time of formation of the first cleavage division approximately 2 minutes. Later cleavages in this experiment were correspondingly retarded, and 17 hours after the completion of the first cleavage, when virtually 100% of the control eggs had become normal, free-swimming plutei, none of the experimental eggs had progressed to the swimming stage and again there were many abnormalities evident.

In experiments in which solutions having a thyroxin concentration of greater than 1:50,000 were used the effect was correspondingly more pronounced. In thyroxin solutions of 1:25,000 for example, the reduction of the rate of division is approximately twice that produced by the 1:50,000 solution. Thus far, however, the writer has not experimented with solutions of so great a concentration that cleavage is entirely inhibited; this point is still to be determined. As would be expected, when solutions of thyroxin with concentrations of less than 1:100,000 are used the retardation is much less pronounced, until in solutions where the concentration was very slight the effect fades out altogether. In solutions of low concentration the results naturally are not so clear cut, for the eggs must be followed for several hours through several cleavages and often to the gastrula to note the retardation.

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Microbic Studies of Acute Infections in Animals (Albino Rat) Deprived of an Adequate Supply of Vitamin A.

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Previous investigators[1] have repeatedly shown that experimental animals (Albino rats), placed on diets deficient in vitamin A, develop a characteristic susceptibility to infection. Goldblatt and Benischek[2] mention that smears made of tongue abscesses in animals

[1] McCollum, E. V., *J. Am. Med. Assn.*, 1917, lxviii, 1379; Drummond, J. C., *Biochem. J.*, 1919, xiii, 95; Daniels, Amy L., *J. Am. Med. Assn*, 1923, lxxxi, 828; Macy, Icie, G., Outhouse, J., Long, M. L., and Graham, A., *J. Biol. Chem.*, 1927, lxxviii, 152; Sherman, H. C., and Burtis, M. P., PROC. SOC. EXP. BIOL. AND MED., 1928, xxv, 649.

[2] Goldblatt, Harry, and Benischek, Marie, *J. Exp. Med.*, 1927, xlvi, 699.

suffering from lack of vitamin A, inevitably show a mixture of gram-positive diplococci and gram-negative bacilli.

The following communication states briefly the results observed, thus far, in a study of the bacteriology of infections resulting through vitamin A deficiency. Dr. Burt R. Shurly, Chairman of the Research Department, suggested this problem for investigation.

The bacteriological flora of the nasal cavities, posterior nasal aperture, and middle ear have been studied in both normal and infected animals. Cultures from the eye and abscesses of the upper digestive tract are also under investigation.

The experiments conducted have shown that gram-negative cocci and gram-negative bacilli are the outstanding organisms in the suppurations of the infected animals. The absence of gram-positive organisms is noticeable.

According to Gordon's[3] classification of gram-negative cocci of the nose and throat, 3 types appear to excel in the pathological animals. These are *M. catarrhalis*, *M. catarrhalis* subgroup A, and a microorganism classed in group 6 of the chromogenic type.

Virulence tests with young cultures of the last 2 organisms have repeatedly shown toxic effects toward rabbits, death occurring, after intravenous injections of 4 cc. of a 48-hour broth, within 24 to 48 hours.

The gram-negative bacilli from their morphological, cultural, and fermentative characteristics, appear closely related to the Friedlander-bacillus. Another gram-negative bacillus, having no action on carbohydrates, has been observed in a number of cases. A detailed study of the bacillary forms has not been made, since both types have been found in the control animal as well as in the infected animal. Virulence tests, thus far, have proved avirulent for both types of bacilli.

Young rats varying from 21 to 50 days of age were used in the experiments. Twenty-nine animals from, presumably, vitamin A-free diets and 14 animals (controls) from like diets with the addition of 5 drops of cod liver oil daily have been examined. Two experimental diets have been used. The basal rations of both diets were prepared with like ingredients, purified and formulated according to Macy and her collaborators,[1] with the exception that in one ration 15% lard was substituted for a portion of the dextrin. Due to uncertainties in regard to the vitamin A content of lard it is not assured that the fat containing ration was completely free from this vitamin. The animals were sacrificed after they had been on these diets for varying periods. A number of infected rats were

[3] Gordon, J. E., *J. Inf. Dis.*, 1921, xxix, 462.

left to succumb. The control rats were kept on the diet until all of the xerophthalmic animals had been examined. Autopsies showed that suppurations were present in the middle ear in 38%, posterior nasal aperture 58% and ethmo-turbinal area of the nasal cavities in 48%, of the 29 xerophthalmic animals. In all 85% of this group showed infection with localization of pus in one or more of these localities. In 7% cloudiness was entirely absent. Records were not obtained for the remaining animals. The control animals did not show any signs of localized pus. The middle ear, nasal cavities, and nasal apertures were clear.

Bacteriological findings for infected and control animals show that gram-negative bacilli have a higher percentage incidence in the control rats than in the infected rats. Gram-negative cocci in the control animals were found only in the posterior nasal aperture, totalling 24%. In the xerophthalmic rats the total percentage incidence of gram-negative cocci for each locality averaged 78%. Gram-positive organisms were observed in several cultures from both pathological and control animals. Of the 102 cultures from the former, one showed hemolytic streptococci, 2 showed staphylococci, and 6 showed diphtheroids. Of the 44 cultures from the latter, one showed organisms of the diphtheroid group.

These experiments were carried out during the spring and summer of 1928, extending from April to September. Mention is made of this because of the possibility of seasonal variation. Experiments under immediate investigation (October) have shown the presence of a gram-positive cocci in several animals, gram-negative cocci being absent. A report of the findings obtained during the winter months will be given in the future.