First, Nature's own method. That is, after recovery from one attack of a certain infectious disease, such as small-pox, the individual is immune to a second attack for the rest of his life, or (in some other diseases) for a very long period only.

Vaccination, the second method, is popularly specified to mean the inoculation in the human subject of the virus of cow-pox, in order to produce immunity to small-pox. However, this term may be applied to the preventive inoculation against any disease by the introduction of the organisms causing that disease. Vaccination is accomplished in a variety of ways, viz.

By the inoculation of sublethal doses of the living bacteria in virulent form. This inoculation has to be repeated a few times with successively increasing doses.

By the inoculation of living germs attenuated in virulence. This is true of vaccination. This method is preferred to the last, for the attack produced from inoculating by this method is quite mild and scarcely noticeable, in fact, it is local—at the site of injection.

By the injection of the dead bodies of the specific bacteria.

The third and last method of producing active immunity, is by the injection of the toxins of the specific bacteria. This method is especially employed in immunising against diphtheria, tetanus, and streptococcic infections.

It must not be forgotten that immunity—whether active or passive produced by any of the technical methods is gradually lost, also that immunity against one disease does not prevent the attack of another. Thus, immunity to tetanus does not exclude diphtheria; and so on.

Frankel believed that artificial immunity is due to the presence of certain specific "immunising substances" which are produced by the bacteria themselves. This "immunising substance," he said, was quite different from the toxin of the bacterium. (This is, practically speaking, similar to the Retention Theory). He proved this by showing that, if the filtered products of the bacterium were heated, the toxin would be destroyed at a temperature of about 55°C to 60°C, and that the "immunising substance" was only destroyed when the temperature reached 70°C, or higher. He also said that by heating the toxin, the latter could be transformed into the "immunising substance." However, the true explanation of these experiments is that the virulence of the toxin was lessened by heat at 60°C. The oppositions to the Retention Theory have been discussed under general immunity.

And now the question presents itself, What is the explanation of the manner in which antitoxins, bacteriolysins, hæmolysins, etc., are formed