(1) If heated with iodine as a catalyst, the tertiary alcohol (I) readily yielded the olefin (III).

(2) This olefin rearranged immediately to the dicyclic hydrocarbon (II) when digested with concentrated sulfuric acid.

(3) Treated with the proper concentration of sulfuric acid, or phosphoric acid, the alcohol (I) passed immediately to the olefin (III), which on longer treatment changed to the ionene homolog (II). Hence, either (III) or (II) was obtained, depending upon the duration of the treatment.

These reactions are now being extended and applied in manifold directions, for the synthesis of numerous polycyclic hydrocarbons and of derivatives not readily accessible by other methods.

MARSTON TAYLOR BOGERT
LABORATORIES OF ORGANIC CHEMISTRY
COLUMBIA UNIVERSITY

THE VITAMIN D POTENCY OF EGG YOLK FROM IRRADIATED HENS

IN five experiments, tests were made to determine the relative antirachitic potency of egg yolk from irradiated hens. Four flocks of hens were used. (1) An irradiated flock of 350 hens had the usual laying ration containing one half per cent. cod-liver oil plus four hours daily access to the ultra-violet rays from one GE Model S-1 Sunlamp; (2) a non-irradiated flock of like size fed the same ration. (Both of these flocks averaged 62 per cent. production during the continuance of the experiment—five months). (3) A small farm flock (Exp. 1 and 2) was given a poorly balanced ration. These birds were producing from ten to twenty-five per cent. (4) Another farm flock of 150 birds, fed the laying ration (Exp. 4 and 5), completed the groups. Eggs were chosen from these hens after they had been in production about one month. They were laying about 50 per cent. daily.

The antirachitic potency of the eggs from these flocks was tested on different pens of rats, having a rachitogenic ration, Steinbock No. 2965. Different amounts of the egg yolk were fed, varying with the experiment. In three of the tests cod-liver oil was also fed the rats in order to make comparisons with the egg yolk.

The experiments confirmed the work of earlier investigators, showing that egg yolk contains appreciable amounts of vitamin D. The tests give clear evidence that irradiation of hens with ultra-violet rays will markedly increase this vitamin above the quantity normally found in eggs. A high vitamin D content may thus be maintained throughout the winter months.

[1] Aided by a grant from the Heckscher Research Foundation.

In the experiments where the quantity of egg yolk was 5 per cent. or more, that from irradiated hens prevented or cured rickets in rats almost as rapidly as exposure to a quartz mercury arc. Ten per cent. of such egg yolk in the rachitogenic diet was as effective as one half per cent. cod-liver oil, or radiations from the quartz mercury arc. These animals grew faster than the irradiated rats because in addition to the antirachitic factor the egg yolk supplied other necessary food ingredients.

Four per cent. egg yolk from the irradiated hens was more potent than one eighth per cent. of cod-liver oil in the rat diet.

While the non-irradiated hens had access to autumn sunshine (during November, 1931, the weather remained unusually fair in New York) the vitamin D content was sufficient to cure rickets. In this high-producing flock, as winter advanced and the hens had been in production longer and longer, the vitamin D content diminished to a low level, much below the amount necessary for satisfactory prevention or cure of rickets.

There seemed also to be a limited ability for hens to store vitamin D and to transfer it to the eggs when needed.

From the tests with farm flocks it was shown that eggs as ordinarily purchased contain varying amounts of vitamin D. Under the most favorable conditions the quantity may be quite adequate to prevent rickets in experimental animals. The season and the volume of production are at least two of the factors which determine the amounts.

GEORGE H. MAUGHAN
EDNA MAUGHAN
CORNELL UNIVERSITY

BOOKS RECEIVED

FIELD, G. C. *Prejudice and Impartiality.* Pp. 116. McBride. $0.80.

FILIPETTI, GEORGE, WILLIAM DACHTLER and JUDSON BURNETT. *Operating Results of Manufacturing Plants in Minnesota, 1926–1930.* Bulletins of The Employment Stabilization Research Institute, University of Minnesota. Vol. I, No. 7. Pp. 101. 10 figures. University of Minnesota Press.

MACE, C. A. *The Psychology of Study.* Pp. viii + 96. McBride. $0.80.

REGAN, C. TATE and ETHELWYNN TREWAVAS. *Deep-Sea Angler-Fishes (Ceratioidea).* Report No. 2 of The Carlsberg Foundation's Oceanographical Expedition Round the World 1928–30. Pp. 113. 172 figures. 10 plates. Oxford University Press, London. 15 s.

REIGHARD, JACOB and H. S. JENNINGS. *Dissection of the Cat.* Revised by Rush Elliott. Pp. vi + 106. Holt. $1.95.

RIETZ, H. L. and A. R. CRATHORNE. *Introductory College Algebra.* Revised. Pp. xi + 328. Holt. $1.76.

SOUTHALL, JAMES P. C. *Mirrors, Prisms and Lenses:* A Text-Book of Geometrical Optics. Third Edition. Pp. xxiv + 806. 329 figures. Macmillan. $4.50.