

nounced that yellow fever, too, is carried by mosquitoes.

Within the very recent past the living cause of syphilis has been demonstrated and the bacilli which produce leprosy have been cultivated.

We must not think that our generation deserves the entire credit of discovery and has promulgated the modern theories of cause and prevention of disease on the basis of its own observation alone.

The relation of bacteria to disease was forecast by Athanasius Kircher in 1646. The slight magnification of his imperfect microscope enabled him to see blood corpuscles and pus elements which he described as worms, and suggested as the cause of disease. This hypothesis of a living cause of disease, correct in itself, was thus based on an error of observation.

The microscope was perfected to such a degree that in 1675 Anthony von Leeuwenhoeck was able to see and describe bacteria in various substances. His drawings are very accurate and of interest to those of us who are working to-day in the same field.

He did not, however, suggest any relationship between his bacteria and the fermentative, putrefactive or disease processes with which they are now identified, nor did he know how essential they are to the maintenance of vital balance or conservation of the vital energy.

Nearly one hundred years later, in 1762, Marcus Antonius Plenciz, a Viennese physician, not only accepted the published work of Leeuwenhoeck, but suggested that his bacteria were the cause of disease. He went further and promulgated the theory of a specific microbe for each disease just as when we sow a particular grain we expect that particular grain to reproduce itself. He advanced the idea that bacteria increased in the body and called attention to their possible transmission through the air.

It was the middle of the nineteenth century before definite proof of certain of these theories became available, through the work of Davaine and Pollender, who showed the presence of anthrax bacilli in the tissues and fluids of cattle which suffered from the disease and were able to transfer it from one animal to another, and to show that the bacteria caused the disease.

The preparation of vaccines by Pasteur,

Chauveau, Salmon and others from living cultures of bacteria whereby protection against the diseases produced by them could be developed, led to the hope that protective inoculation might become general and an immunity of greater or lesser duration might be induced for all the disease.

Many of my readers will recall the great excitement which accompanied the announcement of a protective or curative tuberculosis "lymph" by Koch in the later eighties. The disappointment of thousands or millions which followed was a tragedy, and it has taken thirty years to show the limits of usefulness of this tuberculin in the cure or prevention of tuberculosis.

About twenty years ago, the accidental discovery by Kitasato, the Japanese investigator, working in Germany with von Behring, of the principle that bacterial poisons injected in increasing doses into animals, not only produce resistance to infection, but cause to be liberated in their blood a substance, antitoxin, which protects or cures other animals, was made in regard to the tetanus bacillus, the cause of the disease commonly called lock jaw. Diphtheria bacilli, like tetanus bacilli, produce disease through the liberation of poison from the bacilli into the tissues and fluids of the body, and the same principle of antitoxin treatment was applied in the cure and prevention of diphtheria. This discovery has revolutionized public health procedure and the care of the patient, and has already saved hundreds of thousands of lives.

Avoiding technical detail, it may be stated that the site of the disease, method of growth of the bacilli, and the paths of distribution of the bacterial poisons and their effect upon the various groups of body tissues, cells and fluids are different in the two diseases as is also the stage at which our attention is called to the necessity of combatting the poisons or toxins. The fadist who expected exactly similar results in the two diseases, because each bacillus operates through a soluble poison and each can be neutralized by antagonistic bodies, which are developed in the animal body and circulate in the body fluids, has been disappointed because of the other variables now so plain to us.

On the other hand, we sometimes achieve most wonderful results in human better-