to find sources of disease in the presence of *ptomaines*, whose characteristics have been so well defined by Selmi, Gautier and others. Poisonous alkaloids, bearing this general name, are formed in the body during the disintegration of tissues, and by a process of auto-infection cause disease. Ptomaines may be more dangerous enemies than microbes.

Admitting, however, for the sake of argument, that diseases are very largely due to the influence of these germs, what effect would this have on therapeutics? Naturally, the first thought would be to advance germicides to the front rank of the materia medica. If these infinitesimal demons have captured the citadel of health, bring to bear a choice selection of chemical artillery, and bombard them with disinfectants. This has been tried; and with what success? When the germicides have been introduced in minute quantities they do not appear to have had any more effect than the charms of the ancient exorcists had on the demons they tried to expel. Nor should any other result be expected. A germicide of small dimensions taken into the stomach and submitted to the chemical operations of that organ becomes decomposed and resolved into simpler compounds and simple elements; and long before it reaches the ultimate cell-structure where the germ is at work, it has ceased to be a germicide. Given in larger quantities—large enough to saturate the body and kill the germs—it may doubtless be effectual. But it is effectual after the manner of the heroic treatment of the subject of demoniacal possession by the theological practitioners of past days, who drowned their patients in the river or burned them at the stake. Medical journals detail the results of this treatment occasionally; as, for example, when the *Medical Record* of March 14, 1885, published an article by Dr. Peabody, of the New York Hospital, calling attention to the evil effects of corrosive sublimate used as a surgical dressing for germicidal purposes. He tells of fifteen fatal cases in the practice of Dr. Frankel of Hamburg; and gives an account of eleven cases of poisoning in his own hospital from the same cause—in seven of which there was "frequent bloody discharges, griping, tenesmus, prostration and death." And his conclusion is not unreasonable, when he says: "It is not unlikely that many other deaths have resulted from its use that have been ascribed to other causes, for the reason that we have only recently become aware of the possible dangers that attend it."

The best results of germicidal treatment, whether in a mild or an heroic form, show nothing equal to that of scientific medicine. All that Koch could tell us about the comma bacillus in cholera could supply nothing to take the place of a few remedies like arsenicum, cuprum, veratrum and camphor.

which, in every epidemic of this disease for the past fifty years, have cured eighty-five per cent. of all cases where they have been used. Diphtheria, scarlet fever, typhoid, malarial disease, and every malady attributed to germs, can resist germicides as effectually as they have resisted all other expedients that come short of specific treatment.

If, on further investigation, the germ theory should develop anything beneficial in therapeutics, it will be in the line of the well-known medical motto: *Similia similibus curantur*. It is quite possible that the influence of one form of microbe may be counteracted by that of some other form. Ferran, in Spain, may possibly oppose a cholera bacillus with some success by introducing into the system a bacillus akin to it—similar, but not the same. Pasteur, in France, may cure hydrophobia by hydrophobic injections, and antidote the poison of the mad dog by the poison of the mad rabbit. And it is possible that Cantani and Salama, in Italy, may be correct in reporting good results in the treatment of consumption by inhalation of a Bacillus Termo, if it be true, as Koch assures us, that the disease is due to the presence of a Bacillus Tuberculosis. But this only means, at best, the addition to the materia medica of a few remedies which would have to be proven as other remedies are proved, and applied to the treatment of disease under the same law that governs the administration of others.

It does not appear to me, therefore, that the relation of the germ theory to therapeutics is of such practical importance as to justify the enthusiasm with which it has been received by those physicians whose views were expressed by the late Dr. Austin Flint, when in a paper before the New York County Medical Association he declared that "we are now entering upon a revolutionary period in the progress of medicine. * * * The progressive advancement of our knowledge of the causes of infectious diseases will revolutionize not only Etiology and Pathology, but Therapeutics."

"The revolutionary period in the progress of medicine" commenced in 1796, and was ushered in by an article in *Hufeland's Journal*, from the pen of Samuel Hahnemann. Many theories have been announced since then, some of which have fallen still-born, while others have stimulated thought, promoted investigation and served useful purposes, even though failing to revolutionize medicine themselves, or to reverse the great revolution that began a century ago.

Like many other fashions in medicine the microbomania will in time subside, and, without having had any revolutionary effect, it will have made a good addition to the sum of human knowledge. But doubtless its practical benefits will be shown chiefly in the sphere of sanitary science. If there are poisonous germs which float in the air, and carry disease wherever they go, then it is not to be questioned that the more we can learn of their origin, their

character, and their action, the better we will be prepared to meet their attacks, to counteract their evil influence, and to protect humanity from their ravages.

And this is not the least important part of our work—to prevent disease, to preserve health. If the study of micro-organisms can aid us in meeting the thousand and one enemies of life and health, whether visible or invisible, let us by all means encourage investigation in this direction, and pay all honor to the noble students who are exploring the realms of microscopic life.

