their characteristic so-called "chromatograms," or series of colored bands. The illustrations in the text are well chosen and most helpful. As the author states in his preface, the "major emphasis has been placed upon experimental procedure," and the information supplied in this direction is exceptionally full and critically presented. Following the Historical Introduction (9 pp.), are chapters on the Applications of Chromatographic Adsorption Methods (20 pp.), Apparatus and Procedure (18 pp.), Adsorbents (18 pp.), Solvents and Eluants (6 pp.), and Location of Colorless Adsorbed Substances (6 pp.).

As might be expected, chromatography has not found so many applications in the case of Inorganic Compounds (8 pp.). In the field of Organic Compounds (70 pp.), it has rendered the greatest service —simple aliphatic and aromatic substances, homocyclic and heterocyclic compounds, sterols and related compounds, vitamins, hormones, enzymes, co-enzymes, proteins, anthocyanins, pterins, chlorophylls, hemoglobin derivatives, bile pigments, carotenoids, coal-tar dyes and various natural substances. The volume closes with a résumé of the Industrial Uses (8 pp.) to which the method has been put.

An elaborate Table of Contents makes clear the helpful way in which the subject-matter is organized and presented, and this is supplemented by both an Author Index and a Subject Index. By no means the least valuable feature of the work is a Bibliography covering 42 pp.

The book is heartily commended to all chemists interested in this method of analysis.

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SOCIETIES AND MEETINGS

THE UNION OF AMERICAN BIOLOGICAL SOCIETIES

THE annual meeting of the Council of the Union of American Biological Societies was held in Dallas, Texas, on Monday, December 29, at 4: 00 in the afternoon.

As in the past the Union has been concerned with a number of items of general interest to biologists throughout the country. One of the primary concerns of the organization has been *Biological Abstracts*. Dr. John E. Flynn, editor-in-chief of this journal, reported to the Union that the Abstracts for Volume 15 showed a 45 per cent. greater number of abstracts than Volume 14. He furthermore pointed out that whereas 1,105 periodicals were being abstracted in March, 1941, 1,550 periodicals were being abstracted in December of that year, a net increase of 445. A special effort has been made to arrange for the abstracting of foreign journals, many of which are now difficult or impossible to procure in this country. The steadily increasing cost of publication of the abstracts was pointed out, but it was explained that since, of course, *Biological Abstracts* was a non-profit organization, all money which has become available has been used as efficiently as possible to maintain and improve the journal. It was assured that when more money would be made available, *Biological Abstracts* would be correspondingly enlarged and improved. It was stated that the *Abstracts* had operated without a continuing deficit in the past, but that this could no longer be done now that all foreign subscriptions except those of South America and the British Empire were most probably lost. Dr. Flynn called the attention of the council, however, to certain encouraging signs, namely, the significant increase in subscriptions by United States and Latin American biologists. Since spring the number of subscriptions of the latter group had increased 100 per cent. or more. Despite the fact that American biologists are becoming increasingly aware that *Biological Abstracts* is their own instrument, this journal still needs much greater support in the form of individual subscriptions before it can become as complete as biologists would wish it to be.

The council unanimously approved a plan to have the president of the Union appoint a committee to study the possibilities for expansion of interest in, and cooperation with, *Biological Abstracts* by the Latin-American countries.

Beginning January, 1942, *Biological Abstracts* is establishing a sixth section, Section F, entitled, "Animal Production and Veterinary Science." This has been done in order to provide for the needs of men employed in the animal industries.

A second general project with which the Union has been concerned is aid to the National Central Library of China. This project has recently been almost completely at a standstill, due to the war in the Far East.

Through one of its committees composed of E. V. Cowdry, F. L. Fitzpatrick, H. B. Glass, B. C. Gruenberg, O. Riddle and E. W. Sinnott, the Union has been investigating for a number of years biological science teaching in secondary schools. The final report of this committee was made by its chairman, Dr. Oscar Riddle. Two preprinted copies of the 76-page report were submitted to the Union Council. This report contained an analysis of 3,186 returns on a questionnaire sent to teachers of biology in secondary schools. Dr. Riddle stated that five of the six segments of this report had already been published earlier in the

American Biology Teacher. The sixth segment will appear in the January issue of that journal. Seven thousand copies of the complete report, entitled, "The Teaching of Biology in Secondary Schools of the United States—A Report of Results from a Questionnaire," are in press, and arrangements have been completed for mailing copies to biologists, educators and others throughout the United States.

Dr. Oscar Riddle, Carnegie Institution, Cold Spring Harbor, and Dr. Walter F. Loehwing, University of Iowa, were appointed to serve as representatives of the Union of American Biological Societies upon the recently formed "Cooperative Committee on Science Teaching." This latter committee also has representatives from the American Association of Physics Teachers, the American Chemical Society, the Mathematical Association of America and the National Association for Research in Science Teaching. This joint committee plans to consider certain problems (see SCIENCE, Vol. 95, p. 38, 1942) relating to the teaching of science in secondary schools.

The following officers were elected to serve for the Union of American Biological Societies during 1942: *President,* A. J. Carlson, University of Chicago; *Secretary,* F. A. Brown, Jr., Northwestern University; *Treasurer,* D. H. Wenrich, University of Pennsylvania; *Executive Committee,* B. M. Duggar, University of Wisconsin; A. P. Hitchens, University of Pennsylvania; G. W. Hunter, III, Wesleyan University.

FRANK A. BROWN, JR.,
Secretary
UNION OF AMERICAN BIOLOGICAL SOCIETIES

SPECIAL ARTICLES

THE PROCARCINOGENIC EFFECT OF BIOTIN IN BUTTER YELLOW TUMOR FORMATION[1]

EARLY in 1940 during the course of investigations which led to the demonstration[2,3,4] that biotin is identical with the anti-egg white injury factor (vitamin H), and that biotin is thus functionally involved in animal metabolism, experiments were initiated to ascertain whether or not biotin is a dietary factor present in liver and yeast which is protective against primary carcinoma of the liver induced in rats by the administration of N,N-dimethylaminoazobenzene (butter yellow). Protection against butter yellow by liver and yeast supplements had been reported by the Japanese workers.[5,6]

In two preliminary experiments two very crude biotin preparations, one from liver and one from yeast, were used as supplements to the butter yellow-brown rice-carrot basal diet which alone gave regularly a high incidence of tumors, namely, 96 per cent. at 150 days. Indications of a protective effect were obtained.

Other studies on protection against butter yellow revealed at this time that the addition of 200γ of riboflavin and 18 per cent. casein to the brown rice-carrot basal diet gave marked protection.[7] The tumor incidence at the end of 150 days was decreased from 96 per cent. to 7 per cent. This effect, though marked, was not as complete as that obtained by supplements of dried liver or yeast. Accordingly, the effect of the

TABLE I

DIETS EMPLOYED

	Diet A*	Diet B	Diet C*
Brown rice	82 per cent.	..	81.5 per cent.
Casein (vit. free)	18 " "	15 per cent.	18 " "
Crisco	...	10 " "	..
Sucrose (C.P.)	...	60 " "	..
Egg white (dried)	...	10 " "	..
Cystine	...	1 " "	0.5 " "
O. M. salt mixture	...	4 " "	..
Supplements—Amounts per 100 grams of diet			
Choline	...	250 mg	160 mg.
Riboflavin†	1 mg	2 "	2 "
Thiamin	0.5 "	0.5 "	..
Pyridoxine	1 "	0.5 "	..
Nicotinic acid	5 "	2 "	..
Inositol	...	100 "	..
Pantothenic acid	2.5 "	1 "	..
Vit. A (concentrate)	...	4000 units	..
Vit. K (Me Naphthoquinone)	0.5 "	0.1 mg	..
Vit. E (*dl*, α-tocopherol)	...	1.0 "	..
Irradiated ergosterol	...	400 units	..
Ergosterol	100 "	...	..
N,N-dimethylaminoazobenzene	60 "	100 mg	60 "

* When diets A and C were used 1 gram of carrot was given per rat per day as used by R. Kinosita, *Trans. Japan. Path. Soc.,* 27: 665, 1937.

† 0.5 mg added in Diet B instead of 2 mg from 1st through 45th day.

[1] Acknowledgment is made with full appreciation to Dr. Paul György for the crude liver concentrates used in these experiments and to the S.M.A. Corporation for supplies of biotin concentrates which made this investigation possible. A grant in support of this work to one of us (C.P.R.) from Standard Brands, Inc. is also gratefully acknowledged.

[2] P. György, D. B. Melville, D. Burk and V. du Vigneaud, SCIENCE, 91: 243, 1940.

[3] V. du Vigneaud, D. B. Melville, P. György and C. S. Rose, SCIENCE, 92: 62, 1940.

[4] P. György, C. S. Rose, K. Hofmann, D. B. Melville and V. du Vigneaud, SCIENCE, 92: 609, 1940.

[5] W. Nakahara, K. Mori and T. Fujiwara, *Gann,* (*a*) 32: 465, 1938; (*b*) 33: 13, 1938; (*c*) 33: 406, 1939; (*d*) 33: 57, 1939.

[6] T. Ando, *Gann,* 32: 252, 1938.

[7] C. J. Kensler, K. Sugiura, N. F. Young, C. R. Halter and C. P. Rhoads, SCIENCE, 93: 308, 1941. On the basis of independent investigations, P. György, C. E. Poling and H. Goldblatt (*Proc. Soc. Exp. Biol. and Med.,* 47: 41, 1941), have also obtained a protective effect of casein in the presence of riboflavin.