SCIENCE

VOL. 89 FRIDAY, APRIL 7, 1939 No. 2310

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.
Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington, D. C.

THIAMIN AND PLANT GROWTH[1]

By Dr. WILLIAM J. ROBBINS

DIRECTOR OF THE NEW YORK BOTANICAL GARDEN

ALTHOUGH several investigators, including R. J. Williams (1920) and Lepeschkin (1924), had reported a favorable effect of vitamin B_1 or thiamin upon plant growth, their crude preparations contained other substances as well as thiamin, and their results could not be accepted as definitive. Indisputable evidence of the importance of thiamin for plants depended upon the availability of the pure compound. Isolated in crystalline form by Jansen and Donath as early as 1926, thiamin did not become generally available until 1934, largely as the result of the work of R. R. Williams and his associates.

Almost at once Schopfer (1934) demonstrated that *Phycomyces Blakesleeanus* will not grow in a medium of mineral salts, asparagine and sugar unless supplied with thiamin. The demonstration was so striking that further investigations with this organism and with others soon followed until it is now clear as the result of the work of Schopfer, Bonner, Knight and others that thiamin is as necessary in the physiology of plants as it is in the nutrition of animals.

My own interest in thiamin arose from a study of the nutrient requirements of excised roots, initiated in 1917 as the result of a paper by Jacques Loeb in which he suggested that a hormone is concerned in the formation of roots by the leaves of *Bryophyllum calycinum*. It was my opinion that Loeb had not eliminated sugar accumulation in the leaves as the "hormonal" factor, and the experiments on excised roots were initiated to attack that problem directly. In the twenty years since the original experiments a number of people have been associated with me and through their assistance one aspect or another of that problem and related ones

[1] Presented before the Section on the Botanical Sciences of the American Association for the Advancement of Science, Richmond, Va., December 28, 1938.

or in Van Giesen picrofuchsin. As an instance typical of the ease of use and reliability of the stain, a series of slides was stained for different lengths of time in a trial lot of this solution which contained only 10 grams each of ferrous and ferric alum, instead of the 20 as above described. The slides were then counterstained with Van Giesen picrofuchsin (5 minutes) in the usual manner. The slides stained 2 minutes were fairly satisfactory; those stained 4 minutes were nearly ideal; those stained 15 minutes could hardly be distinguished from those stained 4 minutes, and it was only when the staining was carried up to about an hour that the image showed signs of loss of detail from overstaining.

From these preliminary studies it is suggested that the combination of a high concentration of ferrous and ferric salts serves to maintain an oxidation reduction equilibrium in the solution which is far more suitable for the formation and preservation of the selective blue hematoxylin-iron salt than is either the ferrous or the ferric salt alone. It appears that the stain, above described, is highly selective. It is relatively insensitive to variation in staining time and may be used as practically a progressive stain with little or no differentiation. This differentiation, when required, may be done by time rather than by inspection. The solution is far more stable than either Weigert's or Janssens' hematoxylin, is easily prepared and does not require any aging. This stain has not given satisfactory results when used in contact with at least some metals, as, for instance, monel.

In conjunction with Dr. Ralph Lillie, of the division of pathology, a more detailed study of this stain is being carried on at this institute in order to more accurately define its properties. Even with the data above presented, however, the question is raised as to whether or not many, or possibly even all, of our current iron hematoxylin stains would not be substantially improved by substitution of a mixture of ferrous and ferric salts or some equivalent oxidation-reduction mixture for the ferric salts now in current use.

No studies have as yet been made on the action of this stain on such cell organs as mitochondria. These considerations will be left to a later date.

WILTON R. EARLE

NATIONAL CANCER INSTITUTE,
U. S. PUBLIC HEALTH SERVICE,
WASHINGTON, D. C.

"SPOTTING" SPECIMENS FOR CATALOGUE NUMBERS

ENAMEL spots for catalogue numbers on minerals and fossils have been superseded in this department for some years by spots of clear Duco cement. Applied direct from the tube, the cement is more convenient to handle than paint, and it hardens more rapidly. Its surface takes india ink well from a pen, and the inconspicuous character of the cement will be especially appreciated when numbers must be applied to transparent crystals.

A. S. WARTHIN, JR.

VASSAR COLLEGE

THE CARE OF SKULLS AND SKELETONS OF SMALL ANIMALS

BEFORE shipping small skulls and skeletons, or before allowing them to be cleaned by dermestid beetles, it is usually desirable to dry them as completely as possible.

The automobile, probably now used by the majority of collectors, makes an ideal desiccating machine. Small osteological specimens fastened under the hood by wire, in the hot air stream from the fan, become perfectly dry in a day or two, even in damp weather, if the automobile receives ordinary use. A minimum of preliminary cleaning is necessary, and brains need not be removed from skulls up to the size of a rat's. Enough muscle and tendon may be left on small skeletons to hold the bones firmly together. Fly eggs fail to hatch, and maggots quickly die under this treatment.

No claim to originality is made for this method, but it has proved so useful that it seems worthy of dissemination.

RICHARD M. BOND

NATIONAL PARK SERVICE
PORTLAND, OREGON

BOOKS RECEIVED

BUSH, GEORGE L., ALLAN DICKIE and RONALD C. RUNKLE. *A Biology of Familiar Things.* Pp. 695. Illustrated. American Book Co. $1.92.

Department of Scientific and Industrial Research, Report for the Year 1937–38. Pp. iv + 203. British Library of Information, New York. $0.90.

FAUNCE, FRANCES A. and FREDERICK G. NICHOLS. *Secretarial Efficiency.* Pp. xiv + 601. Illustrated. McGraw-Hill. $2.75.

HESSLER, JOHN C. and HENRY C. SHOUDY. *Understanding Our Environment; An Introduction to Science.* Pp. ix + 661. 220 figures. Sanborn.

MILLER, WILLIAM J. *Elements of Geology; with Reference to North America.* Second edition. Pp. viii + 524. 367 figures. Van Nostrand. $3.50.

MORRIS, PERCY A. *What Shell Is That? A Guide to the Shell-Bearing Mollusks of Eastern North America.* Pp. vii + 198. Illustrated. Appleton-Century. $2.25.

RICHARDSON, E. G. *Physical Science in Modern Life.* Pp. 256. 60 figures. Van Nostrand. $3.00.

The Romance of Exploration and Emergency First-Aid from Stanley to Byrd. Pp. 160. Illustrated. Burroughs, Wellcome, New York.

Science Reports of the Tôhoku Imperial University, Sendai, Japan; First Series (Mathematics, Physics, Chemistry), Vol. XXVII, No. 3, January, 1939. Pp. 211–427. Illustrated. Maruzen, Tokyo.

TOWNLEY, SIDNEY D. and MAXWELL W. ALLEN. *Descriptive Catalog of Earthquakes of the Pacific Coast of the United States, 1769 to 1928;* Bulletin of the Seismological Society of America, Vol. 29, No. 1, January, 1939. Pp. 297. University of California Press. $1.00.