

Again, at this time I have to deviate from the subject of biology and call your attention to the investigation of Metchnikoff, who was the first to teach us the presence of phagocytosis. This subject I will explain under the heading of hematology.

Under the heading of biology we have to consider the subject of tuberculin, which Koch brought to our attention in 1890. On August 4th, 1890, Koch announced that he had found a substance which immunized animals against tuberculosis; and in 1891 he published a formula of his tuberculin. His opinions were based on the findings that when he injected tuberculous substances into an already tubercular infected animal, he produced a tubercular ulcer which subsequently healed, a condition he could not produce when he injected dead bacilli into healthy animals. Hence he extracted the soluble products of the tubercle bacillus and named the end product tuberculin.

History points to the fact that upon this announcement by Koch, the most eminent medical men from all parts of the world flocked to Berlin to get possession of the newly-discovered specific. It seems to me irrational for the narrow-minded to discredit the work of Koch in this direction; his work was mostly theoretic, it being based upon no other ground than that tuberculin might prove a cure for consumption, this in view of his previous biological tests. Time has already decided that tuberculin has its especial uses. These reports and findings of Koch opened avenues for research work resulting later in the discovery and successful application of various antitoxines. No one will deny that Koch's original work led to the discovery of antitoxin diphtheria, and health statistics tell how much this product has decreased the mortality in diphtheria.

Our next step regarding biologic research is when we find that tests have proven that whenever and wherever concurrent infection of other pathogenic bacteria exists, then cavities are rapidly formed. The bacteria which we find in mixed infections are the streptococcus, staphylococcus, diplococcus, lanceolatus, and the Friedlander bacillus; also the colon bacillus.

Dr. Sewell, of Denver, who reports that, after studying the sputum of more than seventy tubercular patients, having in view the relation of the form of tubercle bacillus to the clinical aspects of tuberculosis, the form of the bacillus found has a definite relation to the virulence of the disease. He finds that the short double staining rod or chain of rods of moderate length is the usual form of bacillus found in most cases. The long rods, particularly if irregularly broken, denote a mild process, while a long, slender rod, ill-stained or stained irregularly, is found in cases apparently passing on to a cure. Dr. Sewell has noted that the sputa of the same patient, examined at different times, seemed to vary in the bacillary character according to the clinical condition of the pa-