was the case with the second milk, which in every instance produced marked calcification of the epiphyses. In several animals of the latter group the bones appeared almost normal. The inorganic phosphorus content of the pooled blood of these animals was 5.61 mg. per cent. It is evident that antirachitic properties had been transmitted to the milk in high degree as the result of the irradiation.

It seems that an experiment of this kind has a definite application to pediatrics. It clearly indicates the value of ultra-violet irradiation of the mother during lactation as a preventive of rickets in the baby. Probably during the winter months, when the infant is most in need of protection from rickets, the intensity of sunlight is insufficient to produce this property in the milk.

3096

Photopharmacology. V: Influence of sun's rays on growth of yeast in sodium benzoate.

DAVID I. MACHT.

[*From the Pharmacological Laboratory, Johns Hopkins University, Baltimore, Md.*]

Growth of yeast cells in sugar solutions, in light and darkness was studied by measurements of CO_2 evolved. Uniform suspensions of Fleishman's baking yeast were made in solutions of glucose or more often of sucrose, and the growth in sunlight and in the dark at the same temperatures was studied in two sets of fermentation tubes. Ordinarily suspensions of 0.5 or 1 per cent by weight of yeast in a 5 per cent or 10 per cent solution of sugar was employed. It was found that fermentation took place more rapidly in the dark than in the light, at the same temperature. The effect of sodium benzoate on the growth of yeast and fermentation was studied by adding the drug in concentrations of 1:1500 to 1:500. It was found that sodium benzoate in concentration of 1:1000 produced practically no inhibition in the growth as compared with normal yeast suspensions when kept in dark, and that even concentration of 1:500 of ben-

zoate caused but very slight inhibition of growth in the dark. On the other hand when exposed to direct sunlight even 1:1000 and 1:1250 of sodium benzoate produced a distinct retardation of fermentation, and the degree of inhibition was very much greater than in control experiments with sunlight alone, without the benzoate. The inhibitory action of the sodium benzoate was increased a hundred and more per cent in the light. In diffuse sunlight, growth of yeast in benzoate was also less than in darkness at the same temperature.

Examination of the glass from the fermentation tubes by spectro-photography with a mercury vapor quartz lamp revealed that it was permeable to wave lengths as short as 3000 Angstrom units. By the use of suitable filters in connection with the above experiments it was found that it was the shorter rays of the sun, that is, those which were cut out by amber and brown colored filters which were responsible for the above photosensitizing effect on sodium benzoate. The effect of adding certain fluorescent dyes to benzoate solutions was also studied. Addition of esculin 1:100,000 *decreased* the inhibitory action of sodium benzoate. On the other hand, solutions of eosin, *markedly potentiated* the inhibitory action of sodium benzoate on yeast fermentation. The above experiments were carried out in the bright sunlight on sea shore at Ocean City, Md., during the summer of 1925, and additional experiments with quartz lamp and spectroscope were performed in the laboratory.

3097

Photopharmacology. VI: Influence of sun's rays on growth of yeast in some fluorescent solutions.

DAVID I. MACHT.

[*From the Pharmacological Laboratory, John Hopkins University, Baltimore, Md.*]

The influence of a number of fluorescein derivatives on the growth of yeast in sunlight and in the dark was studied, in a manner similar to that described in the preceding communication. A 0.5 per cent or 1 per cent suspension of yeast in 5 per cent or 10