SCIENCE

VOL. 100 FRIDAY, JULY 28, 1944 No. 2587

SCIENCE: A Weekly Journal devoted to the Advancement of Science. Editorial communications should be sent to the editors of SCIENCE, Lancaster, Pa. Published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

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 25, D. C.

ADVENTURES IN BIOLOGICAL ENGINEERING[1]

By Dr. HUDSON HOAGLAND

EXECUTIVE DIRECTOR OF THE WORCESTER FOUNDATION FOR EXPERIMENTAL BIOLOGY AND FELLOW OF THE JOHN SIMON GUGGENHEIM MEMORIAL FOUNDATION

MAN, together with other higher vertebrates, has developed some elegant automatic mechanisms for regulating the physical and chemical properties of his blood and body fluids. The relative constancy of one's internal environment in the face of external stress and change is characteristic of such factors as blood volume, blood sugar, hydrogen ion concentration and salt content of the body fluids. The thermostatic regulation of internal body temperature is another case in point. These factors are beautifully controlled with little or no conscious thought on our part. As Claude Bernard pointed out nearly a century ago this regulation renders the higher vertebrates free of their external environment to a degree impossible for animals not possessing these automatic mechanisms. Homeostasis of the internal environment, as Cannon, Barcroft and others have demonstrated, is one of the truly central problems of physiology.

When, for example, the environmental temperature falls a bird or mammal conserves more of its metabolic heat and maintains its internal temperature constant. A frog, on the other hand, must take on the temperature of its environment. In cold weather its metabolism and other dependent reactions are slowed until it becomes immobilized and a prisoner of the climate. Freedom thus is not just a matter of sociology and politics, but freedom of a sort has its substratum in biochemistry and physiology.

In recent years with the development of aviation man has desired to be free in an environment for which his evolutionary history could not possibly have fitted him. In high-speed airplanes he is assailed by new and formidable stresses. Living as he does at the bottom of a sea of air supplying a continuous and

[1] Sigma Xi initiation lecture given at Worcester Polytechnic Institute on June 14, 1944.

the amount of PAB up to 0.1 mμ mole; it was approximately the same with 0.1, 0.5 and 1.0 mμ mole. Somewhat less growth was obtained with 10 mμ moles of PAB than with 1 mμ mole.

Schopfer[1] reported that *R. aurantiaca* grew poorly in a mineral-dextrose solution containing asparagine. The addition of thiamine doubled growth, but it was still poor. The addition of pyrimidine, thiazole or thiochrome was ineffective. Schopfer's results as far as they go agree substantially with ours.

We concluded that our strain of *R. aurantiaca* suffers from a complete deficiency for thiamine and for PAB. Its sensitivity to PAB appears to be of the same order of magnitude as that of some other organisms to biotin. Its growth on media supplemented with peptone or malt extract demonstrates the presence of PAB (or a substitute therefor) in those natural substances. *R. aurantiaca* might be useful for the microbiological assay of PAB or of molecular thiamine and for the study of the function of PAB and its relation to the sulfa drugs.

WILLIAM J. ROBBINS
ROBERTA MA
NEW YORK BOTANICAL GARDEN
AND DEPARTMENT OF BOTANY,
COLUMBIA UNIVERSITY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

ATTACHING POINTERS TO MICROSCOPE SLIDES

IN preparing practical slide examinations in such subjects as vertebrate embryology or histology, it is frequently necessary to direct the student to a particular detail selected from many others present in a preparation. Various methods for solving this problem are in use in different teaching laboratories; *e.g.*, (1) accompanying the slide with a mimeographed sketch on which various selected details may be indicated by name or number; (2) covering all extraneous matter with gummed paper, leaving exposed only the detail to be observed by the student; (3) pasting paper pointers to cover slips; (4) using ocular pointers; (5) ringing cover slips with diamond point object markers fitting into the nosepiece of a microscope. It is unnecessary to point out decided disadvantages inherent in each of the methods mentioned above.

Since our difficulties with this problem must be paralleled in many other laboratories, it may be of general interest to describe here a technique which we find to be very satisfactory. Using very sharp scissors, small pointers, in the form of isosceles triangles, are cut from thin, tinted Cellophane. Pointers cut from a good quality of bond paper are often good enough, but under a magnification of 300 or 400 diameters such paper pointers look quite ragged.

The pointers are glued to clean cover slips with thin clarite, balsam or damar, and the cover slips dried on a warming stage. Sections fresh from xylene are mounted in clarite (60 per cent. by weight in toluene) under such cover slips, with the pointer between the section and the cover. By gentle manipulation of the cover slip under a dissecting or compound microscope, it is easy to place the tip of the pointer in any position desired. We have not been troubled by having pointers move during the drying process. After the preparation has been thoroughly dried (*e.g.*, one month at 50° C.), there is no further danger of moving or blunting the pointer. The slide then constitutes a permanent item in a practical examination set.

HADLEY KIRKMAN
JEAN ALLEN KOGAN
DEPARTMENT OF ANATOMY,
STANFORD UNIVERSITY SCHOOL OF MEDICINE

[1] W. H. Schopfer, *Protoplasma*, 31: 105–135, 1938.

LOAN TEACHING SETS ON BACILLARY DYSENTERY

THERE are now available for teaching purposes six sets, each consisting of eighty-six 28 × 40 mm slides, thirty-five in Kodachrome, and a condensed lecture brochure. These slides cover the subject of acute and chronic bacillary dysentery, including the newer aspects of the epidemiology, pathology, bacteriology, serology, clinical phases, prophylactic and curative therapy. They are available on loan to Army, Navy, public health and university teachers without cost except that of mailing. The project is part of a long-range plan of the Dysentery Registry for the dissemination of our ever-growing knowledge of the important subjects of bacillary dysentery, enteritis and colitis. It was deemed expedient to stress the military aspects at this time. Requests will be honored in order of their receipt. The date on which the slides will be used should be specified. The total time of presentation is approximately 90 minutes at the ordinary talking speed. The slides are so aranged that they may be presented in a single lecture, two lectures of 45 minutes each or three lectures of 30 minutes each.

JOSEPH FELSEN
THE DYSENTERY REGISTRY,
THE BRONX HOSPITAL,
NEW YORK 56, N. Y.

BOOKS RECEIVED

GRANT, J. C. BOILEAU. *An Atlas of Anatomy.* One Volume, 1943. Illustrated. Pp. xxi + 398. Williams and Wilkins Company. $10.00.

NORD, F. F. and C. H. WERKMAN. *Advances in Enzymology.* Volume IV. Illustrated. Pp. viii + 332. Interscience Publishers, Inc. $5.50.

ZELIFF, C. COURSON. *Laboratory Manual for Introductory Zoology.* Illustrated. Pp. 144. The Evangelical Press, Harrisburg, Pa.