EFFICIENT LABORATORY LIGHTING

SEVERAL notes have appeared in SCIENCE the past few years relative to the development of glass through which a proper spectroscopic correction could be secured for microscopic purposes. There are also on the market various microscope lamps designed to furnish a corrected artificial light for laboratory study.

These devices, though very satisfactory for small advanced classes, are in many ways undesirable for large classes of elementary students, and sitting, as they usually do, on the laboratory table, are more or less subject to breakage when used by large numbers of students.

The dark winter days during a part of the school year made it imperative that the large classes in agricultural botany at Oregon Agricultural College be provided with a light which would yield relative daylight values with temporary mounts and stained prepared sections. This has been attained most efficiently by the use of the General Electric Company's Ivanhoe Truetint Unit No. 748, known as the "Noon Sunlight" grade. This is a large, apparently blue shade, designed to cover the high-power nitrogen-filled Mazda lamp. Experience has shown that one of these units suspended two feet above the laboratory table and equipped with a one-hundred-watt bulb gives a superior light for four students. In this way, forty students at one time are being handled with ease on dark days, the illumination being ample even for the high-power dry or the oil immersion objectives.

The cost of the entire installation is approximately the same for four men as that of the usual microscope lamp designed for one person. To secure a fixture which would be near the table without obstructing it for laboratory work, the shade holders were suspended by nickel chains from the ceiling over the center of each table. The lack of rigidity of the fixture thus equipped is of special advantage in the elimination of breakage.

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SCIENTIFIC BOOKS

The Elements of the Science of Nutrition. Third Edition. By GRAHAM LUSK. Philadelphia, W. B. Saunders Co., 1917. Pp. 641.

It is sometimes said that the sciences and the fine arts are international in the broadest sense of the word; they do not recognize national boundaries or racial limitations. Nevertheless a nation may well be concerned about the accomplishments of its citizens in the pursuit of knowledge. "Knowledge once won," Gowland Hopkins has recently written in a commendable essay on medicine and experimental science, "is of no country; it is the common guerdon of mankind; but he who cares nothing as to where it grows seems to lack an element of patriotism."

From this standpoint American science need not be dissatisfied with the contributions which the workers in this country have made to the study of nutrition in the past decade. Lusk's "Science of Nutrition," which has established itself as a stimulating and comprehensive text-book, discloses the names of more than one hundred American investigators whose labors have helped, probably in larger measure than those of any other country, to bring new facts and permit new viewpoints in nutrition during the interval that has elapsed since the earlier (1909) edition of the book. Its size has been expanded from 400 to 600 pages not by the mere accretion of incidental observations but by the addition of carefully considered novelties which the later development seems to warrant as worthy of consideration.

The style and mode of treatment of the problems of nutrition remain essentially unchanged in the new edition. The historical method has been followed in a way that can not fail to interest those who are more familiar with the subject-matter, and that ought to enthuse the beginner. There is something almost inspiring in following the story from its beginnings in the days of Lavoisier down to the ingenious contrivances for respiration study and calorimetry so highly developed in the university laboratories and research in-

stitutes of the United States. A special new chapter is devoted to some of this modern technique that has furnished such helpful measurements of the basal metabolism of man and the domestic animals.

The novelties must be sought on every page; for the new edition is not an expedient of bookmaking but a record of progress. Among the major accessions are elaborate discussions of the possible processes of intermediary metabolism. To those who learned their physiology with a former generation the newer chemical language may seem almost incomprehensible. But Lusk properly remarks (p. 175): "One must know the life history of sixteen amino-acids in order to be familiar with the metabolism of protein. Though the extension of knowledge may have been at the cost of simplicity, yet order is being wrought out of apparent complexity. It is often difficult for an older generation to think in terms of the knowledge of a new. The author's father was a student at Heidelberg at the time when the modern chemical formulæ were introduced, when H—O became H_2O, and he recalled the distracted exclamation of one of the university professors, 'Ach Gott! wie kann man so lernen!'"

A new chapter on The Nutritive Value of Various Materials used as Foods develops the history of the latest standpoints which are threatening to upset so many of the currently taught doctrines. "It is evident from the material presented in this chapter," Lusk writes (p. 378), "that the science of nutrition includes something more than the production of energy from fat, carbohydrate and protein. There must be certain salts and certain qualities of protein in the diet, and there must be minute amounts of 'vitamins.' The chemical composition of the latter will some day be known, even as the chemical composition of epinephrin is known. Epinephrin, an essential of life, is present in the blood to the extent of 1 part in 100,000,000. In like manner, vitamins which are present in meat, milk, fresh green vegetables and grains are essential to the harmonious correlation of the nutritive functions of animals.

Nephritis, cardiac disease and other conditions involving acidosis are also considered in their relation to metabolism. A highly interesting and exceptionally timely chapter on Food Economics concludes the volumes. A few brief excerpts will suffice to indicate some of the attitudes of the author. After urging the sale of food by calories and not by pounds Lusk adds (p. 569): "The main objection that has been encountered to the sale of food on the caloric basis has been the sensitiveness of the business world to the introduction of a new and unknown quantity. Why not leave well enough alone? A more highly educated generation will, however, demand that its expenditure of thousands of millions of dollars for food shall not continue to take place in unfathomable depths of darkness." Again (p. 571): "The housewife should know about cooking, and both she and her husband should know something of the value of food. The sum wasted for alcoholic beverages would frequently be sufficient to turn the scale in favor of the proper nutrition of the family. Cheaper milk for the babies of the poor and adequate nourishment for school children are important factors in the situation. . . . As this book goes to press it seems that America herself is certain to face a food shortage before very long. This can be remedied by increasing the number of milch cows and by reducing the live-stock raised for meat. The latter would free arable land for the production of grain and potatoes and save, for human consumption, grain fed to steers. It is quite certain that meat in the quantity it is consumed to-day is entirely unnecessary, and it is susceptible of scientific proof that mechanical work is more efficiently and economically derived from carbohydrate food than from meat."

When the author expresses his conviction that "in another decade the development of scientific knowledge will probably permit the formulation of the subject from the standpoint of physical chemistry" the reviewer is less sanguine regarding the complete dominance of a single mode of attacking the problems of nutrition. Against the author's published statement that he has no intention of

again revising his book, protests are already being heard even from across the Atlantic. Success entails responsibilities.

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Occasional Papers of the Museum of Zoology, University of Michigan. Nos. 1–35, 1913–17 (each separately paged). Ann Arbor, published by the University.

Dr. A. G. Ruthven, the Director of the Museum of Zoology of the University of Michigan, is heartily to be congratulated upon the appearance of the first volumes of these "Occasional Papers." Nowadays when every one is continually receiving requests to subscribe to some new journal or other, this series comes as a refreshing delight; it is not published for sale! We learn that the papers are issued separately to libraries and specialists, and, when sufficient matter has accumulated, a title page and an index—an excellent index by the way—is prepared and the volume is sent forth.

The contents will appeal especially to the modernized systematist, who tries, at any rate, to take interest in ecology, zoography and the careful noting of life histories. We find notices not only of such astonishing novelties as *Lathrogecko, Pseudogonatodes* and *Calliscincopus* among reptiles, and of *Cryptobrachus* and *Geobatrachus* among amphibia, but of more general interest are the very interesting observations upon the egg-laying and hatching of several South American species of amphibia, of varied genera, in all of which some significant and peculiar adaptation or modification is recorded. The series is not, however, for the herpetologist alone. Reighard and Cummins have a model description of a new *Ichthyomyzon* with notes and figures of its appearance and customs. Other writers discuss crustacea, insects of various groups, trematodes, as well as birds and mammals.

That these articles were not chosen for the collection but simply represent the natural output for this comparatively new and hitherto little-known museum indeed augurs happily for the future of the series and for that of the museum as well. Workers in the Museum of Comparative Zoology at Harvard are perhaps naturally more *sympatico* than others and when they review their own museum's past it is not difficult for them to foresee the swift growth of another great university museum of similarly unrestricted interest and endeavor at Ann Arbor.

T. BARBOUR

SPECIAL ARTICLES

CONCERNING THE INFLUENCE OF THE AGE OF AN ORGANISM IN MAINTAINING ITS ACID-BASE EQUILIBRIUM

THE importance of the maintenance on the part of the blood and tissue juices of a hydrogen ion concentration within certain narrow limits of variation has been established through the work of J. S. Haldane and L. J. Henderson. Recent investigations have not only served to emphasize the importance that the organism should maintain a certain acid-base equilibrium for its physiological life, but have also shown that when the mechanism which regulates this equilibrium is interfered with so that the hydrogen ion concentration of the blood is increased and maintained for an adequate time, the organism no longer functionates normally, but becomes pathological in certain of its reactions.

It is not the object of this note to enter into a discussion of the factors concerned in maintaining a normal acid-base equilibrium, nor to discuss those pathological conditions in which a variation from the normal is frequently observed. The object is to call attention to the influence of the age of the organism in controlling the mechanism by which the acid-base equilibrium is kept within the bounds of normality.

Some years ago, while conducting a series of experiments in which uranium nitrate was employed as the toxic agent to induce an acute nephritis, the observation was made that this substance was more toxic for old animals than for young animals.[1] This variation in

[1] MacNider, W. deB., "On the Difference in the