sea waves) and to a discussion of the causes of earthquakes and of the mechanism of focal motion. The second part ends with a list of references of 19 pages. The third part is a collection of chronologic and regional tables in which the damaging earthquakes since 1904 are listed. The earthquakes are classified by focal depth (shallow, intermediate, and deep shocks) and "magnitude." Information is given on time of occurrence, geographic coordinates of focus, focal depth, and the accuracy of this data. The "magnitude" of an earthquake is a very useful notion introduced in 1935 by C. F. Richter. It is a figure obtained from seismographic records, which is a measure of the energy released in an earthquake. A list of active volcanoes containing name, geographic coordinates, date, and character of the last eruption is included. The book is the standard work on seismicity of the earth. It will be a guide for anyone who wants information on this subject.

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Climatic Atlas of the United States. Stephen Sargent Visher. Harvard Univ. Press, Cambridge, 1954. xii + 403 pp. Illus. $9.

The concept of climate is deceptively simple. Defined as average weather, or the long-term state of the atmosphere, depiction of climate might seem to be a simple matter of filling out a map with a few well-chosen symbols. Unfortunately (or perhaps fortunately, at least for the intellectually curious), climate contains so many facets that no stereotype has been agreed upon. In Visher's *Climatic Atlas of the United States* more than a thousand maps and diagrams are employed. As the exposition of climate by means of manifold maps is perhaps Visher's chief contribution to climatology, it is interesting to see how effective the technique is in the present volume.

The maps and diagrams are mostly simple, crisp line drawings. At a scale of about 1 : 40,000,000, three maps are placed on a page only slightly oversize (7 by 11½ in.) Legends appear in the margins and, with the exception of a short introductory text and a few pages of explanation elsewhere, the maps stand alone. Temperature and precipitation command the major part of the atlas (688 maps) but the remainder covers a wide range of subjects (not flying weather, however), including such disparate topics as ratings of regional climates as they, presumably, affect human energy, the annual death rate attributable to lightning, and the maximum depth that frost penetrates the ground (compiled originally by the U.S. Weather Bureau from reports of gravediggers). Usual runs of annual and monthly means are present in abundance, but weekly and seasonal periods are treated as well, and many terms other than the arithmetic means are shown.

In this large collection, most persons cannot fail to find some maps of real interest. The search for specific maps is aided by an index and by a reasonable arrangement of the subject matter. A cover-to-cover perusal of the atlas is a rather dull chore, however, leaving impressions of duplication (one subject, the frequency of heavy rains, appears in three closely similar maps) and of discrepancies in style and content.

Undoubtedly the greatest limitation was imposed by the choice of map scale. As examples of the generality of the maps, one notes that a climatic hint is lacking as to the presence of national forests in Nevada; even the outstanding economic importance of winter snow packs on western mountain ranges is poorly shown on maps of snowfall and snow cover. Diversity of subject rather than perfection of detail is the strong point of this work and, judged by the reception of climatic maps in the past, it is safe to predict that the *Climatic Atlas of the United States* will find a large use for many years.

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Medical Sciences

Handbook of Radiology. Russell H. Morgan and Kenneth E. Corrigan, Eds. Year Book Publ., Chicago, 1955. x + 518 pp. Illus. $10.

This *Handbook* is largely a compilation of a large amount of quantitative data related to the use of ionizing radiations in medical, scientific, and industrial applications. It should be of great value to workers in these fields, at levels of both basic research and practical application. The specific data here included in one volume are available elsewhere only from a variety of sources.

The material is divided into six major sections and four appendixes as follows: Definitions of physical terms and units, including conversion formulas and tables; general physical information (including biophysical data); radiotherapeutic data; radioisotopes; radiography and fluoroscopy; radiation protection; common drugs used in radiology; mathematical tables; the Greek alphabet, and schematic diagrams of x-ray generators and particle accelerators. There is an excellent and comprehensive index. Noteworthy for their inclusion are sections on medical radiographic technique, complete data on radioactive isotope physical characteristics and decay systems, and summaries of radiation protection material from the many handbooks published by the National Bureau of Standards for the National Committee on Radiation Protection.

The typography is legible and the proofs were evidently carefully corrected. Certain workers in medical radiations might have wished for additional radiobiological data, but the authors may have been unwilling to include material, the accuracy of which might not yet be firmly established.

This *Handbook* is authoritative, remarkably complete, handy in format, and well organized. It should

be an excellent reference work for all who deal with x-rays and radioactive materials.

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Human Physiology. Bernardo A. Houssay, Juan T. Lewis, Oscar Orias, Eduardo Braun-Menendez, Enrique Hug, Virgilio G. Foglia, and Luis F. LeLoir. Trans. by Juan T. Lewis and Olive T. Lewis. McGraw-Hill, New York–London, ed. 2, 1955. xvi + 1177 pp. Illus. $12.

Bernardo A. Houssay, professor of physiology and Nobel prize winner in physiology and medicine, was assisted by six Argentine colleagues in physiology, biochemistry, and pharmacology, in writing this second edition of *Human Physiology*. There are 504 excellent illustrations, and a foreword by Herbert M. Evans of the University of California. The first edition of this superior textbook was translated into English in 1951. It has also been translated into French and Portuguese.

The book was written for undergraduate medical students and doctors of medicine. It can also be a valuable reference volume for all teachers and investigators in the biological sciences, as many life processes in all animal species have much in common. The authors of this superior book bring us up to date in the fields of contributions of animal experimentations to the understanding of man in health and in disease. The nine sections of the book are divided into 88 chapters. At the end of each chapter there is a brief, but up-to-date and challenging, bibliography of the main subject of each chapter. In producing this book our Argentine colleagues have rendered a significant service to biologic and medical education in many lands.

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British Pharmaceutical Codex, 1954. Pharmaceutical Press, London, 1954. xxxii + 1340 pp. £3 3/.

In the field of drug standards, a national pharmacopoeia implies a book of selective scope and legal force. Such a "pharmacist's bible" sometimes has been called a codex, as it is today in France. But the *British Pharmaceutical Codex* represents at a high level another type of pharmaceutical literature: reliable, general reference works supplementing the national pharmacopoeias.

The British *Codex* first appeared in 1907, by authority of the Pharmaceutical Society of Great Britain. It gains added authority by the increasing reliance placed on it, by the courts and by administrators of the National Health Service, for standards covering drugs not included in the *British Pharmacopoeia*. This accounts for the increased attention given to standardization procedures and tests in preparing this fifth revision and its predecessor. The book has no exact parallel in America, although in outlook and practical effect it is roughly analogous to the *National Formulary*, issued by authority of the American Pharmaceutical Association.

The *Codex* consists mainly of six parts: (i) monographs on simple or basic drugs (842 pp), (ii) antiserums, vaccines, and related substances (50 pp.), (iii) preparations of human blood (12 pp.), (iv) surgical ligatures and sutures (2 pp.), (v) surgical dressings (40 pp.), and (vi) formulas for compound preparations (260 pp.). Monographs on many additional drugs (to list them would require two pages of small type) have been added to this edition, but about three times as many drugs have been deleted. The *Codex* provides three types of information that are subjects of consideration and debate among those responsible for the content of our *National Formulary*: antidotes for toxic substances, statements of action and use, and, in an accompanying pamphlet, trade names used for *Codex* substances or for preparations containing the substances.

There are eight appendixes of pharmaceutical chemical data and procedures and an excellent index.

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Connective Tissue in Health and Disease. G. Asboe-Hansen, Ed. Munksgaard, Copenhagen, 1954. 321 pp. Illus. $7.50.

During the past two decades there has been developing a many-sided and intense interest in human connective tissue. This is perhaps the most significant site in which to study the fundamental processes associated with an important group of human diseases. The interest has been stimulated by a series of recent discoveries and new concepts outstanding among which are the spreading factors by Duran-Reynals, hyaluronic acid and hyaluronidase by Karl Meyer, the recognition of mucoid swelling and fibrinoid degeneration as characteristic of several rheumatic diseases by Klinge, the focusing of attention on connective tissues in the broad group of "collagen" diseases by Klemperer, the electron microscopic pattern of collagen by Schmitt, and the clinical effect of cortisone in rheumatoid arthritis by Hench. Stimulation by these particular events, as well as by a climate favorable to medical research, has resulted in a broad attack on problems of connective tissue by every available technique from every possible point of view. Information has accumulated so rapidly in so many fields that it is difficult for individual workers to see the growing forest for the budding trees.

This volume is a survey of contemporary work and thought on connective tissue intended primarily for medical workers. There are 23 articles by as many authors, 19 of whom are from Denmark or the United States. The articles are almost equally divided among three groups. The first group, at a chemical and histological level, discusses morphology, histochemistry, ground substance components, collagen, mucopolysaccharide metabolism, sulfate exchange, and hyalur-

onidase inhibition. The second group, at a more physiological level, considers spreading, hormonal effects, aging, wound healing, pathology, the reticuloendothelial system, infection, and the influence of hormones on infection. The third group is concerned with diseases: cancer, arteriosclerosis, collagen diseases, arthritis, fibroses, and skin and eye diseases.

The articles are by workers well known in their fields and are generally well written, clear, and informative. As in any rapidly developing field, there must be latitude for differences of opinion. It might be easy to carp at the omission of some related fields of work but it would be difficult to produce a better concise summary for the purpose intended. The book is well printed and includes a reasonable number of references.

MAXWELL SCHUBERT

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Biochemical Investigations in Diagnosis and Treatment. John D. N. Nabarro. Little, Brown, Boston, 1955. ix + 299 pp. Illus. + plate. $6.

The great acceleration in the application of biochemistry to clinical medicine that has occurred in the past 25 years has received increasing recognition in various reviews and textbooks. The author of the present book has not attempted any comprehensive survey of this field. Rather he has set himself the task of preparing a short, practical work that will serve the hospital resident in the biochemical aspects of the problems that are likely to be met on the hospital ward.

The chief concern of Nabarro is to show the way in which the results of various laboratory procedures may be utilized in the diagnosis of disease and the management of the patient. Some of the material has been arranged in accordance with clinical categories as, for example, Chapter VIII, "Diseases of the gastro-intestinal tract and pancreas" and Chapter IX, "Diseases of the liver and biliary tract," but most of the subject matter has been classified biochemically. Among the major topics that are discussed in individual chapters are disturbances of protein and nitrogent metabolism; disturbances of fat metabolism; disturbances of water and sodium metabolism; acid-base equilibrium; potassium, magnesium, iron, copper calcium and phosphorus metabolism; biochemical examination of the urine; the cerebrospinal fluid; the endocrine glands; the vitamins; and poisoning.

In general, little space is devoted to discussion of the nature of the biochemical derangements, although some chapters, such as those on disturbances of water and sodium metabolism and of acid-base equilibrium contain thoughtful and rather complete presentations of the subject matter. A number of recently developed procedures applicable to clinical medicine are described. These include paper electrophoretic patterns (p. 72) and tubeless gastric analysis (p. 126). However, in other instances as, for example, the consideration of phosphatase (p. 89) or diabetes mellitus (pp. 95–109), the limitations of space self-imposed by the author result in a discussion that, either in detail of information or analysis of the problem, is not much beyond that which the resident has probably acquired in medical school.

The absence of specific references to recent and current investigations in the literature contributes to the fluency of the presentation but does not give any lively sense of our changing views and present uncertainties about the biochemical mechanisms in a number of diseases. The author has failed to mention some interesting recent advances, such as the Coris' demonstration of the enzyme defects in glycogen storage disease, the variants of the hemoglobin molecule in the group of the hereditary anemias of the sickle cell, thalassemia and related types, or the evidence for the effect of insulin on cell permeability to glucose. This book would probably have gained considerably from the presentation of specific case material to illustrate the various biochemical defects.

Within the limits of his expressed aim, however, the author has fulfilled his purpose well. The general style and readability of the present volume should commend it to interns and residents in connection with the everyday problems met in their hospital training.

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Pharmakotherapie des Fiebers und der fieberhaften Affektionen. R. Isenschmid, E. Glanzmann, H. Berger, and T. Gordonoff. Hans Huber, Bern–Stuttgart, 1954. ix + 360 pp. Illus. Dm 29.80.

Throughout the history of medicine, fever has been recognized as an expression of a pathologic process. *Calor* is one of the four cardinal symptoms in the classic, Celsus description of inflammation. Nevertheless, it was only 300 years ago that quinine, the first antipyretic, was discovered and it was not until the end of the 19th century that chemists were able to synthesize new medicaments capable of combating febrile diseases on an etiological basis. Today, the physician has at his disposal an entire arsenal of effective antipyretic medicaments.

This book deals with the problem of fever, febrile diseases, and the means of combating them. It is divided into three major sections. The first deals with the pathophysiology of fever. In this section Isenschmid discusses the regulation of body temperature, the changes of temperature that occur in disease, and the "utility" of fever. The second section handles the clinic of febrile affections. Glanzmann and Berger consider the normal regulation of body temperature, the causes of fever, different types of fever (transient, continuous, remittent, intermittent, recurrent), the significance of fever in differential diagnosis and prognosis, and finally fever therapy. The book concludes with a comprehensive section by Gordonoff on

the pharmacology and toxicology of antipyretic substances. In it he dwells especially on the dangers of these "vest pocket medicaments."

Aimed at the general physician, this book is solidly grounded in recent research. It is recommended to anyone concerned with the problem of fever and febrile diseases.

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Animal Agents and Vectors of Human Disease. Ernest Carroll Faust. Lea & Febiger, Philadelphia, 1955. 660 pp. Illus. + plates. $9.75.

Although the words *Parasite* and *Parasitology* do not appear in the title, this latest textbook by Faust actually covers the field of parasitology. The book is new in the writing, in emphasis, and in organization. Its generic relationship to the books previously written by the author is revealed by the fact that 70 percent of the 216 figures are taken either from Craig and Faust's *Clinical Parasitology* or Faust's *Human Helminthology*. Its scope is approximately that of the former of these texts except for the addition of section 7.

Following a section on general information about and orientation to the field, there are four sections dealing with the protozoa and worms which cause human disease. The insects and other arthropods which act as agents and vectors of human disease are presented in one section. Section 7, which is new to this book, presents: (i) the coelenterates, echinoderms, and mollusks which are occasionally harmful to man through venenation; (ii) poisonous fishes; (iii) poisonous lizards and snakes; and (iv) harmful mammals. A final section deals with parasitological diagnosis and instructions for the collection and preservation of specimens.

The presentation is accurate, succinct, and readable. Coverage of subject matter over such a wide scope is accomplished at the sacrifice of adequate discussion of some of the more intricate or disputed subjects. Disproportionate space is devoted to the worms to the detriment of the protozoa and arthropods. The seven black-and-white drawings of malarial parasites original to this book will prove a poor substitute for the colored plates in *Clinical Parasitology*. The book is definitely better than a syllabus but falls short of being an exhaustive treatment.

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Porphyrins. Their biological and chemical importance. A. Vannotti. Trans. by C. Rimington, Hilger & Watts, London, 1954. vii + 258 pp. Illus. + plates. 50s.

This book is a welcome and timely addition to the literature of the porphyrins. Whereas the volumes of Fischer and Orth consider the organic chemistry of the porphyrin compounds, and Lemberg and Legge's book is concerned with the formation and functioning of porphyrins from a biochemical point of view, this volume by Vannotti discusses normal and abnormal porphyrin metabolism from a clinical point of view.

The first half of the book includes chapters on some of the physical and chemical properties of the porphyrins, some methods on isolation of porphyrins from biological material, and a survey of the distribution of porphyrins in nature. The latter half of the book contains a valuable and extensive summary of the porphyrin diseases, their etiology, symptoms, and sequelae. Discussions and interpretations of these diseases presented here are no less valuable, even though they are admittedly speculative. The task of summarizing more than 500 references, especially to the older literature, was no light one and has been well done.

The present-day activity in the field of porphyrin biosynthesis is being accompanied by a lively interest in the human metabolic disorders—the porphyria diseases. In nature, the normal is often recognized by the presence of the abnormal. The understanding of normal biosynthetic pathways has often been aided by a study of mutants that occur in nature. Human pathology presents a wealth of data on mutants that represent a number of different kinds of porphyria diseases. This book contains a valuable summary of such diseases. It will be welcomed, not only by clinicians, but also by many of the workers in the field of porphyrin biochemistry who seek to understand the normal with the hope that they may alleviate the abnormal.

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Perspectives in Physiology. Elza Veith, Ed. American Physiological Society, Washington 14, D.C., 1954. xi + 171 pp. Illus. $3.

When the triennial International Congress of Physiology last met (Sept. 1953, in Montreal), the International Council of Scientific Unions took the occasion to hold a Conference on the Future and Limitations of Physiology. Certain invited physiologists contributed brief discussions on what physiology meant to them and to their geographic groups (4 continents and 13 countries were represented). This small volume contains the more formal essays that they presented. Some authors talked about the subject matter of physiological science, some noted economic factors in its development, some dwelt upon historical personalities, and some presented their concepts of physiology's aims. All the essays will interest the general reader who may be curious about the ambitions of professional scientists, and will inform the scientific reader about numerous local scenes.

The volume records the current notions and hopes of physiologists. Some of the authors indulge in high thinking (Von Muralt, Homer Smith); others describe the vagaries of political and historical influences (Hoffman, Houssay). For some, history is still in the

making (Kuno, Rosenblueth); for others, history is in discontinuity (Bykov, Häusler). Physiology appears to lose ground where no public appreciates its worth.

The authors indicate that in most countries there is little or no physiology outside of medical institutions; actually, representatives of other brands of physiology were not heard from. All but two of the 17 contributors are shown in portrait; the portraits are inadequately reproduced. There is no index. Some errors of dates and spelling of proper names mar the book.

The general reader will correctly gather that physiologists around the world are factual folk who deal precisely with special and limited varieties of abstractions. Physiologists believe in laboratories, scientific lineage, instinctive behaviors, and what they are doing. They also have abiding faiths in a future that is socially hazardous.

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Communications

Ten Commandments for Technical Writers

At the last session of the Conference on Scientific Editorial Problems at the AAAS Berkeley meeting, Elmer Shaw read these ten commandments for technical writers. He wrote them as a result of listening to the speakers in the first-day sessions.

1) Thou shalt remember thy readers all the days of thy life; for without readers thy words are as naught.
2) Thou shalt not forsake the time-honored virtue of simplicity.
3) Thou shalt not abuse the third person passive.
4) Thou shalt not dangle thy participles; neither shalt thou misplace thy modifiers.
5) Thou shalt not commit monotony.
6) Thou shalt not cloud thy message with a miasma of technical jargon.
7) Thou shalt not hide the fruits of thy research beneath excess verbiage; neither shalt thou obscure thy conclusions with vague generalities.
8) Thou shalt not resent helpful advice from thy editors, reviewers, and critics.
9) Thou shalt consider also the views of the layman, for his is an insight often unknown to technocrats.
10) Thou shalt write and *rewrite* without tiring, for such is the key to improvement.

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That and *Which* Again

It was a pleasure to re-read the charmingly humorous Christmas piece reprinted from *The New Yorker* [*Science*, **120**, 7A (1954)]. But I have wondered again, as I did on first reading the article, whether the editor of *The New Yorker* seriously believed that the Bible could help us use *that* and *which* in the ways that would now be regarded as correct. And now I must also wonder whether the editors of *Science* believe it, since they tell us they reprinted the piece in the hope of softening the hearts of certain contributors who had been incensed at their "which hunting." Be that as it may, the reprinting seems to invite discussion of the use of *that* and *which* by Fowler, St. Matthew, and others.

The practice advocated by the Fowler brothers (joint authors of *The King's English*) is the most rational that has been described in print, and yet I believe it could be slightly improved. Their rule is, briefly: Use *that* for defining clauses, and *which* for nondefining clauses. They also appear to regard any clause properly begun with *that* as restrictive, and therefore not to be preceded by a comma, unless the comma be one of a pair enclosing a parenthesis ("the house, as you know, that Jack built"). They also appear to assume that any clause properly begun with *which* is supplemental, and therefore must be preceded by a comma. I do not think the correlation between pronoun and punctuation is quite so close, but in order to justify that view it is necessary to consider the difference in function between the two kinds of clauses.

Defining will serve to describe the proper function of a *that* clause, provided that we use the word in a rather broad sense. A *that* clause could rarely serve as a dictionary definition of the antecedent. What it generally does is to identify, or characterize, the antecedent by distinguishing it from other things (or rarely persons) of the same class. A clause properly begun with *that* can therefore be aptly described as a *distinguishing* clause.

Nondefining, the term the Fowlers apply to clauses properly begun with *which*, is not very useful, for it fails to tell us what such a clause does; it merely tells us one thing that it does not do. The main purpose of a *which* clause, it seems to me, should be to give us information about the antecedent, and a proper *which* clause may therefore be called an *informing* clause, or an *assertive* clause when that word better describes its tone.

Almost every clause properly begun with *that* is in fact restrictive, and therefore should not be preceded by an unpaired comma, but there are cases, though they are very rare, in which this rule does not seem