

through porcelain under pressure, the toxins can be separated entirely from the germs which produced them. It is found now that if these toxins be injected into the body of an animal, that animal will manifest the same general symptoms as if it were actually suffering from the disease which the germ produces. If the dose be large enough death speedily results. If a smaller dose be given the animal sickens but rapidly recovers. A repetition of the same dose will be followed by less severe symptoms, and it is found that from day to day the dose may be rapidly increased, and that in the course of a few weeks or months the animal may receive with impunity a dose several hundred times as large as would have been a lethal dose in the first instance; and also that the injection of the living germs is followed by no ill results whatever. In short, the animal has been rendered "immune" to the disease. From what has been already said you will readily follow the course of events. Upon the injection of the first dose of toxine the cells of the animal injected bestir themselves to produce the antitoxine required. Additional antitoxine is formed after each injection, until in time the serum of the blood becomes saturated with it, and immunization is complete. If this process be carried on slowly and carefully the animal operated upon continues in robust health, and suffers no pain or discomfort except that caused by the prick of a fine hypodermic needle.

ANTITOXINE TREATMENT OF DIPHTHERIA.

Though perfectly satisfactory as regards the lower animals, it is manifest that this process is too cumbersome and protracted to be applicable to man. In 1890, however, Prof. Behring, of Berlin, found that the serum of a guinea-pig which had been artificially protected against diphtheria was able to confer a similar immunity upon another animal when injected into its veins. This was of course a most important discovery, and it is the foundation of the new treatment of diphtheria by antitoxine injections from which we hope so much.

For the purpose of producing the antitoxine for use in cases of diphtheria, the animal selected is man's noblest friend—the horse. The horse is selected because he is habitually free from disease, tractable under treatment, bears the injection of the diphtheria toxins without showing symptoms of discomfort or illness, and produces large quantities of antitoxine with the same cheerfulness and industry with which he renders so many other valuable services to man. The practice followed at the British Institute of Preventive Medicine is as follows: A healthy young horse is secured, placed in comfortable quarters; and well fed. A few drops—say, three or four (.25 c.c.) to start with—of a filtered culture of the diphtheria bacillus that has been growing a month in beef tea, are injected