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SELECTION AND TRAINING OF STUDENTS FOR INDUSTRIAL RESEARCH¹

By DR. ALBERT W. HULL

RESEARCH LABORATORY, GENERAL ELECTRIC COMPANY

IN selecting college graduates for industrial research, certain qualities are sought. Not all these qualities are the product of college training, but many of them might be. The purpose of this discussion is to inquire whether colleges could contribute more to this total training.

The qualities which are needed for success in industrial research may be classed in four groups. They are, in order of importance, character, aptitude for research, attitude toward work and knowledge.

CHARACTER

Character is the most important qualification. It is rated first in the hiring and retaining of personnel.

¹ Vice-presidential address before the Section for Physics, American Association for the Advancement of Science, Cleveland, 1944.

I shall not try to define character; the many virtues which it comprises include self-discipline, courage and tolerance, all of which are needed in industrial research. It also includes honesty and generosity. Honesty is more than the negative virtue of not telling lies. Positive honesty is the quality that enables you to say of a man, "I always know just where to find him." It is the basis of true friendship and teamwork, and hence is an essential requirement in a co-operating group. The honesty of research workers, however, must be even greater than this. They not only must not deceive others but must not deceive themselves, for the greatest scientific sin is wishful interpretation of data. It is more common than is generally realized, and is so serious that it can reduce a research worker's value to the vanishing point. The man who is more anxious to prove that he is right

making a color with the vitamin, since they are all dehydrating agents of various degrees. In the case of this reagent the dehydration takes place on the surface of the particles because they have an adsorbed layer of sulfuric acid as a result of the leaching process used in their manufacture. Attempts at elution with solvents such as acetone destroy the blue color but yield an orange oil which has a different absorption spectrum from the vitamin.

Complex formation between the reagent (adsorbed sulfuric acid) and the anhydro compound appears to be the most probable explanation of the phenomenon. That such a complex is possible is indicated by the fact that carotene also makes a color even though it is a hydrocarbon.

Interesting possibilities are suggested by the principle of this assay. Not infrequently it is desirable, either for synthetic or analytic purposes, to react two substances which can not be brought into solution in a common solvent. Carrying one substance into contact with another by means of an inert adsorbent might solve such problems.

ARNOLD LOWMAN

CALIFORNIA PACKING CORPORATION,
SAN FRANCISCO, CALIF.

A MODIFIED PETRI DISH FOR CONTINUOUS TEMPERATURE OBSERVATION

IN investigations upon free-living and parasitic Protozoa, I have found that greater accuracy could be obtained in using a modified Pyrex Petri dish for

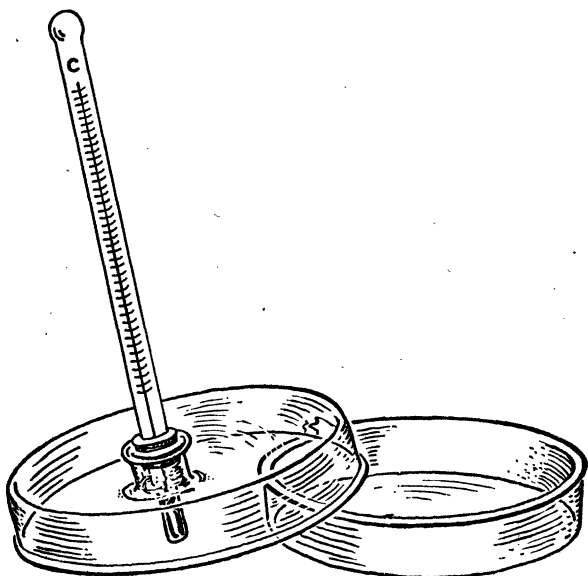


FIG. 1.

controlling and maintaining constant temperatures of culture fluids, stains and various fixing reagents.

The dish (Fig. 1) is a regulation stock four-inch

Pyrex Petri dish (bottom and lid) in which a hole measuring approximately one centimeter in diameter is made close to the rim of the lid. A piece of glass tubing slightly larger than the diameter of the hole is then fused over it so that a collar is formed about one centimeter high. A piece of rubber tubing about six millimeters in length is inserted in the glass collar. Then a small clinical-type thermometer is inserted into the rubber-cushioned collar so that the bulb of the thermometer which should be immersed in the fluid comes to rest slightly above the bottom of the dish. Direct temperature readings may now be made of the contents of the dish without removing the lid.

Many investigators in protozoology and parasitology make smeared preparations directly on cover-slips which are then dropped into the heated fixing fluid. With this dish, it is possible to kill and fix the organisms at a definite temperature and still be able to maintain the correct temperature over a given period of time with the lid covered. In staining, it has proved to be extremely useful, especially in the Feulgen test for thymonucleic acid where a given temperature must be maintained for a definite period of time.

The dish should prove to be convenient and useful for protozoologists, parasitologists and those working with small animals where greater accuracy is desired in this phase of technical work. Entomologists may find the dish useful by simply using it as a cover with a stoppered opening through which fluids may be added to developing embryos without removing the lid thereby lessening the possibility of contamination.

It seems likely that with greater emphasis being placed upon research in parasitology and tropical medicine, there will be considerable usage for a dish of this nature.

The author wishes to express his thanks to Dr. James A. Harrison for his aid in construction of the dish.

RALPH WICHTERMAN

TEMPLE UNIVERSITY

BOOKS RECEIVED

- HADAMARD, JACQUES. *The Psychology of Invention in the Mathematical Field*. Pp. xiii + 143. Princeton University Press. \$2.00. 1945.
- HUDSON, RALPH G. *An Introduction to Electronics*. Illustrated. Pp. x + 97. The Macmillan Company. \$3.00. 1945.
- LYONS, HENRY. *The Royal Society, 1660-1940. A History of Its Administration under Its Charters*. Pp. x + 354. Cambridge University Press. 1944.
- MARTIN, RICHARD A. *Mummies*. Illustrated. Pp. 18. 11 plates. Chicago Natural History Museum. 25¢. 1945.
- The Abortion Problem. Proceedings of the Conference Held under the Auspices of the National Committee on Maternal Health, Inc.* Illustrated. Pp. xii + 182. Williams & Wilkins Company. 1944.
- THOMPSON, LAURA and ALICE JOSEPH. *The Hopi Way*. Illustrated. Pp. 151. University of Chicago. \$3.00. 1944.



A Selected List of WILEY BOOKS IN *Biology*

• TEXTBOOK OF GENERAL ZOOLOGY

By W. C. CURTIS, *Professor of Zoology*, and MARY J. GUTHRIE, *Professor of Zoology*; both at the *University of Missouri*

A detailed study of the facts concerning structure and function of animals. Approach is through a study of vertebrate anatomy. ("Laboratory Directions in General Zoology," by the same authors, is particularly planned as an accompanying manual. Third edition, 1939, 195 pages, \$1.50.)

Third edition; 1938;
682 pages; 6 by 9; \$3.75

• ELEMENTS OF BIOLOGY

By PERRY D. STRAUSBAUGH, *Professor of Botany, West Virginia University*, and BERNAL R. WEIMER, *Professor of Biology, Bethany College, West Virginia*

A one-semester textbook stressing principles substantiated by factual material. ("A New Manual for the Biology Laboratory, by Weimer-Core, was written for use with this textbook. 1944, 213 pages, \$2.00.)

1944; 461 pages; 5½ by 8½; \$3.25

• GENERAL BIOLOGY

By PERRY D. STRAUSBAUGH and BERNAL R. WEIMER

A more comprehensive treatment than "Elements of Biology," by the same authors, this textbook gives a fundamental understanding of structure and function, and pictures the organism as a whole.

1938; 555 pages; 6 by 9; \$3.75

• INTRODUCTION TO VERTEBRATE EMBRYOLOGY

By WALDO SHUMWAY, *Professor of Zoology, University of Illinois*

A modern physiological approach to problems of embryology, as well as the classical morphological treatment. Emphasis is dynamic and upon patterns and mechanics of the different stages of development.

Fourth edition; 1942;
372 pages; 6 by 9; \$4.00

• AN INTRODUCTION TO THE VERTEBRATES

By LEVERETT A. ADAMS, *Professor of Zoology, University of Illinois*

Provides an outline of the characteristics on which the modern system of classification is based, and gives a general view of each of the five classes, as well as a comparative analysis of anatomical systems and specialized structures.

Second edition; 1938;
479 pages; 6 by 9; \$3.50

• INTRODUCTION TO PARASITOLOGY

By ASA C. CHANDLER, *Professor of Biology, The Rice Institute*

Completely revised, this edition contains the results of the many advances in this field in the past few years. Human parasitology is emphasized.

Seventh edition; 1944;
716 pages; 5½ by 8½; \$5.00

• GUIDE TO THE STUDY OF THE ANATOMY OF THE SHARK, THE NECTURUS, THE CAT

By SAMUEL EDDY, *Associate Professor of Zoology, C. P. OLIVER, Associate Professor of Zoology*, and J. P. TURNER, *Late Assistant Professor of Zoology*; all at the *University of Minnesota*

A manual to serve as a guide in dissecting the animals described, this book is excellent for laboratory courses in comparative anatomy. ("Atlas of Outline Drawings of the Dogfish Shark, the Necturus, and the Cat for Vertebrate Anatomy," an aid in studying anatomy of these animals. 1940, 77 sheets, \$1.50.)

1939; 100 pages; 6 by 9; \$1.50

• ESSENTIALS OF HUMAN EMBRYOLOGY

By GIDEON S. DODDS, *Professor of Histology and Embryology, West Virginia University*

Written primarily for medical students, embryology is presented in this book from the human rather than the comparative view.

Second edition; 1938;
316 pages; 6 by 9; \$4.00

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