COMMITTEE ON DISARMAMENT

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WORKING PAPER

DEFINITION AND CHARACTERISTICS OF THE TOXINS

In three classical instances (diphtheria, tetanus and botulism), typical bacterial exoproducts were discovered early in the history of bacteriology, soon after the identification of bacteria (Corynebacterium diphtheria 1884, Clostridium tetani 1890, Clostridium botulinum 1897). While in most instances it is still difficult to establish which of the multitude of bacterial properties determine the microb's ability to cause disease, in these three cases it was fairly easy to establish the role of bacterial "toxins"; it was found that the bacteria produce exoproducts, which when applied to experimental animals mimic the natural disease.

The introduction of the term toxin is rather obscure. It originated soon after the three above-mentioned infectious diseases were identified as "intoxications" (that is, not the proliferation of bacteria in the organs, but the production of toxic exoproducts causes the disease).

A poison may be defined as any chemical substance which when introduced into a suitable host -- either parenterally (by injection), orally, by inhalation or by any other route results in overt damage to tissues or interruption of normal physiological functions, and if the dosage is sufficient, in death of the individual.

The distinction between poison and toxin was made by early investigators although no hard rules were even established, nor are they established today. A tacit agreement was arrived at, namely that toxins are antigenic poisons of microbial origin (the term antigenic means that they are able to induce the antibody response in the body; to be able to do this, their molecules must have rather high molecular weight and a complex structure -- in most instances they are proteins).

This definition does not cover, however, the whole problem. An infectious disease is a result of complicated interrelationships between the host and the micro-organism. The micro-organisms display metabolic activity and produce many soluble substances which can be found in the tissues of the infected host, as well as in laboratory cultivating