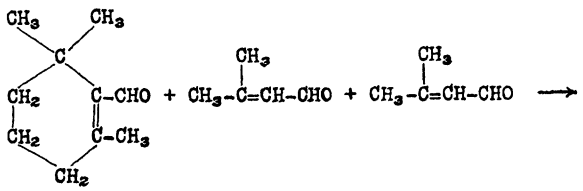
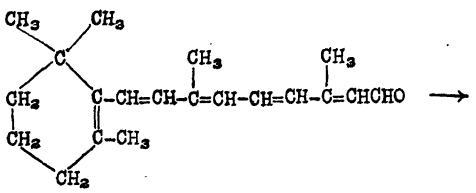
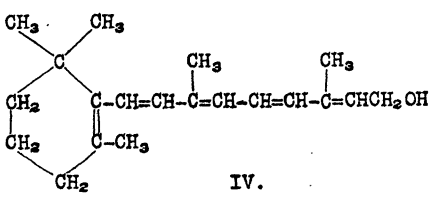


I. II.



III.



IV.

dimethylacrolein (II) should lead to the formation of the aldehyde III. The latter should yield IV when selectively reduced by the method of Ponndorf.[2] This alcohol has the structure ascribed by Karrer, Morf and Schöpp[3] to vitamin A.

We have condensed I with II and subjected the crude reaction product to the action of aluminum isopropoxide. The resulting solution gives a blue color when treated with antimony trichloride in chloroform —which is the standard test for vitamin A.[4] At appropriate dilutions of the synthetic material a color is obtained which is indistinguishable from that given by cod-liver oil.

The ultra-violet absorption spectrum shows a maximum in the region of 328 mμ. Biological tests for vitamin A activity are in progress.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE REGAL LILY AS A SOURCE OF ROOT-TIP MATERIAL

OBSERVATIONS made in our laboratory indicate that the Regal lily (*Lilium regale*) furnishes root tips which are superior to any other generally available material for the study of mitosis. The root tips are secured easily by burying the bulbs in damp moss and keeping them at a temperature between 60 and 70 degrees F. Bulbs which are taken in September are mature and ready to begin growth when placed under favorable conditions. Keeping the bulbs in cold storage at a temperature of 34° F. for a period of three weeks resulted in slightly more rapid sprouting and growth, but did not cause any more root tips to be developed than grew from the bulbs which were not chilled.

The root tips of the lily vary greatly in size, some being only slightly larger than those of the onion, while others have a thickness of 3 to 4 mm. The number of primary root tips is usually small, 5 to 10 per bulb; but if the primary roots are allowed to grow, they soon produce numerous branches from which a much larger number of small tips can be secured.

Measurements of cells in the growing region of the Regal lily root tip show them to average 50 per cent. larger than the cells of the onion, and 20 per cent. larger than those of Tradescantia. The chromosomes and the mitotic figures of the Regal lily are also considerably larger than those of the other two forms. The average of measurements of chromosomes of onion, Tradescantia and Regal lily show a ratio of 1 : 1.28 : 1.44.

The large size of the cells, and their organs, of the Regal lily permits cell structures to be seen with greater readiness than in any other root tips that we have examined. Our experience in the use of these as study material shows that the details of mitosis are more easily observed by students than in onion or Tradescantia root tips.

The Regal lily was discovered by E. H. Wilson growing on the hills of western China at an elevation of 2,500 to 6,000 feet, where seasonal temperatures are extreme, and strong winds blow at all seasons of the year. On being brought into cultivation it has proven to be a hardy and easily grown lily. It is completely fertile, producing large numbers of seeds which give almost 100 per cent. germination, and develop into blossoming plants in two years. The development of the embryo sac, seeds and pollen is normal. The pollen grains sprout readily in sugar solutions, and produce long pollen tubes with accompanying cell divisions. The ease with which the Regal lily can be grown in large numbers, its hardiness and its complete normality make it a useful and convenient plant for study and experiment.

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[2] Ponndorf, *Zeit. angew. Chem.*, 39: 138, 1926.
[3] Karrer, Morf and Schöpp, *Helv. Chim. Acta*, 14: 1431, 1931.
[4] *Pharm. J.*, 126: 466, 1931.