the action of the pneumococcus soluble substance[2, 3, 4] on the growth of such strains of pneumococci in the rabbit or cat serum-leucocyte mixtures. It was found that whereas the growth of a small number of avirulent pneumococci was normally inhibited by such mixtures, the addition of a very small amount of the purified soluble substance of the homologous type was able to cause growth of the organisms in them. Such action of the soluble substance was shown to be highly specific to type. A type II substance assisted the growth of only type II pneumococcus, likewise a type III substance, the growth of type III pneumococcus only.

Experiments employing broth filtrates of young pneumococcus cultures in place of the purified soluble substances gave similar results, thereby established the identity of the purified substance with the substance originally described in the cultural fluids of pneumococcus cultures.

From the results of previous studies, such action of the pneumococcus soluble substance may be interpreted as having the power of rendering an avirulent pneumococcus of the homologous type virulent.

125 (2648)

The effect of chemical preservation of eggs upon the stability of their vitamin contents.

By ERNEST TSO. (Introduced by O. H. Robertson).

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The Chinese preserved eggs or "pidan" are produced on a commercial scale from fresh ducks' eggs, and are perhaps as much relished by the Chinese people as cheese is in Western countries. In preserving, each egg is coated with a layer about 7 mm. thick of a mixture containing pure soda 5, burned straw ash 25, table salt 4, slacked lime 40, and boiling water 26. This again is

[2] Dochez, A. R., and Avery, O. T., *J. Exp. Med.*, 1917, xxvi, 477.

[3] Heidelberger, M., and Avery, O. T., *J. Exp. Med.*, 1923, xxxviii, 73.

[4] Heidelberger, M., and Avery, O. T., *J. Exp. Med.*, 1924, lx, 301.

covered with rice husks to prevent sticking. The eggs are laid in earthenware jars, sealed with wet clay, for a month. Both the white and the yolk are then coagulated. The white has turned dark brown and the yolk greenish gray with concentric rings of different shades of gray. These eggs are marketed with their coverings on and are usually consumed within six months of production. The taste of these eggs can only be very imperfectly described as somewhat caustic and piquant and the odor largely ammoniacal.

In the preserved egg there was, according to Blunt and Wang,[1] a marked increase in the ash content and the alkalinity of the ash; and a partial decomposition of the proteins and the phospholipoids resulting in an excessive production of free ammonia and in a diminuation of the yolk-fat. It was believed that these characteristic changes were brought about by the combined action of bacteria and enzymes as well as by the alkali preservative.

It should be of interest, both from the point of view of setting a vitamin value to "pidan" as a food and the point of view of studying the properties of vitamins, to know what effects the preserving agents and the chemical changes have upon the stability of the presumably rich vitamin contents of the ducks' eggs.

Feeding experiments were made on 57 albino rats. Three or four animals were used for each single experiment. It was shown that 3 per cent of the preserved yolk, or 2 per cent of the ether extract of the dried preserved yolk contained sufficient amount of vitamin A to cure this vitamin deficiency disease in the rats. Five per cent of the preserved yolk was as efficacious as 5 per cent of liquid yolk from fresh ducks' eggs in curing Xerophthalmia, and inducing promptly the return of vigorous growth in rats which had declined in weight on basal diets deficient in vitamin A. On the other hand, 25 per cent of the preserved yolk exerted no appreciable influence on the course of vitamin B deficiency disease, though the yolk from fresh ducks' eggs was found to be very rich in vitamin B. Five per cent of the preserved yolk, or 2 per cent of its ether extract incorporated in the No. 84 Sherman and Pappenheimer diet, was effective in preventing and inducing healing of rachitic bone changes. Two per cent of the ether extract of the preserved yolk, after being oxidized for six hours by exposure to showers of heated air at a

[1] Blunt, K., and Wang, C. C., *J. Biol. Chem.*, 1916-1917, xxviii, 127.

temperature of about 120° C, was found to have lost its vitamin A content but retained to a large measure its anti-rachitic potency.

It seems justified to conclude that under the conditions as found in the Chinese preserved eggs, the originally rich vitamin B content is practically completely destroyed, but the stability of vitamin A and the anti-rachitic food factor is little or not at all affected.

126 (2649)

A method for the preparation of basal dietary free from vitamin A.

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The method depends upon the fact that vitamin A can be easily destroyed by oxidation and that the higher the temperature the more rapid, apparently, is the destructive process. The apparatus illustrated in the accompanying diagram consists of an iron coil of about 7 mm. bore; two suction flasks interposed between the coil and the compressed air faucet; one improvised Marshall and Kolls' flowmeter; a shower expansion of about 28 cm. diameter, made of copper sheet; and a galvanized iron drum box enclosing the shower expansion. Through a large window in the drum the food is placed under the air shower. Exit of the air current is provided for by a tube inserted in an upper corner of the drum.

By using a four tube burner under the coil and setting the air stream running at the rate of about three thousand liters per hour, the temperature of the food is maintained at about 110° C. in the case of yeast and, in the case of casein and starch, about 120° C. Two hundred grams of the food are spread over a 26 cm. aluminium tray placed at a distance of 6 cm. under the shower plate. The food is stirred at half an hour intervals in order to secure a uniform surface of exposure.