globin are recognized, they can be designated hemoglobin A_1, hemoglobin A_2, etc. (*6*).

2) Normal fetal hemoglobin, or hemoglobin F, previously also referred to as hemoglobin *f* (*6*, *7*). Again, with the discovery of normal subvarieties they can be designated hemoglobin F_1, hemoglobin F_2, etc. (*6*).

3) Sickle cell hemoglobin, or hemoglobin S, previously also referred to as hemoglobin *b* (*4*).

4) Hemoglobin C, previously referred to as hemoglobin *c* (*4*), hemoglobin III (*3*), or hemoglobin X (*8*).

5) Hemoglobin D, previously referred to as hemoglobin *d* (*4*).

It is suggested that as new varieties of hemoglobin are described, they be assigned letters of the alphabet in the order of their discovery, beginning with E, unless, as in the case of sickle cell hemoglobin, there is some outstanding associated hematological or clinical effect which will serve as the basis for a convenient mental association.

It is felt that adherence to this system, with the introduction of modifications only as necessitated by further discoveries, will tend to minimize confusion based solely on terminological differences.

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The First Law of Fluorescence

SLIGHTLY more than ten years ago, the present writer pointed out the "First Law of Fluorescence" (*1*). This was derived by reasoning analogous to the basic rule of photochemistry, known as the First Law of Photochemistry or the Grötthuss-Draper law. The latter law was first discovered in 1817 by Grötthuss; after an interval of about 26 years, this law was independently rediscovered by Draper; some 60 years later the Grötthuss-Draper law was quantified by van't Hoff.

In 1942 the First Law of Fluorescence was stated as follows: *"energy must be absorbed by a luminescent system before emission (i.e., luminescence) can occur"* (italics in original). An old reference has just come to my attention which establishes that this law is at most an independent rediscovery. In 1876 Eugene Lommel (*2*) published the following statement: "The general proposition can therefore be laid down, *that a body capable of exhibiting fluorescence fluoresces by virtue of those rays which it absorbs*" (italics in original).

Obviously, then, due credit for priority must be given Lommel, and any eponym must take this into consideration.

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Book Reviews

Methods and Principles of Systematic Zoology. Ernst Mayr, E. Gorton Linsley, and Robert L. Usinger. New York–London: McGraw-Hill, 1953. 328 pp. Illus. $6.00.

Zoological systematics, widely scorned a generation ago as a dusty routine, has recently come alive again. It is now being more widely taught, more earnestly discussed, and more intensely studied than ever before. One reason for renewed interest is that even the more limited aspects of the science are undergoing a revolution, from typological taxonomy to population systematics, a movement parallel to and strongly influenced by the shift from, strictly speaking, Mendelian genetics to population genetics. Another reason is that systematists have broadened their objectives. It has never been true, in spite of criticisms to that effect, that they were solely occupied in labeling specimens. It is, however, true that their wide concern with all phases of evolution, with comparative physiology, with ecological factors, and indeed with practically every aspect of biology is a relatively recent development.

In spite of all that renewed activity, there has been no general book on zoological systematics. Such a book is now provided by the skilled hands of an ornithologist at the American Museum (author of *Systematics and the Origin of Species*) and two entomologists at the University of California. Stress

is on methods. This is largely a "how to do it" book for the beginning systematist, with about half of the text devoted to procedure: collecting, identification, statistical methods, and working up the results for publication. The next longest section is devoted to nomenclature, "strictly a means to an end," as the authors note, but an essential means and one so legalistically complex that here the student particularly needs guidance. This excellent summary and commentary of rules and usages will, indeed, be useful also to the experienced taxonomist, especially as the subject is now again in a state of flux and there is no up-to-date edition of the International Rules.

The smallest part of the book (less than 60 pp.) is devoted to principles, strictly speaking. Even here the emphasis is more on laying a basis for practice than on exploring really fundamental theoretical concepts or following ramifications into broader aspects of the subject. Thus the book does not fully convey or pointedly contribute to the currently exciting broadening of the scope of systematics. It was, however, a valid decision to provide a sound foundation in methods and to leave more theoretical and more controversial topics for later and more individual expansion. That does not mean that the book is not abreast of the latest theoretical advances; many of them are briefly explicit and all are implicit here.

Joint authorship has ironed out individual idiosyncrasies and produced a well-rounded treatment authoritative in all its many aspects. There is some unevenness of style and level, with occasional bits downright childish and a few quite difficult, but on the whole the book is not condescending and yet should be comprehensible to any college student. Altogether, this is a fine job and one that was greatly needed.

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Fatigue and Fracture of Metals. William M. Murray, Ed. Cambridge, Mass.: Technology Press of the Massachusetts Institute of Technology; New York: Wiley, 1952. 313 pp. Illus. $6.00.

This book contains 14 papers that were presented at a special conference on fatigue and fracture of metals held at MIT in June 1950.

The subject matter covered by these papers is extremely broad, in keeping with the multitude of variables that determine the fatigue fracturing of metals. In addition, the subject of brittle fracture is considered beyond any immediate connection with fatigue. For example, brittle fractures in ships and temper brittleness are discussed and there is a paper on "Fundamentals of Brittle Behavior in Metals" by Dr. E. Orowan. However, the problem of fatigue is the focus of the book, and the subjects treated include: fatigue in aircraft, ships, and machinery; designing for fatigue, with separate considerations of internal stresses and cumulative damage; statistical aspects of fatigue; transition temperature and fatigue; fatigue at high temperatures, and techniques of physical metallurgy for studying fatigue damage. The paper on the effect of metallographic structure by Major P. L. Teed is written in an especially refreshing style.

This book makes a worth-while contribution to the problem of fatigue by summarizing much of the contemporary knowledge and by indicating pertinent questions for future research. Since the book will undoubtedly find extensive use as a monograph on fatigue, it is unfortunate that an index was not prepared. Also, the readers of the book are denied the stimulation of the discussions of the individual papers and of the general panel discussions that were important parts of the conference.

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The Theory of Homogeneous Turbulence. G. K. Batchelor. New York: Cambridge Univ. Press, 1953. 197 pp. Illus. $5.00.

Homogeneous turbulence refers to a fluctuating random fluid motion whose average properties are independent of position in the fluid. The basic problem is to understand the mechanics and to determine analytically the average properties of this kind of motion. Dr. Batchelor has presented a systematic review of established knowledge of homogeneous turbulence. He has treated the problem from the point of view of the applied mathematician or theoretical physicist. With the qualification that he has leaned heavily on the research carried out at Cambridge, he has tried to make his account as complete as possible.

Chapters include a mathematical representation of the field of turbulence, the kinematics of homogeneous turbulence, some linear problems, the general dynamics of decay, the universal equilibrium theory, the decay of energy-containing eddies, and probability distribution. A good bibliography is given. Some experimental data are presented for comparison with the theoretical studies.

This book is limited to incompressible flow. The kinds of turbulent motion which are found in nature are usually more complicated than homogeneous turbulence. There are various complicated effects, as the effects of boundaries, that are extremely difficult to handle mathematically. We have not yet obtained a clear understanding of these complicated effects. The author treats a simplified case which makes the analysis simpler.

This book should be very useful to anyone wishing a good review of previous work in the field of homogeneous turbulence.

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