lent definition of the problems, the accuracy and extent of the information, and the critical evaluation of the data. The experimental results presented are numerous (697 references) and amazingly up to date; many neat and easily understandable tables are included, as are also effective illustrations.

The first seven chapters of the book discuss the general properties and physical and chemical characteristics of the viruses. The statistical and physico-chemical principles involved in the determination of some characteristics are adequately discussed. The concept of purity of virus preparations is discussed in an acute and original way. The following five chapters discuss the interaction of viruses and of their hosts in bacteria, plants and animals. Other chapters discuss hemagglutination phenomena, interference, and variation of viruses. After discussing the transmission of viruses and the tumor problem, the book ends with a general discussion of the origin and nature of viruses. A discussion of the Rickettsiae is given as an appendix.

The book stresses the problems of greatest actuality: for example, one chapter is mainly devoted to the use of tissue cultures in animal virology; another, and an inspiring one, to the relationship between viruses and tumors. In discussing debated questions, which are numerous in a new science, the author restrains from taking too sharp a position, although his attitude is always critical and progressive. The practical implications of many biological properties of viruses are not neglected, as proved by the extensive discussion of the medical aspects of virus serology (ch. 6), of the problems of transmission of plant and animal viruses and of their epidemiological significance (ch. 16), and of many other points.

Owing to the considerable number of facts and to the high level of the discussion, the book, in a few places, may not be easy to read; mature students will profit most from it.

All together the book is truly outstanding. It will constitute exciting reading for everyone interested in some of the most intriguing aspects of biology.

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***The Medusae of the British Isles: Anthomedusae, Leptomedusae, Limnomedusae, Trachymedusae, and Narcomedusae.*** E. T. Browne Monograph of the Marine Biological Association of the United Kingdom. Frederick Stratten Russell. Cambridge Univ. Press, New York, 1953. 530 pp. Illus. + 35 plates. $22.50.

Every devoted systematist must secretly cherish the hope that he might emulate the example of Alfred Goldsborough Mayer who wrote, in his *Medusae of the World,* "I have always felt that each working naturalist owes it as a duty to science to produce some general systematic work," but few have been able to do so in these days when so many things seem more important than a knowledge of the species of animals. Yet, without such knowledge, much practical work in oceanography, agriculture, physiology, and medicine would be impossible. It may well be true that Dr. Russell's original motivation for taking up the study of medusae is their utility in studying water movements, but it is plain that he is a zoologist and a devoted systematist as well, for it took perseverance and interest to carry this work on to its delayed but successful conclusion.

All the species known to occur in British waters (some 90 species, including the one fresh-water form) are discussed, and a number of possible species, not surely known for the area, are also considered. Exhaustive synonymies are given for most of the species, although the author has had to throw up his hands once: "Sufficient has already been said to indicate the confusion that exists in the synonymy of *Obelia.* There is nothing to be gained by further mention." Nevertheless, the highest traditions of scholarship have been met, and every effort has been made to make this work useful. Many of the drawings are of preserved material, rather than idealized perfections seldom seen in collections, and a neat pictorial key consisting of 80 vignettes is offered in place of the usual verbal dichotomy. The bibliography on *Craspedacusta* is listed separately from that on the marine species. Citations are not restricted to regional references.

From the standpoint of zoology, it is of interest to note that the author makes no attempt to harmonize the divergent classification of hydroid and medusae stages, since he is of the view that our knowledge of the hydroids is still too imperfect. Rather limited use has been made of nematocysts, and it may well be that this is the last major monograph that does not at least make the attempt to ascertain the validity of this character in a comprehensive manner, although much remains to be done before we can decide whether this character may be used for both hydroid and medusoid stages.

Publication of this work on such a handsome scale has been made possible in part through the bequest of E. T. Browne, himself a student of medusae and in a sense the inspirer of this work. It is a splendid piece of bookmaking, and the color plates look fresher and more lifelike than those in Mayer's monograph.

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## The Medical Sciences

***Adventures in Physiology: A Selection of Scientific Papers.*** With excursions into autopharmacology. Henry Hallett Dale. Pergamon Press, London, 1953. (U.S. distrib.: Macmillan, New York.) 652 pp. Illus. $19.50.

This remarkable volume presents a dramatic portrait of one of the greatest and most beloved scientists of this century. It is principally a reproduction of his important papers with comments by the author which bring the facts and ideas of the past into relationship with the current state of knowledge. The papers chosen by Sir Henry are concerned with his two main areas of research and serve to emphasize his extraordinary versatility as a scientific investigator. In their pursuit he utilized the techniques and background of several scientific disciplines including pharmacology, physiology, and experimental pathology. In the author's own words:

> These two lines of inquiry have led, on the one hand by way of studies which involved the specific actions of adrenaline and acetylcholine, to a widening application of the conception of a chemical phase in the transmission of excitation from nerve fibre endings to responsive cells; and, on the other hand, by way of studies of the actions of histamine and of its distribution in the animal body, to evidence for its contribution to local and general reactions, by which the organism as a whole and its separate tissues respond to various chemical, immunological or physical assaults upon the integrity of their living cells.

The introduction, written by the author, gives a biographical sketch of his scientific career. He relates the circumstances surrounding many of the scientific discoveries that are described in the body of the volume. The result is a fascinating story which has many points of interest and lessons for the physician, the teacher, and the investigator whether he is in a university, a commercial, or a government laboratory.

During the early part of his career, Sir Henry received guidance and inspiration from many eminent members of the great school of British physiologists, including Gaskell, Langley, Anderson, Bayliss, and Starling. In 1904, he accepted a post in the Wellcome Physiological Research Laboratories against the advice of many friends. Here began one of the most productive scientific careers of our era and also one that provides an important illustration of serendipity in medical research. It was suggested that he attempt to bring some clarity into the problem of ergot—the knowledge of its pharmacology being then in a state of confusion. This project given to a young scientist, to whom pharmacological research was a novelty, presented no attraction for him. However, out of the work, which eventually led to a Nobel laureate, arose both of his main themes in research.

On several occasions, the keenness of his observations and the awareness of their possible importance led him to make important discoveries that had no primary relationship to his basic assignment.

His first good fortune came from making what he labels a shocking "howler." While finishing an experiment concerning the blood pressure effects of an ergot extract on the spinal cat, he was asked to test a preparation of dried suprarenal gland substance fresh from the Wellcome factory. Successive injections gave only falls in pressure and with the "confidence of inexperience" he condemned the sample without hesitation. Then, by one of those coincidences which make life so remarkable, the same sequence of events occurred the following week. On referring to his notes, he quickly saw the correct answer; thus, not only was the reputation of the young pharmacologist saved in the eyes of the company, but the basic discovery of the effect of ergotoxine on the pressor response to adrenaline was made.

Later, examination of the products formed by putrefaction in the preparation of the official "Liquid Extract of Ergot" led to the study of a variety of pressor amines and the coining of the term *sympathomimetic,* researches which have been of great general importance in medicine. Also, after seeing Kehrer's demonstration of the tonic effect of an ergot extract on the cat's uterus, he recognized that this must be caused by an active substance of a different kind from any he had previously studied. This led, in collaboration with Barger, to the isolation of histamine, and many studies of fundamental value followed which form the first important group of papers reproduced in this volume.

In 1913, another accidental observation he made, while testing an ordinary liquid extract of ergot, led to the detection of acetylcholine and stimulated his interest in what was the most exciting venture of his life: his studies concerning the chemical transmission of excitation at the junctional contacts between nerve endings and cells. Fifteen years later, while engaged in a series of studies on the distribution of histamine in normal tissues and organs. Dale and Dudley quite unexpectedly found acetylcholine in the spleens of oxen and horses, thus being the first to show that this substance is a natural constituent of animal tissue.

As the author points out, when one reviews this succession of events, it is clearly evident that accidents frequently provided new directions to his research, Most of these "accidents" stemmed from investigations into the problem originally assigned to him by Mr. Wellcome and led him along fruitful paths quite unrelated to it. What the author does not point out in his extraordinary ability which allowed him to perceive the meaning behind each event in this "succession of accidents." This volume not only reproduces a selected series of scientific papers of importance presented in a most interesting way, but also the story of this successful scientific career unfolded in autobiographical style is an exciting and valuable document in its own right.

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***The Conquest of Plague. A Study of the Evolution of Epidemiology.*** L. Fabian Hirst. Oxford Univ. Press, New York, 1953. 478 pp. Illus. + plates. $11.00.

This fascinating and highly informative volume is concerned with the natural history of one of the world's most deadly diseases, the bionomics of its natural host, the rodent, and the impact of the infection on primitive, medieval, and modern man. Beginning with the earliest records of plague in ancient Babylon and continuing through its many devastating epidemics in Asia, Europe, and North Africa, the conception of the origin of the pestilence passed through one period after another of animistic superstition, then miasma and contagion, until, during the last decade of the 19th century and the first decade of the 20th century, the etiologic agent and the methods of its transmission were discovered. It is repeatedly emphasized that urban plague is primarily a disease of the semidomestic Norway rat, and that the most important vector is the tropical rat flea, *Xenopsylla cheopis,* which spreads the plague bacillus to

other rats, including the domestic black rat and its relatives, and through these rats to man.

During the last pandemic, which originated in Hongkong in 1894, the disease was disseminated for the first time to the Western Hemisphere and to Australia. Here, as in Asia and Africa, it became established in extensive areas in native wild rodents. Although these enzootic foci constitute a continuing potential for extension of plague to human communities, domestic rodent plague is greatly reduced and human exposure is much less than it was previously. This conquest in rodent plague has resulted from an understanding of the ecology of the reservoir hosts and their flea ectoparasites, the climatic factors which favor rat breeding and flea densities, the transmission of the plague bacillus, and the institution of measures to prevent the breeding of urban rats and their parasites. Furthermore, modern chemotherapeutics when administered early in the disease provide a favorable prognosis, and immunization offers considerable protection for the exposed human population. Thus the conquest of plague, like that of malaria, yellow fever, and typhus fever, has been achieved by discovery of the agent and its arthropod transmission and by the institution of measures to interrupt the cycle.

The author is well equipped by extensive experience in plague areas of Asia to write authoritatively on the subject from a modern viewpoint. The historical background has been developed by an exhaustive critical study of the literature. The work is extensively documented and is illustrated by a few well-selected photographs, charts, maps, and graphs. The style is essentially narrative and is unusually lucid for a scientific publication. Good reference lists to the literature are found at the end of each chapter. There are separate author and subject indexes. The format is pleasing, and no typographical errors have been found.

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***Problems in the Anatomy of the Pelvis: An Atlas.*** Eduard Uhlenhuth, with assistance of DeWitt T. Hunter; illus. by William E. Loechel. Lippincott, Philadelphia–London, 1953. 206 pp. Illus. $10.

Professor Uhlenhuth's monograph is an atlas prepared for the use of those engaged in urological and gynecological surgery and for the guidance of teachers who are called upon to instruct postgraduate students or hospital staff members in either of these specialties.

Influenced by a defensible surgical bias, consideration of the anatomy of the retrovesical space is given first place, its description being Part I of the book. This space is made the hub of the discussion, upon which the accounts of all other subperitoneal areas and their organs are, so to speak, convergent. Parts II and III then contain specialized descriptions of the musculature of the urinary bladder, rectum, and pelvic diaphragm. The text, with a selective list of references, covers the first 66 pages; the figures, their legends, and two indexes use the remainder of the volume.

Among the important anatomical structures discussed in the text are the following: the vesical and prostatic capsules; the ductus deferens and seminal vesicles; the trigone of the bladder; the urinary sphincters (the structure of which has been the subject of sober, long-term controversy); the levator musculature, its divisions and variably lamellar character.

The illustrations were prepared either from original dissections or from roentgenograms of cadavers. In the preparation of the former, the author was assisted by De Witt T. Hunter; in the execution of the figures, he is indebted to William E. Loechel, his departmental medical artist. The dissections are ingenious; the drawings are clear, the reproductions first class.

This product of painstaking laboratory study offers to the inquisitive student of pelvic structure very substantial material for self-improvement either as a surgeon or as an anatomist. Its content is not readily mastered—but never could be made easy of acquisition, simply because of the inherently difficult nature of pelvic layering.

The use of numbered items accompanied by explanatory key is somewhat unfortunate; labels, placed on structures or employed with leaders, would have rendered study more expeditious. Some new terms are coined, special to the portrayals in the figures.

Altogether, the treatise offers its own tribute to Uhlenhuth's acumen and persistence. The author's work is a refutation of the lazy conclusion, complacently reached by some anatomists, that, since all fasciae are fibrous, segregaiton of laminae and consequent production of spaces are procedures both arbitrary and unrewarding.

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***Symposium on Fatigue.*** W. F. Floyd and A. T. Welford, Eds. H. K. Lewis, London, 1953. (For the Ergonomics Research Society.) 196 pp. Illus. + plates. 24s.

The symposium unites a number of recent contributions to the many-sided problem of human inadequacy generally called fatigue. Of the 20 contributors to the symposium held in England in 1952, four are Americans, namely Ryan, Schwab, Kennedy, and Gagné. All told, a great variety of aspects of the work and inadequacy problem were presented either experimentally or by reference, but in no case was a general comprehensive, systematic treatment of the problem given.

Those who gave most attention to nonexertional factors were the two participants reporting upon "tropical fatigue," a syndrome that arises without sufficient physical changes to account for the inefficiency. Even here, the inefficiency rather than the identifiable experience of the victim and its relation to the task or situational demand is the focal point in the first participant's thinking. In the second, tropical fatigue is pointed out as sometimes being tropical neurasthenia. In this paper such broad factors as whether or not the individual wants to live in the tropics are thought to be significant.

Bartlett made the most comprehensive definition of fatigue in the symposium. His definition made the term

*fatigue* cover so much that other terms were required to designate the specific forms of change that occur in the organism, as, for example, impairment for the intracellular, and some other word for the experiential.

One paper by Browne was "Fatigue, Fact or Fiction?" He said that what most workers mean by fatigue is simply "decreasing performance," therefore, why not call it that, and that any single entity called fatigue is a fiction. Muscio reached the same conclusion many years ago. This sidesteps the existence of the identifiable self-experienced state that people in general call fatigue and that expresses the relation of a *person* to a task.

The failure of research workers, even as yet, to attempt systematic treatment of the problem of human inadequacy is a more important thing to point out here than factual contributions made by the participants. This failure must represent some sort of implicit attitude toward the general problem—probably the belief that systematic formulations would be premature, or that we can always get along well without them. On the contrary, if systematization is still premature with all the myriad facts we have, it always will be. Thus we should always be guilty of the same muddled thinking and overlapping terminology we have at present, despite the ingenuity of workers to investigate, and the ever-increasing accumulation of their findings.

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***The Physiopathology of Cancer.*** Freddy Homburger and William H. Fishman, Eds. Hoeber-Harper, New York, 1953. 1031 pp. Illus. + index. $18.

At this time when the study of cancer needs coordination of information and interdisciplinary approaches as well as further specialization, Homberger and Fishman have attempted to assemble in one volume the present-day knowledge in all active fields of cancer research. As could have been expected, the result is a tome that is much too heavy to be carried around and read at one's leisure, but it is one that should occupy a prominent place on the desk of the investigator and the physician and one that will be of use to the student preparing himself for research in cancer.

Apparently realizing that the scope of cancer research can no longer be covered adequately by a single author, the editors have followed the rather frequent practice today of inviting outstanding investigators to contribute chapters in their respective fields of specialization. Probably the editors' greatest success with this book was in their selection of the 28 contributing authors.

Just as one author could not be expected to write a book adequately covering all fields of cancer, neither should one individual be so presumptuous as to attempt a detailed appraisal of all chapters in this volume. After having read the book, however, one can give a general description of it and present certain impressions he has gained with detailed evaluation limited to certain chapters.

The book has been divided into four sections: Biology, Chemistry and Physics, Clinical Investigation, and Practical Applications. The first two parts, written by investigators in the more basic fields of research, appear to be written for the investigator. Under Biology are presented discussions on morphology of tumors, carcinogenesis, genetics, endocrinology, virology, nutrition, and transplantation of tumors. The second section has two chapters linking biology and chemistry in the mechanisms of carcinogenesis, with others presenting discussions of the chemistry of cancer including nucleoproteins, enzymes, cytochemistry, and histochemistry, and also a discussion of experimental chemotherapy and radiation. The third and fourth sections are directed toward the clinical investigator and the physician. The third section gives a general discussion of clinical investigations in cancer with special chapters on steroid metabolism and problems in occupational cancer and statistical studies. The fourth section includes an evaluation of diagnostic tests, a discussion of diagnosis by the use of exfoliative cytology and of isotopes, and chemotherapy and radiation therapy.

Throughout the volume, standards of presentation are high, although there is, of course, great variation in manner of presentation and type of material given. Two extremes are represented by the chapter on genetics and the chapter on viruses. The former is a faithfully recorded chronological account of the work published in this field with very little deviation from the conclusions of the authors. In contrast, in the chapter on viruses, the author is vigorously selling an idea. Although many of his readers will not be convinced that all types of cancers are caused by viruses, all will agree that he has presented a very stimulating discussion. Many of the chapters, such as the one on nutrition and the one on endocrinology, contain a vast amount of facts that have been firmly established, whereas others, such as the two on chemical and genetic mechanisms, contain discussions one might not expect to find in a book of this type, since some of the facts are not so well established. These two chapters are thought provoking nevertheless.

The extensive experience of the authors of the chapters on morphology is clearly evident. Future investigators will be fortunate to have these published observations. This section, however, is not well rounded, for, whereas there is a whole chapter on testicular tumors and another of endometrial carcinoma in the rabbit, both of which are of more limited use and interest, there is no chapter on leukemia or any of the other neoplasms of the blood-forming organs. Morphology of neoplasms in man already amply dealt with in many textbooks is not included. The photomicrographs in this section and elsewhere are excellent. There are not as many, however, as might be desired. Some of the chapters describing the morphology of specific groups of tumors have none. From her vast number of observations of mammary gland tumors, the author of this chapter has presented a classification that undoubtedly will receive wide acceptance. Unfortunately, errors have occurred in printing the legends for some of the figures. (The legend for Fig. 37 should have been that for Fig. 38; the legend for Fig. 38 should have been that for Fig. 39; and the legend for Fig. 39 should have been that for Fig. 37.)

Present knowledge on transplantable tumors covering both the genetic and the immunologic aspects is well summarized. This section should be of great interest to the plastic surgeon as well as to the cancer investigator. To one who has read the chapter carefully, the editors' footnote which implies that from the work of transplant-

ing human neoplasms to experimental animals by the use of cortisone or various techniques we are going to have to modify our concepts of these basic principles of tissue transplantation, hardly seems justified.

As a whole, the problem of cancer is presented as one in biology. Nevertheless the chemistry subjects are adequately presented. Furthermore, it is well to have them in the same volume with the biology, for this arrangement does tend to relate the two subjects and points up areas where more work should be done in order that one field keep abreast with the other.

Chemotherapy is discussed both from the standpoint of experimentation and from the standpoint of clinical application. Clinicians everywhere will surely find the chapter on clinical chemotherapy extremely useful, but they should also find the chapter on experimental chemotherapy of interest. Likewise, the investigator working with experimental animals will want to read the clinical chapter.

The chapter on clinical investigations is rather sobering. It is recommended that amid the present cry for clinical investigations one read this discussion, which, as the author so aptly points out, "must consist essentially in a listing of difficulties and problems."

The evaluation of diagnostic tests probably takes up more space than is justified. However, the discussions of exfoliative cytology and of isotopes in diagnosis should be of great practical value. Much worth-while information can be found in the chapters on environmental cancer and on statistical studies.

For the research man, *The Physiopathology of Cancer* should prove to be a valuable reference book. The full list of references with each chapter should make it particularly useful. The physician will find much practical information in the clinical and applied sections, and it is hoped that he will find time to read the remainder of the book to gain a fuller concept of the disease with which he is dealing. It is somewhat doubtful that the volume will come up to expectations as a textbook for students. If it does not prove to fill this need, it may be that, in the course of their training students, one of the editors may wish to condense and coordinate the material here into a volume that will provide a good textbook.

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***Frontal Lobes and Schizophrenia.*** Second lobotomy project of Boston Psychopathic Hospital. Milton Greenblatt and Harry C. Solomon, Eds. Springer, New York, 1953. 425 pp. Illus. $12.50.

This volume, written by more than 30 contributors, reports the effects of prefrontal lobotomy on 116 patients. A unilateral (left or right) operation by the Poppen technique was performed in 42 cases, a bilateral in 39, while 35 patients were subjected to a bimedial operation that (in contrast to the bilateral one) spares the white matter lateral to the trephine openings. A sample of about 30 patients was studied intensively prior to and after the operation and the methods, as well as the results of the psychological, sociological, and physiological studies of this sample, comprise the larger part of the volume.

It is concluded that a high degree of tension present preoperatively is predictive for a favorable outcome, that the lobotomy decreases tension, and that most of the intellectual and emotional changes, as well as changes in social behavior, of the lobotomized patients may be the result of the elimination of the tension.

The large majority of the patients have been suffering from schizophrenia for many years. This selection of the prognostically almost hopeless cases will be applauded by all those who believe that the operation is basically a mutilating procedure and that it should not be undertaken without compelling indications.

The different chapters are written very unevenly and the amount of new material they present varies greatly. The reader is likely to find of particular interest the chapters dealing with the psychological and sociological studies where an attempt is made to quantitate all results of the tests.

The fact that solutions of too many problems were attempted on a small heterogeneous sample is a major weakness of nearly all the data. Many findings are not significant from a statistical point of view, and many others reach statistical significance at such low levels of confidence that their interpretation remains quite uncertain. Furthermore, although most patients were diagnosed as schizophrenics not all of them were so diagnosed, and most statistics disregard this fact. Even though the bias introduced is probably not large, it seems unsound to include data (however small) pertaining to various disorders other than schizophrenia into over-all findings that refer to schizophrenic patients.

Despite these reservations, the reader will find many data of great interest, and the main results emerge rather clearly. Sixty percent of the patients were judged to be markedly or moderately improved following a bimedial operation, 46 percent were so improved after a bilateral procedure, and 28 percent after a unilateral operation. These and other data imply that the bimedial operation, which is less destructive than the bilateral one, is likely to be the operation of choice. On the other hand, the unilateral operation promises on the whole much less favorable results than the standard bilateral lobotomy.

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