recent advances have been dealing with the interaction of antibody with hormones and viruses, and still more recently it has been demonstrated that RNA and DNA themselves can be considered antigens, and one can expect that certain of the antigenic groups are specific sequences of bases in the double helix. As one of the contributors points out, if this finding is confirmed, this will be a vital and valuable key for the study of the genetic code and for its mode of transcription. In addition to reports on the results of antigenic studies, this symposium also brings many details on technique, for example, modern methods of protein chemistry which allow the investigation of the antigenic sites of proteins.

H. LEHMANN

Aspects of Medical Virology. Edited by A. P. Waterson. *British Medical Bulletin*, Volume 23; No. 2. (Pp. 5; 30s.) London: The Medical Department, The British Council. 1967.

The great success of genetic analysis for the bacterial viruses (phages) now spurs on the animal virologists. In a recent issue of the *British Medical Bulletin* devoted to medical virology, Dr. P. D. Cooper outlines the methods of genetic analysis available in the study of animal viruses—recombination, complementation, and physiological functions—but concludes that good genetic markers are still lacking. 'Temperature-sensitivity' is, as yet, the only demonstrably universal marker for animal viruses and has been used in the study of polio, polyoma, and two arboviruses—Sindbis and Semliki Forest. The other universal marker for phage is 'suppressor-sensitivity'; but attempts to find analogous animal virus systems have not, so far, been wholly successful, though they have been tried for rabbit pox and herpes virus strains. The author concludes that 'information from genetic analysis should greatly expand during the next five years'.

R. J. C. HARRIS

Die Evolution der Organismen. Band I. Ergebnisse und Probleme der Abstammungslehre, 3rd ed. Edited by Gerhard Heberer. (Pp. xvi + 754; 265 figures + 8 tables. DM.128.) Stuttgart: Gustav Fischer Verlag. 1967.

This is the first volume of the third edition of a three-volume handbook which ranges over the whole of evolution. The second and third volumes are due to be issued in 1968 so that the whole edition is appearing one hundred years after Haeckel's 'Generelle Morphologie der Organismen' (1866) and his 'Naturliche Schöpfungsgeschichte' (1868); consequently this volume is in his memory and carries his portrait opposite the title page. It is likely that the subsequent volumes will be of more interest to readers of this journal, for the second will deal with evolutionary genetics and the third with the phylogeny of the hominadae. However, this volume will be prized by anyone who is interested in the evolution of animals and plants.

The first section deals with general principles and considerations. Although the standard of all the articles is high, two deserve especial praise for clarity and detail. The first of these is by Simon and Zippolt on geological dating, stratigraphy, the use of pollen, and the use of radioactivity for dating strata. The second is by Kuhn-Schnyder on palaeontology. Both articles have excellent charts and drawings which relate the different fossils to the different geological levels and indicate probable lines of evolution. This section also includes a philosophical discussion, at some length, by Zimmermann on the methods of evolutionary science; he ranges from early mythology and Aristotle through to Goethe and so to modern times, but barely mentions Lamarck. The article by Wickler on behaviour is fascinating, though at a lighter level.

The second section deals with the evolution of organisms in detail. Kaplan discusses the earliest living forms, the definition of life, and after a brief mention of bacteria, blue-green algae, and PPLO, he launches into the molecular basis of the living process. The usual subjects are reviewed: DNA replication and reproduction; genetic information and protein synthesis; viruses; how you can make organic molecules from gases. Admittedly this is the current fashion but the present reviewer cannot help feeling that none of these processes has much meaning unless they occur inside a living cell and that such articles miss the whole point of 'the living process' which is the maintenance of biological organization. The other two articles in this section, that by Mägdefrau on the evolution of plants and that by Remane on the evolution of animals, are highly commendable. They deal concisely with what is known about each main group of living organisms.

The book is extremely well illustrated by photographs and drawings; there are good charts and diagrams to help the reader through the millions of years which are so well reviewed.

J. CHAYEN

The UFAW Handbook on the Care and Management of Laboratory Animals, 3rd ed. Edited by the Staff of UFAW. (Pp. xvi + 1015; illustrated. 120s.) London and Edinburgh: E. & S. Livingstone. 1967.

Those familiar with the first and second editions (1947 and 1957) need no recommendation for the third edition of this excellent handbook. It skilfully rejects what can be omitted (though still useful) to make room for material that must be included as a result of what Sir Peter Medawar calls, in his foreword, the three revolutions. These concern genetics, husbandry, and the control of disease. The first-named revolution allows control of the hereditary variation in the experimental animal; the second (which includes among many things the statement of the Animal Technician as a member of a profession ancillary to biological and medical science) allows control of the external environmental variation; and the third, which enables specification of animals in

terms of their germ-free, 'SPF', conventional or 'dirty' status, allows control of what may be called the internal environmental variation.

A book of this size is at least two years out of date when published—a few chapters are more so—but this is unavoidable; a corollary to this is that it will be useful in many aspects beyond the ten years or so when a fourth edition will no doubt be in demand. The book is a *must* for every research worker and technician, whether he be starting to use animals at all, or whether he be merely moving to a species unfamiliar to him. Its purpose is to promote the welfare and comfort of animals. Since the achievement of this inevitably results in experimental efficiency and economy, the new reader will benefit greatly, before studying the chapter relevant to his species, by perusal of the first general section: the legal protection of laboratory animals, the design of housing and equipment, handling, nutrition, anaesthesia, euthanasia, transport, and the training of technicians. Here the chapter on genetic aspects of breeding methods, a subject often mysterious to the uninitiated, is unequalled in clarity. Over three-quarters of the book is devoted to particular species or groups of species. These include all those in common use, and a number of unusual ones—over 50. The illustrations are good and the lay-out easy to use.

It would be too much to ask a handbook to cover more than the facts. But a treatise, under UFAW auspices, on the gaps in our knowledge (such as a means of measuring the sensibility of different species to different kinds of pain, or the duration of a given SPF status in a given conventional environment), and on techniques which still need improving (such as lessening stress during transport, or the design of cages based more on further ethology studies and less on expediency) would be an impetus to further inquiry for those developing this relatively new discipline: laboratory animal science.

M. E. WALLACE

An Atlas of Mammalian Chromosomes, Vol. 1.

By T. C. Hsu and Kurt Benirschke. (Pp. x+200; 50 plates+212 figures. Loose leaf boxed: DM 37.60; \$9.40.) Berlin, Heidelberg, New York: Springer-Verlag. 1967.

The ultimate value of this Atlas is difficult to judge after the appearance of only one volume, and it is perhaps a little unfair to review it at this stage. There are, however, a number of points of criticism, perhaps worth noting, and which can perhaps be rectified in the next volume.

The past 10 years has seen the development of simple techniques for the study of mammalian chromosomes, and as a direct result of this there has been a veritable explosion in the number of species in which the chromosome complements are known. This has resulted in difficulties in description and nomenclature, not to say taxonomy, which urgently require attention. This Atlas is a valiant attempt to sort out some of these problems

and as such is to be commended. There are, however, a number of specific points which require attention.

First, it is likely to be difficult to maintain uniform standards in a series of volumes appearing over many years, but I am sure that the authors recognize this difficulty and will take steps accordingly. Second, there are several specific shortcomings in Volume 1. One of the most important from the taxonomic point of view is the failure to give the authority and date for each specific and subspecific name, in conformity with the rules of zoological nomenclature. It is essential that this be done in subsequent issues so that specific descriptions can be checked with those of the author originally describing the species. It would also be useful to know the source of each specific identification, and in which museum, if at all, the skin and skull have been deposited. A more minor point, when domestic animals are being considered, it would also be useful to know the breed that was studied in a particular instance, because as the karyotypes of further individuals become available, differences between breeds may become apparent.

The authors should remember that in a work of this nature, accurate taxonomy is as important as accurate cytology, and that one is valueless without the other, and to evaluate a particular cytological description it is necessary to have a knowledge of the reliability of both the cytology and the taxonomy.

It is a pity that the terms used to describe chromosome morphology have not been clearly defined. For instance, the terms 'telocentric' and 'acrocentric' appear to be used synonymously, or do the authors in fact intend them to mean different things? Do they imply, for instance, that some species have truly telocentric chromosomes lacking short arms while others do not? If this is so, the evidence for the existence of a true telocentric chromosome is, to say the least, doubtful. The terms 'subtelocentric' and 'submetacentric' mean very little; for instance, at what stage does a submetacentric chromosome become subtelocentric or acrocentric? A paragraph or section at the beginning of the next volume defining the terms used would be of immense value in comparison of the different karyotypes. In the same way, the use of the adjectives to describe chromosome size, such as 'small', 'large', 'medium', 'relatively small', etc. are vague, and are not in every case used consistently.

The karyotypes used to illustrate the chromosomes of the various species must be of the highest quality, and this is not always evident in Volume 1. The use of karyotypes overlaid with autoradiographic grains is not to be recommended for these purposes. The karyotypes should also be arranged in as consistent a manner as possible, particularly within each group of species. This consistency of arrangement again is not evident throughout the present volume.

All these points are important, and it is hoped that the authors will take steps to rectify them where possible in Volume 2. Nobody is more aware than this reviewer of the difficulties and magnitude of the task that the authors have set themselves, and it is to be hoped that this critical review will be taken in the constructive spirit