

culosis but a number of other forms, such as the actinomyces organism, the smegma bacillus, and such organisms as Rabinowitch's butter bacillus, and those found by Møeller in grass and fæces show the same branching. On this account and on account of a resemblance in staining and cultural characters, but more important still because of a tendency which they all have of giving rise to a chronic proliferative inflammation with the formation of granulomata more or less like the typical tubercle, these organisms have been classed together. Lehmann and Neumann suggest that all these organisms be classified apart from the typical bacteria as Mycobacteria; by others they have been called Streptothricaceæ.

Although these facts are of interest in determining the affinities of the bacillus, they do not, of course, in any way affect its position as the cause of the disease tuberculosis, but on the other they give us, in our ability to study its near relatives, a means of throwing light upon such biological problems as the production of proliferative inflammations by bacteria, and the question of natural and acquired immunity to these organisms.

In the first morphological studies upon the bacillus of tuberculosis, it was observed that certain oval areas could not be stained by any possible method, and subsequent observations showed that these areas, although not always found, were often present in old or degenerating individuals. These were interpreted by Koch to be spores, similar in character to the spores of the anthrax bacillus; the spores of the anthrax bacillus are more difficult to stain than the growing bacillus and are oval in form, and one would, therefore, expect the spores of the bacillus of tuberculosis to show a similar resistance to stains. Another observation which seemed to support this view, that spores were formed by the tubercle bacillus, was the difficulty of demonstrating them in lesions undoubtedly of a tuberculous nature; it being argued, that since the material from such lesions would produce tuberculosis in animals, whilst microscopic examination failed to show the organisms, these must be present in some form which resisted staining, and so presumably as spores.

The spore of a micro-organism is a form in which it is able to resist unfavorable conditions better than in the vegetative state and this resistance is typically shown in the greater resistance to heat of the anthrax spore. The tubercle bacillus is probably more resistant than many of the ordinary forms of micro-organisms, but as far as we know, it never in any form shows that resistance to heat and other bactericidal agents which is characteristic of the spores of anthrax or tetanus. We consequently have no evidence that spores exist.

The tinctorial characters of the tubercle bacillus have been found to be due to the impregnation of the cell membrane with fatty acids, probably also with a wax-like substance, and perhaps also with a material