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THE STRUCTURE OF BIOTIN*

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DURING the past year my associates and I have been working on the structure of biotin and I should like to take this opportunity of presenting to you the results of this study. In 1940, our group at Cornell University Medical College, in collaboration with Dr. Paul György and Catharine S. Rose at Western Reserve, had demonstrated that biotin, the yeast-growth substance which had been isolated by Kögl, was actually identical with vitamin H.[1, 2, 3] Vitamin H was the name which had been given by György to the factor present in liver, yeast and various foods which was capable of preventing the fatal syndrome resulting from the feeding of large amounts of raw egg white, a syndrome found to occur in all species studied. We were thus able to show that biotin was involved in animal metabolism and through this work biotin became recognized as a member of the vitamin B-complex. The full role in nutrition of this newcomer to the group of vitamins is not fully understood, yet there are indications that it may be extremely important. There are now scores of laboratories working on this compound and within the next year or two much light should be thrown on the significance of this vitamin. With the demonstration of the identity of vitamin H with biotin we undertook a study of the chemical nature of this compound and have recorded from time to time some of our chemical findings. We

* A lecture delivered before the New York Section of the American Chemical Society, on October 9, 1942.

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

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

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

The animal is placed on the table in an upright position and the loop holding the upper teeth flicked off in a single motion. The syringe and tube are rinsed with water and are ready for the next animal.

After short training a single operator can feed 30 to 40 animals per hour. Regurgitation or leakage up the esophagus is never encountered. By the use of this method we have supplied normal and hypophysectomized rats of all ages, beginning at 35 days, with their entire food supply for long periods with excellent results.

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THE USE OF CREOSOTE IN MOUNTING FLEAS AND OTHER ARTHROPODS ON SLIDES

To study the classification of fleas properly, it is necessary that unsclerotized structures and intestinal contents be cleared or dissolved away so as to expose the taxonomically important terminalia. In general, the procedures used to accomplish this end are long and tedious. It is usually considered necessary to treat the material with potassium hydroxide, dehydrate in several changes of alcohol and clear in xylol before mounting in balsam. The technique of C. Fox[1] makes eight treatments necessary before the flea is ready for study, while that published by the writer[2] in 1940 involves six steps, which is but a slight saving in time and trouble.

In an effort to discover a method of preparation which would dispense with potassium hydroxide, and the necessity for dehydrating and clearing in separate processes, experiments were made with cedar oil, clove oil, beechwood creosote and wood creosote. It was soon discovered that the best of these reagents for this purpose is wood creosote. Creosote not only clears the soft parts and intestinal contents to a satisfactory degree, but also prepares the specimen for mounting in balsam. No other reagent is necessary. The flea may be removed from any degree of alcohol or even from water and placed in creosote for 24 hours. Thereafter it is ready for mounting in balsam. Both the creosote U.S.P. from wood tar and the creosote U.S.P. from beechwood were satisfactory.

The chief advantage to this method of preparing fleas is the convenience of having to use but a single reagent. There are other advantages, however, to the use of creosote instead of KOH. It frequently happens in the use of KOH that important taxonomic characters are distorted, the setae are loosened and lost, and in general much destruction of parts inflicted. These things do not happen where creosote is used, and it is the writer's opinion that a much better mount is obtained, since sufficient clearing is accomplished without the violent action of a caustic. A disadvantage to the use of creosote is its slightly irritating effects to the human skin and the objectionable odor, but the writer does not regard these as annoying to a prohibitive degree.

This simple process has proved a boon not only as regards research in the taxonomy of fleas, but also in preparing material for use by large classes in entomology. Thrips, Collembola, mites, immature stages of Diptera, and insect organs, such as honeybee stings, mouthparts, etc., have been prepared quickly and easily by simply dropping the material in creosote and mounting in balsam after 24 hours. Where the integument is rather delicate, as in the case of some Collembola, it is preferable to "cut" the creosote with equal parts of absolute alcohol. The process should not be used, however, where the integument is very delicate or where it is desirable to retain the coloration.

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[1] Carroll Fox, "Insects and Disease of Man," p. 221. Philadelphia, Pa., 1925.

[2] Irving Fox, "Fleas of Eastern United States," p. 2. Ames, Iowa, 1940.

BOOKS RECEIVED

BILLINGS, MARLAND P. *Structural Geology.* Illustrated. Pp. xi + 473. Prentice-Hall, Inc. $4.50.

BLAIR, THOMAS A. *Climatology: General and Regional.* Pp. xvi + 484. Prentice-Hall, Inc. $5.00.

BURROWS, J. AUSTIN, PAUL ARTHUR and OTTO M. SMITH. *Semimicro Laboratory Exercises in General Chemistry.* Pp. xiii + 328. Macmillan. $2.50.

DEGERING, ED. F. and COLLABORATORS. *An Outline of Organic Chemistry.* Revised. Pp. xi + 386. Barnes and Noble, Inc. $1.25; *An Outline of Organic Nitrogen Compounds.* Pp. 381. John S. Swift Company, Inc.; *The Quadri-Service Manual of Organic Chemistry.* Pp. 221. Houghton Mifflin Company. $2.50; *The Work Book of Fundamental Organic Chemistry.* Pp. 256. Barnes and Noble, Inc. $1.25.

EVANS, WILLIAM LLOYD, JESSE ERWIN DAY and ALFRED BENJAMIN GARRETT. *An Elementary Course in Qualitative Analysis.* New edition. Pp. 239. Ginn and Company. $2.25.

GARRETT, ALFRED BENJAMIN, LAURENCE LARKIN QUILL and FRANK HENRY VERHOEK. *Introductory Chemistry for the Laboratory.* Pp. 239. Ginn and Company. $1.60.

GOLDSTEIN, KURT. *Aftereffects of Brain Injuries in War.* Pp. 244. Grune and Stratton. $4.00.

LANG, EDWARD H. *Technical Handbook for Solving Problems in Shop or Factory.* Pp. ix + 100. Prentice-Hall, Inc. $1.00.

MEES, C. E. KENNETH. *The Theory of the Photographic Process.* Illustrated. Pp. x + 1124. Macmillan. $12.00.

RUKEYSER, MURIEL. *Willard Gibbs, American Genius.* Pp. xi + 465. Doubleday, Doran and Company, Inc. $3.50.

SPILHAUS, ATHELSTAN F. and JAMES E. MILLER. *Workbook in Meteorology.* Pp. ix + 163. McGraw-Hill. With charts, $3.00.

WILLKIE, HERMAN FREDERICK and PAUL JOHN KOLACHOV. *Food for Thought.* Illustrated. Pp. 209. Indiana Farm Bureau, Inc., Indianapolis. $2.00.