

54 (1801)

The effect of the accessory substances of plant tissue upon growth of bacteria.

By O. T. AVERY and HUGH J. MORGAN.

[From the Hospital of The Rockefeller Institute for Medical Research, New York City.]

The study of the properties of blood upon which depends the ability of the so-called hemoglobinophilic bacilli to grow in this medium, has shown that these properties are related to at least two factors which can be separately studied. Further studies have shown that both of these factors are present in plant tissue, (potato and banana), and that sterile unheated vegetable tissue can replace blood in the cultivation of *B. influenzae*. These observations have now been extended; yellow and white turnip, carrot, beet, parsnip, and sweet potato, when added to fluid media have been found to possess the same growth stimulating action as white potato.

It has been found that these vegetable tissues not only permit the cultivation of the so-called hemoglobinophilic organisms, but that they also greatly favor the growth of other entirely unrelated organisms. For instance, in the case of pneumococcus, not only is there a marked acceleration of growth, but a seeding too minute to initiate growth in plain broth alone, will amply suffice to induce abundant multiplication in the same medium to which small pieces of sterile, unheated vegetable have been added. Moreover in the plant tissue medium the zone of hydrogen-ion concentration within which growth can be initiated is considerably extended beyond the acid and alkaline limits of the optimal range in ordinary bouillon. In addition certain other bacteria, which ordinarily fail to grow in the presence of free oxygen, multiply in a medium containing fresh plant tissue even though no precautions are taken to exclude air. It is evident, therefore, that the presence in media of certain substances contained in fresh plant tissue not only supplies the necessary factors for growth of the hemoglobinophilic bacilli, but furnishes the requisite requirements for the cultivation of other bacteria which multiply only under certain

restricted conditions. One such condition is the reaction of the medium which in the presence of plant tissue may be made to vary over a much wider zone without retarding growth; another condition is oxygen tension which similarly seems to require for sensitive organisms much less accurate control in the presence of plant tissue than in its absence.

The exact nature of the substances contained in plant tissue upon which these properties depend is not yet determined, but the studies so far made suggest that they are related to the presence of certain oxidizing and reducing enzymes in fresh plant tissues as well as to the presence of so-called accessory food substances.

55 (1802)

The diffusion of sodium chloride through a "lecithin"-collodion membrane.

By **HAROLD A. ABRAMSON** and **SAMUEL H. GRAY**.

[From the Department of Pathology, College of Physicians and Surgeons, Columbia University, New York City.]

A study of the diffusion of sodium chloride through: (a) membranes prepared from collodion; and (b) membranes prepared from collodion which contained approximately four grams of commercial "lecithin from eggs" per hundred cubic centimeters, was made under the following conditions.

1. The collodion (Eimer and Amend's, U.S.P. IX) contained about four grams of guncotton per hundred cubic centimeters. The membranes, therefore, which contained "Lecithin" were approximately fifty per cent. lipid by weight.

2. The membranes were made with as nearly uniform technique as possible. The viscousness of the collodion and of the lecithin-collodion solution was kept constant and the same. The volume of the membranes, which were shaped inside of Erlenmeyer flasks, varied between fifty and sixty cubic centimeters.

3. The only factor experimentally varied was the drying time which was terminated by fixation with tap-water.

4. In every determination of permeability, the membranes were filled with one fourth molar sodium chloride and immersed