

sense not in its restricted use of vaccination against smallpox. A vaccine is simply a modified or attenuated form of the virus so that when such a material is used we have a corresponding modification of the disease process which, however, affords protection. I will endeavor later on to explain how I believe such attenuated virus has generally as powerful an effect as recovery from the disease process itself. The diseases against which vaccines are used are smallpox and rabies in man, anthrax in cattle and sheep, blackleg in cattle and rouget in swine.

A third way in which we find immunity can be developed in certain instances is by the use of the toxins or metabolic products of certain bacteria. In some bacterial species the toxins are thrown off from the cell as soluble products while in others the true toxins are bound up with the cell plasm and hence the dead bacterial cells have to be used in such cases. We have an excellent illustration of the immunizing power of intercellular toxins in the prophylactic fluids now so extensively employed against the plague and the cholera. (In the method of immunization against cholera, while living cholera vibrios may be employed in the second injection, yet as the vibrios are not in their normal habitat in the tissues and do not multiply therein, but rapidly die, their products only are active.) The early inoculations in the preventive treatment of rabies are also undoubted examples of this form of immunization. The method of toxin (soluble) immunization is also extensively employed on animals used in the production of the various antitoxic serums, e.g., those of diphtheria, tetanus and streptococcus infections. An attempt has been made with many other infective bacteria to obtain practical results by this method. Prominent among these is the use of the various tuberculins from the original preparation of Koch to the numerous forms now on the market. The curative results with these (except in certain animals) are to say the least very discouraging.

The types of acquired immunity so far considered are those commonly termed the active forms, because the tissues have had to actively contend against and overcome the disease agents