

Moreover, a careful process of staining by aniline dyes has to be carried out in order to distinguish it from other organisms of a similar character.

This minute fungus not only multiplies by fission, but by spores also, and these are of infinitely greater importance than are the bacilli themselves, inasmuch, as like the seeds of a plant, as compared with the plant itself, they withstand the effects of a far greater amount of adverse influences; and it has been shown by Pasteur that at a temperature of 212° F., milk containing spores requires to be boiled for a considerable period in order to render it harmless.

It is necessary that this fact should be kept in mind in reference to the question as to the harmlessness or otherwise of tuberculous meat and milk.

Not only do the spores of this fungus withstand the effects of boiling, but they resist the action of long drying and of freezing, and also of strong solutions of salt; and it is believed that they are capable of retaining their vitality and their power of propagation and reproduction for a very long period outside the living body. Thus it is believed, and in fact distinctly proved, that the dried spittle of a consumptive man, and the discharges from the nose of a consumptive cow, adhere to woodwork and similar substances, and may be the means of contaminating healthy persons or animals respectively long after they have been so deposited.

The Lancet (30th June, '88) says: In inquiring into the origin of epidemics, it is felt how necessary it is to recognize the channels of diffusion, and the vital resistance of the infectious microbes. The germ of glanders possesses but little vitality; desiccation kills it; putrefaction shortens its life; and the chances of infection, when not immediate, diminish and rapidly disappear as time proceeds. The germ of tuberculosis, on the contrary, realizes a collection of conditions eminently favorable for more remote infection, for it survives the majority of microbes usually associated with it. Neither drying nor putrefying appear to destroy it, whilst both processes often allow of its being distributed through air or water.

In numerous experiments pieces of tubercular lung were kept at a temperature from one degree to eight degrees below zero, in such a fashion that the matter remained frozen sometimes for more than a week. Yet virulence was maintained for seventy-six and one hundred and twenty days.

HOW THEY ENTER THE BODY.—The methods by which bacilli or their spores gain access to the living body are—1, by inhalation (breathing) of contaminated air; 2, by ingestion (swallowing) of any fluid or solid matter containing tubercular pro-

ducts; and it has been shown distinctly that these products need not contain a single bacillus in order to render them infective. And this is easily accounted for by the fact that though no matured bacilli may be present, there may be thousands of spores which, when sown on favorable ground, develop in the course of time into matured bacilli.

When bacilli or their spores are taken into the interior of the body, they adhere to the inner lining of the different organs (the mucous membrane), and may there undergo further development and multiplication. As a proof of this it may be mentioned that when calves are fed on milk from cows suffering from tubercular disease of the udder, or milk with which is mixed tuberculous matter, the disease is found developed along the membrane of the mouth, throat and bowels. At the same time there can be no doubt but that millions of these bacilli are rendered harmless by the juices of the stomach, or are swept out of the bowels before they can gain lodgment. Many of these organisms pass from the mucous surface, or inner lining of the bowels and lungs, into the surrounding tissues.

Next to the lymphatic glands the delicate lining (serous membrane) of the abdomen and the chest is most largely affected.

Of the internal organs, the lungs, the liver, the kidneys and the brain are most frequently found to be the seat of tuberculosis.

The udder of the cow, unfortunately, is also frequently affected with the disease, and many of the so-called cases of "weed" in that organ are nothing more nor less than tuberculous inflammation.

THEIR EFFECTS ON THE TISSUES.—The bacilli produce their effects on the tissues by acting like any other irritant matter—i.e., by setting up a circumscribed inflammatory process which results in the formation of minute centres of new tissue; this new tissue, however, never becomes perfectly organized owing to the want of perfected blood-vessels, and indeed in place of going on to form a permanent tissue it goes through a backward or retrograde process, and becomes converted into a material resembling cheese (caseous matter) of a very soft consistence, and into a gritty substance known as calcareous matter.

The primary tubercular centres are no bigger than millet seeds, and from this fact they are termed *miliary tubercles*. But owing to the amount of inflammation of the tissue in which they are produced, they become aggregated together and form immense masses or tumours, and these masses may either remain hard and firm or may undergo a general softening, and produce tubercular abscesses or "gatherings."