neoplasms produced by a single individual mouse. These various animals had very evidently reached a point where central physiological control of the variability of somatic cell variation had diminished to a stage where they no longer acted as individuals in the restricted sense.

(4) The origin of neoplasms as the result of the fundamental disintegration of a centrally controlled "individuality" would become more clearly established. Different types of neoplasms would naturally be expected to follow different age distributions—as they do—because the different tissues are organ systems of the body "age" physiologically at very different periods in ontogeny. As matters stand there seems to be sufficient evidence to conclude:

(1) "Individuality" in mammals and probably in all higher animals is a relative term with a well-pronounced durational phase.

(2) Within genetically comparable material, variability in form and function is greater in the very young and in the very old than it is in the height of reproductive efficiency.

(3) Measurements of simple increase or decrease in function are not sufficient to give a complete picture of the nature of individuality.

(4) Senility is not simply a "major involution" but rather a period at which the disintegration of individuality is the most interesting biological phenomenon. "Involution" as a concept suggests the opposite of "evolution." It would be much more accurate to consider old age as a period primarily of a type of physiological and morphological disintegration and incoordination.

(5) All studies of genetic characters in animals should consider the age factor as an important variable likely to influence fundamentally the justifiable conclusions as to the type and nature of the character under consideration.

(6) This applies not only to genetic characters and processes outside of the germ-plasm but to such characters and processes as mutation, crossing-over, and other chromosomal aberrations. It may be expected that variability in relation to age will be operative in all germ cells to a more nearly comparable degree than it will be in the somatic characters of various groups of organisms.

(7) There is, however, little likelihood of general mathematical values for such variation being immediately established since the genetic characters of strains and individuals would be expected to vary in so far as they affect the assumption and degeneration of "individuality."

(8) The existence of the durational phase in the development of individuality helps to bridge the gap which has existed between physiologic and theoretic genetics. It shows that geneticists must recognize and consider that factor before the gene-character relationship can become sufficiently definite to allow accurate evaluation of gene location, dominance and other genetic phenomena.

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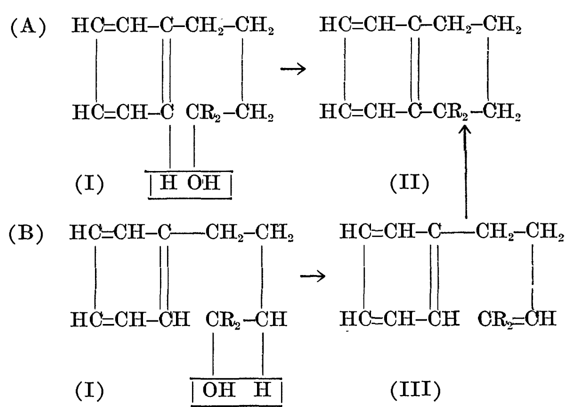
THE MECHANISM OF THE IONENE SYNTHESIS

IN a recent report[1] we described a synthesis of ionene that for the first time provides convincing evidence of the constitution of this interesting hydrocarbon, which has so lately risen to prominence in connection with studies of the structure of vitamin A.

Further work by Davidson and Apfelbaum, in these laboratories, has now thrown additional light upon the mechanism of this synthesis, in so far as the transition from a monocyclic tertiary alcohol (I) to a dicyclic hydrocarbon of ionene type (II) is concerned.

Manifestly, such a cyclization involves the elimination of a molecule of water, and this may be accomplished by the OH of the tertiary alcohol removing an H, either from the benzene nucleus, thus forming the second cycle, as shown in (A); or (B), from the adjacent CH_2 group, with production of the olefin (III), which then isomerizes to the dicyclic hydrocarbon (II), a type of rearrangement not at all uncommon in terpene chemistry:



Since the next lower homolog (I) is much more easily prepared than the tertiary alcohol used for the synthesis of ionene itself, this was used in our experiments, as shown in the formulas above, and gave the corresponding lower homolog (II) of ionene.

That (B), rather than (A), represents what actually occurs in this cyclization is indicated by the following experimental facts:

[1] M. T. Bogert, SCIENCE, n.s., 76: 1977, 475, November 18, 1932.

(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.

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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.

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