ported a similar response with as little as 0.3 g. daily of *α-p*-biphenylylbutyric acid.

In Table I we summarize our observations on the effect of *α-p*-biphenylylbutyric acid and of α-phenylbutyric acid on cholesterol biosynthesis from 1-C^{14}-NaOAc and from 2-C^{14}-MVA[8] by rat liver homogenates.[9]

TABLE I

EFFECT OF TWO HYPOCHOLESTEREMIC AGENTS ON THE *in Vitro* SYNTHESIS OF CHOLESTEROL BY RAT LIVER HOMOGENATES

Agent	C.p.m./mg. C in cholesterol[a] synthesized from	
	1-C^{14}-NaOAc[b] 114.5×10^3 c.p.m.[c]	2-C^{14}-MVA[b] 11.5×10^3 c.p.m.[c]
None	1160	4925
α-p-Biphenylylbutyric acid, 1 mg.	11	340
α-Phenylbutyric acid, 1 mg.	1095	4945
α-Phenylbutyric acid, 5 mg.	185	3300

[a] Cholesterol isolated and counted as the digitonide. [b] NaOAc added: 1.2 μM.; MVA added: 0.6 μM. [c] Total counts incubated. All flasks contained aliquots of the same liver preparation.

We have interpreted these data as follows: *α-p*-biphenylylbutyric acid is a much more potent inhibitor of cholesterol synthesis in rat liver homogenates than is α-phenylbutyric acid, since the former suppresses acetate and mevalonate incorporation 99% and 93%, respectively, whereas α-phenylbutyric acid (at 1 mg.) has no effect on mevalonate incorporation, and exerts only an insignificant (6%) inhibition on acetate conversion. (b) The high degree to which mevalonic acid is inhibited by the biphenylyl compound suggests that the metabolic block is beyond the six-carbon stage of cholesterol synthesis. The same is not true for α-phenylbutyrate. Even at the 5-mg. level this substance inhibits acetate conversion much more than it does mevalonate conversion, thus corroborating the observations of Steinberg and Fredrickson[3] that α-phenylbutyric acid affects one of the very early phases of acetate metabolism.

It appears to us that mevalonic acid may be used to good advantage in *in vitro* studies aimed at uncovering inhibitors of cholesterol biosynthesis. The technique involving the parallel use of both acetate and mevalonate may serve well to discriminate between those substances that exert a more or less general block on acetate metabolism and those that have their effect primarily on the pathway reserved for cholesterol synthesis.

In view of the obscure etiology of hypercholesteremia, it appears significant that *α-p*-biphenylylbutyric acid, which is so effective in reducing the serum cholesterol level in man, should exert so pronounced an inhibition on the *in vitro* synthesis of cholesterol from mevalonic acid.

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(8) Carboxyl-labeled mevalonic acid cannot be used in experiments of this nature since it has been found to contribute no isotope to cholesterol; P. A. Tavormina and M. H. Gibbs, THIS JOURNAL, **78**, 6210 (1956).

(9) Details of our procedure will be presented in a future publication.

(10) Mead Johnson and Co., Evansville, Ind.

BOOK REVIEWS

Valency and Molecular Structure. BY E. CARTMELL, B.Sc., A.R.I.C., Lecturer in Inorganic Chemistry, University of Southampton, and G. W. A. FOWLES, B.Sc., Ph.D., Lecturer in Inorganic Chemistry, University of Southampton. Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1956. xi + 256 pp. 15 × 22 cm. Price, $5.80.

Quite a number of books have appeared in recent years dedicated to bridging the gap between quantitative and qualitative quantum mechanics of valence. The present, quite compact, volume is aimed primarily toward inorganic students and was "written by chemists for chemists." In the latter lie both its strength and weaknesses.

The first quarter of the book is devoted to atomic structure, the second quarter to the quantum theory of valence and the remainder to discussions of bonding in specific cases of chemical interest, including ionic and metallic solids, simple inorganic compounds, complex compounds and electron-deficient substances. In most instances, considerable and worthwhile historical development is presented. Much of the material on the quantum theory of valence is similar to that given by Coulson ("Valence," Oxford University Press, 1952).

On the whole, the discussions are clear and interesting although few new ideas or approaches are given. In quite a few instances, considerable expansion will be required if students are to understand clearly the ideas involved. This is especially true of the discussion of the comparison of resonance and molecular orbital theories (pp. 102–105) which also contains statements like "----mutual repulsions----would make the existence of the (valence) structure improbable." A sizable list of weak points could be compiled. As might be expected, the reviewer was most conscious of deficiencies in the discussions of chemical binding in organic substances. As one example, no hint is given (pp. 115–116) how the molecular orbital theory can explain why benzene molecules possess hexagonal symmetry.

A particularly troublesome point is the "pictorial combination" of valence bond (VB) and molecular orbital (MO) methods discussed on p. 142. It is alleged that superposition of orbital diagrams of valence bond structures "leads to the idea of delocalized π-molecular orbitals." This may be, but ideas so gained can hardly reflect the differences between the predictions of the simple VB and MO treatments which characterize such systems as cyclobutadiene. In fact, the advocated approach really seems only to lead to a delocalized electron picture of the VB resonance hybrid. The authors do not feel bound to consistency in this regard and submit (pp. 229–232) that the VB method fails to account satisfactorily for binding in diborane because of unfavorable bond angles and interelectronic repulsions even though MO models based on similar atomic orbitals are presented so as to seem eminently reasonable.

The book can be recommended to those wishing an interesting and easily readable survey of some important current problems of structural inorganic chemistry. It seems less suitable as an introductory textbook of valence theory.

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Catalysis. Volume IV. Hydrocarbon Synthesis, Hydrogenation and Cyclization. Edited by PAUL H. EMMETT, W. R. Grace Professor of Chemistry, The Johns Hopkins University, Baltimore, Maryland. Contributing Authors: ROBERT B. ANDERSON, ERNST M. COHN, MURRAY GREYSON, L. J. E. HOFER, H. STEINER AND S. W. WELLER. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1956. vi + 570 pp. 16 × 23.5 cm. Price, $12.50.

The first three chapters in this fourth volume on Catalysis are written by Robert B. Anderson of the Bureau of Mines, Pittsburgh. They reflect therefore the authoritative viewpoint of this organization's researches on coal to oil, principally the Fischer–Tropsch synthesis from carbon monoxide–hydrogen mixtures. The initial chapter deals with the thermodynamics of possible surface processes and reactions, the second with the catalysts for, and the third with the mechanism of, the Fischer–Tropsch process. While the thermodynamical data on products formed provide the necessary information as to reaction possibilities, the reviewer has never been able to convince himself that similar calculations with respect to the reactions of the catalyst have any value. The science still awaits an authoritative treatment of this problem which will illumine why surface reactions occur, as with poisons, under conditions where the equilibrium value of the ratio of reactants is 10^4–10^6 times greater. The second chapter of 225 pages covers exhaustively the catalysts, the factors determining their behavior, the history of process development and experimental and industrial reactors, the products and poisons. The author rightly calls it a formidable problem which he has discharged with considerable skill. More than 200 references are reviewed. The third chapter surveys kinetics and mechanism of the Fischer–Tropsch process. Here is to be seen how the earlier postulates lead to experimentally verifiable conclusions as to mechanism from isotopic tracer studies in which the Editor of these volumes has played so conspicuous a role.

There follows a 70 page discussion of the crystalline phases possible in the Fischer–Tropsch catalysts and involved in their formation, activation and deactivation. These include not only the metals but such compounds as the carbides, nitrides and borides as well as the oxides and hydroxides used as the starting materials. The four final chapters of the book deal successively with the isosynthesis, methanation, liquid phase hydrogenation of coal and tar and, finally, the catalytic cyclization and aromatization of hydrocarbons. This last is a brief, well balanced survey of a development in the decade around the opening of World War II which had a great significance for the provision of explosives and high-octane fuels. The whole volume is a welcome addition to the literature of catalysis.

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December 10, 1956–January 10, 1957

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