the incorporation of labeled choline into phospholipide when supplemented with ATP and other cofactors.

Choline-1,2-C^{14} and choline-methyl-C^{14} are incorporated at identical rates. The incorporation reaction is dependent upon oxidative phosphorylation for the generation of adenosine triphosphate in fresh preparations of mitochondria, being severely inhibited by the addition of dinitrophenol or the omission of adenine nucleotide. In acetone powder extracts, in which no oxidative phosphorylation occurs, there is an absolute requirement for adenosine triphosphate.

After hydrolysis of the phospholipide extracts with N/1 KOH at 37° by the method of Hack[5] the radioactivity may be quantitatively recovered as choline reineckate, indicating that it is lecithin rather than sphingomyelin which is labeled. By chromatography of the phospholipides by a variation of the method of Hanahan *et al.*,[6] radioactive lecithin fractions may be isolated with a choline/P ratio close to unity. The curves for the elution of C^{14} and lipide P from the columns are very nearly identical in these experiments.

The nature of the intermediates involved in the incorporation of choline into the lecithin of mitochondria, and in particular the possible role of phosphatidic acids in the process, is not yet known, and is the subject of continuing investigation in this laboratory.

(5) M. H. Hack, *J. Biol. Chem.*, **169**, 137 (1947).

(6) D. J. Hanahan, M. B. Turner and M. E. Jayko, *ibid.*, **192**, 623 (1951).

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PEROXIDE- AND LIGHT-INDUCED REACTIONS OF ALCOHOLS WITH OLEFINS

Sir:

Preliminary results of a general program of research to determine if free-radical, chain addition is a property common to substances containing a methylene or methine group directly attached to an electronegative atom[1] have led to the discovery that primary and secondary alcohols add to olefins in the presence of peroxides or light. The reactions of ethanol, propanol-2, butanol-1 and butanol-2 with octene-1 in the presence of *t*-butyl peroxide give telemeric products whose chief components are, respectively, decanol-2, 2-methyldecanol-2, dodecanol-4 and 3-methylundecanol-3.

A reaction mixture containing ethanol (454 g., 9.87 moles), octene-1 (35 g., 0.31 mole) and *t*-butyl peroxide (4.4 g., 0.03 mole) was heated in a glass-lined, stainless-steel autoclave at 115–118° for 40 hours. Distillation, after the removal of *t*-butyl alcohol and unreacted ethanol, gave decanol-2 (11.6 g., b.p. 52–54° at 1 mm.; n^{20}_D 1.4357; mol. wt. 152; m.p. of its α-naphthylurethane, 69°)[2,3], a product formed by the reaction of two molecules of octene-1 with one of ethanol (4.0 g., b.p. 120–126° at 1 mm.; n^{20}_D 1.4479; mol. wt. 268), and a residue (18 g., mol. wt. 488).

In the apparatus described above a reaction mixture containing propanol-2 (356.7 g., 5.95 moles), octene-1 (28 g., .25 mole) and *t*-butyl peroxide (5 ml.) was held at 120° for 30 hours. Distillation gave *t*-butyl alcohol and unreacted propanol-2 (342.5 g., b.p. 81–82°), and a fraction shown to be 2-methyldecanol-2 (16.5 g., b.p. 49° at 0.1 mm.; n^{20}_D 1.4359).

Anal. Calcd. for $C_{11}H_{24}O$: C, 76.67; H, 14.04; mol. wt., 172. Found: C, 76.35; H, 13.80; mol. wt., 178.

It was identical in infrared spectrum and other physical properties with 2-methyl-decanol-2 (b.p. 49.5° at 0.1 mm., n^{20}_D 1.4358) prepared by the reaction of *n*-octylmagnesium bromide with acetone. Its allophanate (m.p. 113.5–114°; m.p. of mixture with authentic sample, 113–114°) was prepared.

Anal. Calcd. for $C_{13}H_{26}N_2O_3$: N, 10.8. Found: N, 10.5.

Further distillation gave a 2:1 product (7.4 g., b.p. 120–130° at 0.1 mm., mol. wt. 263) and a residue (7 g., mol. wt. 449). A similar reaction was observed when a mixture of propanol-2 (198.8 g., 3.31 mole) and octene-1 (19.9 g., 0.178 mole) was illuminated with a quartz mercury resonance lamp for 96 hours. 2-Methyldecanol-2 (6.0 g., b.p. 50–52° at 0.2 mm.; n^{20}_D 1.4369; m.p. of its allophanate, 113–114°; m.p. of mixture with authentic sample, 113–114°), 2:1 product (3.1 g., n^{20}_D 1.4525) and a residue (4.7 g., mol. wt. 422) were obtained.

The reaction of butanol-1 (581 g., 7.85 moles) with octene-1 (29.1 g., 0.26 mole) and *t*-butyl peroxide (3 g., 2 g. added after 18 hours) at 115–116° for 43 hours gave dodecanol-4 (18 g., b.p. 83–84° at 1 mm.; n^{20}_D 1.4409).

Anal. Calcd. for $C_{12}H_{26}O$: C, 77.35; H, 14.07; mol. wt., 186. Found: C, 77.64; H, 13.82; mol. wt., 192.

This product was identical in infrared spectrum and other physical properties with dodecanol-4 (b.p. 83–84° at 1 mm., n^{20}_D 1.4409) prepared by the reduction of dodecanone-4 (prepared by the peroxide induced reaction of *n*-butyraldehyde with octene-1)[4] with lithium aluminum hydride. Its α-naphthylurethane (m.p. 57–58°; m.p. of mixture with authentic sample, 57–58°) was prepared.

Anal. Calcd. for $C_{23}H_{33}NO_2$: C, 77.70; H, 9.36. Found: C, 77.53; H, 9.58.

A 2:1 product (7.5 g., b.p. 120–145° at 1 mm.; n^{20}_D 1.4518, mol. wt. 297) and a residue (15 g., mol. wt. 421) were obtained.

Butanol-2 (247 g., 3.33 mole), octene-1 (26.5 g., 0.24 mole) and *t*-butyl peroxide (5 ml.) at 117–118° for 40 hours gave 3-methylundecanol-3 (13.3 g., b.p. 58–60° at 0.2 mm.; n^{20}_D 1.4418).

Anal. Calcd. for $C_{12}H_{26}O$: C, 77.35; H, 14.07; mol. wt., 186. Found: C, 77.70; H, 14.18; mol. wt., 194.

It was compared as above with 3-methylundec-

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(1) *Cf.* W. H. Urry, O. O. Juveland and F. W. Stacey, THIS JOURNAL, **74**, 6155 (1952).

(2) D. W. Adamson and J. Kenner, *J. Chem. Soc.*, 842 (1934).

(3) R. H. Pickard and J. Kenyon, *ibid.*, **99**, 55 (1911).

(4) M. S. Kharasch, W. H. Urry and B. M. Kuderna, *J. Org. Chem.*, **14**, 248 (1949).

anol-3 (b.p. 63° at 0.25 mm., n^{20}_{D} 1.4416) prepared from *n*-octylmagnesium bromide and butanone-2. Its allophanate (m.p. 76–77°; m.p. of mixture with authentic sample, 76–77°) was made.

Anal. Calcd. for $C_{14}H_{28}N_2O_3$: N, 10.29. Found: N, 10.44.

2:1 Product (6.2 g., b.p. 150–160° at 0.2 mm.; n^{20}_{D} 1.4552; mol. wt. 311) and a residue (10.4 g., mol. wt. 518) were obtained. This work is continuing.

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BOOK REVIEWS

Chemistry of Carbon Compounds. Volume I, Part A. General Introduction and Aliphatic Compounds. By E. H. RODD (Editor), A.C.G.I., D.I.C., D.Sc., F.R.I.C. Elsevier Publishing Company, 402 Lovett Boulevard, Houston, Texas, 1951. xxv + pages 1–778. 16.5 × 23 cm. Subscription price, $18.00. List price 15% higher.

The appearance of a publication of the scope and magnitude of "Chemistry of the Carbon Compounds," the initial volume of which is now available, represents a landmark in the history of chemical publishing.

Growing out of a clearly-recognized need for revision of Richter's "Organic Chemistry," the book maintains the general organization of its predecessor but is in every other way an entirely new effort. A group of distinguished advisors, headed by Sir Robert Robinson and including J. W. Cook, R. D. Haworth, Sir Ian Heilbron, E. L. Hirst and A. R. Todd, have presumably aided Editor E. H. Rodd in the organization of the work and the selection of authors, twenty-three of whom have contributed to this first volume.

The general organization of the work calls for five volumes as follows: I, General Introduction, Aliphatic Compounds; II, Alicyclic Compounds; III, Aromatic Compounds; IV, Heterocyclic Compounds; V, Miscellaneous.

This first book, part A of Volume I, is devoted to a general introduction and a survey of aliphatic compounds up to and including dicarbonyl compounds. The former gives short accounts of the history of organic structural chemistry, classification and nomenclature, and the literature of organic chemistry, as well as a more detailed discussion of analytical methods. Chapters on physical properties, crystallography, light absorption, the concept of acids and bases, stereochemistry, reaction mechanisms and free radical reactions complete the introduction. Although certain of these chapters are excellent, some are too short to be of real value; they serve merely to acquaint the reader with a few of the more important ideas and to provide him with a selected bibliography for further reading. Perhaps this reflects the intentions of the Editor and his Advisory Board; in justice it must be said that for adequate treatment some of the topics would require much more space than could be allocated in this work.

It is impossible to review adequately the remainder of the first volume on such short acquaintance. For one to acquire the intimate acquaintance necessary for authoritative comment, the book would have to remain at hand over a period of years, referred to continually and read occasionally in systematic fashion. All that can be said now is that a superficial scrutiny shows excellent organization and adequate coverage for the sections examined.

One is at first tempted to compare this work with its predecessor, Richter, and with that remarkable work of another generation, Meyer-Jacobson. In this reviewer's opinion, the latter has never been equalled, and in view of the enormously increased scope of the science, probably cannot be. It is this very increase in scope which renders such a comparison meaningless. The Editors, Advisors and Authors of the present work faced a different and vastly more complex task than those of the earlier works, and are to be congratulated for the assumption of so formidable a burden.

The series is certain to become a standard reference work available in all libraries and occupying a position in the personal libraries of many organic chemists. The appearance of subsequent volumes will be awaited with interest.

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MARSHALL GATES

The Alkaloids—Chemistry and Physiology. Volume II. By R. H. F. MANSKE, Dominion Rubber Research Laboratory, Guelph, Ontario, and H. L. HOLMES, Riker Laboratories, Inc., Los Angeles, California (Editors). Academic Press, Inc., 125 East 23rd Street, New York 10, N. Y. 1952. viii + 587 pp. 16.5 × 23.5 cm. Price, $14.50.

The first volume of this series was received with enthusiasm by organic chemists. The present work is equally deserving. It is the expressed intent of the editors "to present a readable and comprehensive work which will include all matters of importance in alkaloid chemistry." For the most part, this aim has been achieved very successfully.

This is a timely monograph. A high proportion of the systems discussed are under intensive study at present. The list of chapter headings and authors include: Morphine I (H. L. Holmes), Morphine II (H. L. Holmes and G. Stork), Colchicine (J. W. Cook and J. D. Loudon), Alkaloids of the Amaryllidaceae (J. W. Cook and J. D. Loudon), The Acridine Alkaloids (J. R. Price), The Erythrina Alkaloids (L. Marion), The Strychnos Alkaloids II (H. L. Holmes).

The chapters are not of equal quality. The presentation of the stereochemistry of the morphine family deserves special praise; however, other sections concerning these alkaloids are at times both tedious and obscure. The section on colchicine makes fascinating reading. The biological effects of this substance are discussed in some detail—a subject largely neglected in the other chapters.

The discussion of the indole group is divided into three main sections: indole, Erythrina and Strychnos alkaloids. The chapter entitled "The Indole Alkaloids" contains the most complete discussion of these bases presently available. A number of ill-defined bases are included, presumably on a biogenetic basis, where the evidence for the presence of an indole system appears based on intuition rather than fact. Extensive recent developments in the chemistry of the Erythrina bases make that chapter seriously out of date. In the final chapter of the indole sequence, developments in the strychnine field which have appeared since the publication of Volume I are discussed.

The editors and authors of this series are to be complimented on the fine job that they are doing. They are filling real need. That some portions of these volumes are out of date at the time of publication should not distress them.