

- ⁴ Hess, A. F., and Weinstock, M., *J. Am. Med. Assn.*, 1923, lxxx, 687.
⁵ Dorno, C., *Klinatologie im Dienste der Medizin*, Brunswick, Vüewig & Son, 1920.
⁶ Hess, A. F., *J. Am. Med. Assn.*, 1925, lxxxiv, 1033.
⁷ Tisdall, F. F., *J. Biol. Chem.*, 1922, 1, 329.
⁸ Bethke, R. M., Steenbock, H., and Nelson, M. T., *J. Biol. Chem.*, 1923, lviii, 71.

3411

The Antirachitic Effect of December Skylight and of December Sunlight Through Vitaglass.

FREDERICK F. TISDALL AND ALAN BROWN.

From the Nutritional Research Laboratories of the Sub-Department of Paediatrics, University of Toronto and of the Hospital for Sick Children, Toronto.

In the preceding publication,¹ results were reported which indicate that December sunlight in the latitude of the City of Toronto possesses a definite antirachitic effect. Although the rats were exposed for 2 hours daily, they received only a daily average of 36 minutes of sunshine, due to the cloudy weather. It has been noted by Dorno² and Hill³ that skylight contains ultraviolet rays, as well as direct sunlight. This raises the question as to how much of our antirachitic effect was due to the 36 minutes exposure to sunshine, and how much to the remaining 84 minutes exposure to skylight. Accordingly rats on McCollum's rickets producing diet No. 3143¹ were placed outdoors for 2 hours daily from 11 a. m. to 1 p. m., exposed to skylight, but protected from direct sunlight. After varying periods ranging from 1 week to 4 weeks, 2 rats at a time were killed, roentgenograms taken of the bones, the blood phosphorus determined, and the per cent ash in the bones estimated. The results which are given in Table I, indicate that December skylight possesses a definite antirachitic effect, which effect is almost as marked as that obtained by exposure to the available sunlight.

A clear glass which the manufacturer claims will transmit the shortest ultraviolet rays of sunlight (290 millimicrons) can now be obtained under the trade name of "Vitaglass". We found that rays as short as 262 millimicrons, the source being an iron arc in air, will pass through this glass. To get some idea of its value from the clinical standpoint, we constructed from vitaglass, a glass box to fit over and around one of the cages. Another glass box made with ordinary glass which transmitted rays only as short as 320 millimi-

crons, was also made. Rats on a rickets-producing diet were then exposed to sunlight from 11 a. m. to 1 p. m. daily, the rays in one case passing through vitaglass and in the other through ordinary glass. The rats were then killed and examined. The results which are recorded in Table I indicate that the rays passing through the ordinary glass have no antirachitic effect, while the rays passing through vitaglass have roughly one-quarter the value of the direct rays.

The cold air is apparently not a factor in producing any of the changes which we have attributed to the ultraviolet rays, as the cold air circulated freely into the cage enclosed with ordinary glass with no resultant prevention of rickets.

Conclusions: (1) December skylight in the latitude of the City of Toronto produces a definite antirachitic effect on rats fed on a rickets producing diet.

(2) The rays from December -sunlight which have passed through vitaglass had an antirachitic effect which is roughly one-fourth the value of the direct rays. Rays which have passed through ordinary glass had no antirachitic effect.

Our thanks are due to the Department of Health of the Province of Ontario for a grant in aid of the expense of this investigation and to the Honorable Dr. Forbes Goodfrey, Minister of Health for his interest in this work and the authorization of the grant from his department. This is a complete report.

¹ Tisdall, F. F., and Brown, A., *PROC. SOC. EXP. BIOL. AND MED.*, 1927, **xxiv**, 446.

² Dorno, quoted by Hill, L., *Brit. J. Rad.*, 1926, **xxxi**, 25.

³ Hill, L., *Brit. J. Rad.*, 1926, **xxxi**, 25.

3412

A Chemical Study of the Normal Aqueous Humor.*

A. M. YUDKIN, A. C. KRAUSE, H. H. GOLDSTEIN AND M. B. BERMAN.
(Introduced by S. C. Harvey.)

From the Ophthalmological Section of the Surgical Department, Yale University School of Medicine, New Haven, Conn.

The preliminary study of the composition of the normal aqueous humor in the dog was undertaken to serve as a basis for further

* The expense of this experimentation was defrayed in part by a grant from the Committee on Scientific Research of the American Medical Association.