mary and metastatic orchitis, the occurrence of scrotal edema, the time of development of generalized lesions, their distribution, number and duration, and the initiation of latency, that is when all manifestations of the disease have healed.

The results of completed experiments and the observations of others still in progress may be summarized as follows:

The character of the syphilitic infection has been markedly affected by the simultaneous inoculation of vaccine virus. With the intracutaneous injection of vaccine virus, the severity of the syphilitic process was greatly increased, as shown in the case of both primary and secondary lesions, but particularly the latter in which an increased distribution, greater size, longer duration and in some series increased incidence, were especially marked. On the other hand, the syphilitic infection which developed after the combined injection of vaccine virus and syphilitic material in the same testicle was modified in the direction of decreased severity. The mildness of the disease in these rabbits as compared with the controls was very striking. An immunity to vaccine virus present at the time of syphilitic inoculation was also associated with alterations in the manifestations of the infection, and in general, the disease was less severe than in the controls. The reaction to vaccine virus under the condition of simultaneous inoculation with syphilitic material will be reported later, but in general, it may be said that it is accelerated and exaggerated. This was also the case in many instances in which syphilitic rabbits were vaccinated.

The interpretation of these results will not be attempted here, but it is obvious that as far as the syphilitic process is concerned, their significance is intimately related to the factors of host susceptibility and resistance as determinants of the course and outcome of this particular infection.

This is a preliminary report.

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A New Dietary Deficiency With Highly Purified Diets.

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In the course of our work on vitamine E it became necessary some years ago to attempt to withdraw all traces of this substance from dietaries. But various workers, including ourselves, have re-

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ported inferior animals when ordinary casein is extracted for a long time with solvents for E-alcohol and ether. This effect could be due to removing impurities or to lowering the nutritive value of the protein itself. The solution of this problem is obviously facilitated by purity and hence constancy in the remaining ingredients of the diet. It is established that the rat can use without embarrassment either fat or carbohydrate alone for the complete satisfaction of its caloric needs. The use of starch as a source of energy involves the inclusion of many impurities. The recent papers of Taylor and Iddles,¹ for example, show that cornstarch contains about 0.6 per cent of fatty substance, which is within the granule and is non-extractable. The use of sucrose has been decided upon after a comparison of this sugar with chemically pure glucose and chemically pure lactose. The former offers no advantage and lactose proved entirely unsuitable, since the animals soon declined and died apparently because of intestinal disturbances. The sucrose is made by recrystallizing the best grade of commercial cane sugar from 80 per cent alcohol. The casein is prepared according to Van Slyke, and is a dry white powder which has no ether extractable material and an ash content of not over 0.2 per cent. The salts are of the highest purity obtainable in the market. The pure diet employing these substances (our Diet 519) is as follows:

Casein, Van Slyke 50)
Sucrose, pure150)
Salts (185) 8	3
KI added to water.	
Distilled water ad libitum.	
Cod liver oil 2 to 3 drops daily.	
Yeast 700 to 1000 milligrams daily.	

The animals are taken at 21 days of age and kept in individual metabolism cages so there is no access to feces or urine. They are kept in a large, light, well ventilated metabolism room whose temperature is maintained between 22° C. and 25° C. by thermostatic control. All vitamine doses are fed in a separate dish and are quickly consumed.

The results summarized here have been secured during the past twelve months but the groups were small and the data must be considered as preliminary in nature. When the pure diet was fed to twelve females with 700 milligrams of whole dried yeast (Fleischman) and 3 drops of cod liver oil (Patch) daily, they plateaued when about 125 grams in weight. This weight was attained slowly rather than rapidly and ovulation did not occur during the first four months of life. (Normally, ovulation begins before the fiftieth day of life.)

When the pure diet was fed to males and supplemented by 750 milligrams of yeast (extracted with pure absolute ether) and 2 drops of cod liver oil, the males grew at the apparently normal rate of 2.7 grams daily for the first 18 days, reached about 100 grams in weight and quickly plateaued. No further gain was observed in four weeks. Males fed 750 milligrams of fresh wheat germ daily instead of the yeast have reached the same weight but much more slowly.

The most recent data show that females which receive 600 milligrams of fresh wheat germ daily (instead of yeast) plus 3 drops of cod liver oil gain less than 1.5 grams daily during the first 30 days on the diet and they plateau at about 100 grams. Females receiving 1.0 grams of ether extracted yeast daily plateau at about 120 grams.

In examining these diets for any known deficiency we feel that vitamines A, D, and E can be ruled out at once. We have often tested our supply of Patch's cod liver oil and find that in vitamine A experiments (irradiated lard) 2 milligrams daily allows resumption of growth by rats. We feed either 40 or 60 milligrams daily in this diet. We know that 20 milligrams daily is an ample supplement to our ordinary casein and cornstarch diets. The use of wheat germ for B in some of the experiments supplied an overabundance of E.

There is more confusion concerning the growth vitamine, B. Osborne and Mendel² have found that normal growth to 100 grams of weight is given by 100 milligrams of Harris yeast, and normal growth to 300 grams is given by 200 milligrams of Harris yeast. We have found that when wire bottoms are used 200 milligrams of Harris yeast will allow females to grow only to 150 grams of weight and maintains them at this level. Furthermore, during the period of most rapid growth their daily gain is about 1.5 gram instead of 2.5 to 3.0 grams. Smith, Cowgill and Crall³ have found that the yeast dose must be increased about 50 per cent when wire bottoms are used. But when using the pure diet we find no growth above 100 grams weight when 600 to 750 milligrams of wheat germ or yeast are used, and grave subnormality is detected in animals receiving even 1 gram of yeast daily. It would appear that we must radically revise our conception of the amount of vitamins B present in the usual simplified diets if this is the limiting factor in our pure food experiments. The complicity of B is highly improbable. It is more likely that the trouble has resulted from the purification of the

main dietary ingredients. It is difficult to believe that the purification has caused any impairment in the nutritive value, as ordinarily understood, of either the sugar or casein. A restitution can be effected from the above dwarfism when small amounts of 2 natural substances are added to the rigorously purified diet. Females receiving 800 milligrams of yeast plus 10 grams of fresh lettuce leaf, or 0.5 grams of fresh beef liver are equalling in growth the best animals on natural foods. The pure diet when supplemented by these amounts of lettuce or liver also allows gestation and the birth of good litters. Lactation is deficient but these data are still too scanty for summation of our experience here. The simplicity and purity of this basal ration makes its value for nutrition research evident. It perhaps approaches in purity the culture media used by plant physiologists who have recently made remarkable findings concerning the mineral requirements of plants.

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Observations on the Filtrability of B. Tuberculosis.

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A series of 21 guinea pigs was inoculated with the Berkefeld filtrates of tuberculous material. Of 12 animals autopsied so far, acid-fast bacilli have been identified in the direct smears from the lung, inguinal and tracheo-bronchial glands of 3 of the animals. Prolonged search was necessary to demonstrate the organisms which, however, occurred usually in large clumps when found.

No definite evidence of tuberculosis was found by histological methods, except in the lungs of two of the positive animals. These showed small punctate areas of granulomatous, endotheloid hyperplasia, not specific for tuberculosis. The lesions did not differ materially from those found in the lungs of one out of twelve control animals examined.

Exhaustive search of the smears of the lymph glands and lungs of 12 uninoculated animals did not disclose the presence of any

¹ Taylor and Iddles, J. Ind. and Eng. Chem., 1926, xviii, 713.

² Osborne and Mendell, J. Biol. Chem., 1922, lix, 739.

³ Smith, Cowgill and Crall, J. Biol. Chem., 1925, lxvi, 15.