From the title, introduction, and length of this book, one might have expected it to do just that or at least to provide a fairly objective review and evaluation of facts and views on the role of the cell surface in morphogenesis. Instead, Curtis's book bypasses this chance in favor of promoting his speculations about "cell stickiness"; it also includes a lengthy description of some elementary aspects of embryology, an account of much-reviewed work on inervation, a very incomplete description of the migration of primordial germ cells, and a digression on cancer cells.

This is not the place to describe the author's theories on cell stickiness or to examine their scientific validity, except to say that they do not come out clearly from this text and seem to be so permissive as to elude decisive testing. Many statements are based on unpublished work, others on unconfirmed results. The basic views and arguments of the author cover essentially the same ground as his 1962 article in *Biological Reviews*. The reader will look in vain for up-to-date discussions of more recent work on the properties of cell surfaces and cell contact phenomena, such as that of R. Dulbecco, L. Warren, P. K. Vogt, H. Rubin, P. I. Markus, C. Grobstein, H. Holtzer, and their groups; or of the studies on contact inhibition from the laboratories of L. Sachs, H. Eagle, M. Stoker, and others, whose contributions were either overlooked or given short shrift. Equally baffling is the absence of references to some of the major reviews on the role of cell contact and cell aggregation in morphogenesis, for example those by Trinkaus, de Haan and Ebert, Mercer, and others.

Perhaps the most striking and significant feature of the book is its tendency to endlessly juggle presumptions rather than evaluate facts, to magnify what should be simple issues into extremely troublesome ones, and to fan the flickers of pointless controversies. This, together with the glaring omissions of excellent factual work, makes reading the book unrewarding. It is, of course, anyone's right to be preoccupied with Newton's apple's pull on the earth rather than with the earth's pull on the apple; however, by losing sight of the common principle the author sets himself up in artificial disagreement with many others in this field and, to support his position, runs up a good list of snap judgments. Some are unintentionally quite amusing. One fellow's "theories are of course unsatisfactory . . . even if true"; Sperry's theory "goes entirely against the evidence"; Trinkaus's "assessment of adhesiveness is entirely subjective"; Holtfreter's work on gastrulation is "almost entirely theoretical"; Weiss's hypothesis "is difficult to operate"; "there is no evidence" for the suggestions of B. Jones and P. Jones; Steinberg's "results were probably due to a failure to take account of the fact that cell movement ceases below c. *p*H 6.0"; the isolation of cell-binding materials is a "logical mistake"; and so on. Occasionally, the author disagrees even with himself and describes some of his previous statements as made "rashly and entirely without good evidence." One is to assume that his judgment is now sounder, although his discussions of some well-established facts are shrouded in mystifying uncertainties while various highly speculative conjectures are expounded in detail. With puzzled consternation one turns the pages back to the motto of the book, a quotation from Mark Twain: "There is something fascinating about science. One gets such wholesale returns of conjecture from such trifling investment of fact."

According to the subtitle, the book purports to be a molecular analysis of the problem; yet, one fails to find in the index the usual guidemarks of "molecular" processes such as "RNA," "DNA," "nucleus," "virus," "ribosomes," "genes," "hormones," "induction," "receptors," "chromosomes," "differentiation." It is equally baffling that the "enzymology of the cell surface" (p. 9) is disposed of in 14 lines and that there is no serious discussion of the burgeoning problems of the genetics of cell surfaces. The work on the cell surface in ciliates, on mating contact, and on surface antigens in microorganisms is overlooked; so are plant cell walls in relation to plant morphogenesis. The genetics of histocompatibility is treated lightly, and so are the problems of transport across cell membranes. No serious consideration is given to the significance of membrane and cell fusion to differentiation. And why is there no discussion of the author's experiments on the grafting of the cell cortex in amphibian embryos widely reported some years ago? When it comes to specifics, the poignant omissions and preferences are too numerous to be listed in this short space and they all contribute to the disappointingly inadequate and lopsided character of this curiously subjective document.

It is a dangerous book for the nonexpert and the untrained reader. Like a modern Procrustes the author chops things down to his narrow view of the cell surface; that which cannot be fitted is conveniently overlooked, summarily dismissed, or finely counterpointed with a supercilious "but." When it is all over, the field is so strewn with the wreckage of viewpoints and so darkened by the clouds of speculations that one can pick up nearly anything. The earnest student should not identify this book too closely with the field which it purports to represent. It would be regrettable if he were discouraged by it from becoming seriously interested in the role of the cell surface and intercellular communication in morphogenesis and differentiation. That, however, is unlikely, since the real challenges and accomplishments of this focal area of cellular and developmental biology are too important and too appealing to be blurred or deflected even temporarily by a book which the author himself considers to be but an "ephemeral attempt."

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The Zoo World

International Zoo Yearbook. Vol. 8. CAROLINE JARVIS and RUTH BIEGLER, Eds. Zoological Society of London, London, 1968. vi + 414 pp., illus. $18.75.

Time was when zoological gardens were merely menageries, collections of wild animals exhibited in cages or pens for the edification and amusement of the public. The emphasis has changed in recent years. Moats now replace the restraining bars; attempts are made to simulate the animals' natural habitats; modern medical and husbandry techniques improve the condition of the inmates; an awareness is present of the vast scientific knowledge that can be attained from the captive specimens; a realization exists of the role that zoos can play in the conservation of dwindling species. These happy developments are portrayed by this series of annual *International Zoo Yearbooks,* begun in 1960 and spearheaded by the Zoological Society of London, which operates one of the oldest and best zoos in existence. These volumes not only serve as the authoritative record of the zoo world, but also provide a medium for the international exchange of information on all aspects of the care, behavior, and

biology of wild animals in captivity.

Like the earlier volumes in the series, this one contains an opening section on one specific topic. The subject here is a Symposium on Canids and Felids in Captivity. It presents 24 informative and provocative articles by 29 authors in 15 countries, and deals with over 25 different kinds of dogs and cats. Section 2 treats of New Developments in the Zoo World, with consideration of such matters as architecture and construction, breeding, conservation, education, husbandry, and research. Section 3, the Reference Section, contains a useful list of 846 zoos and aquaria of the world, with addresses, names of officials, numbers of specimens, and attendance figures; lists of wild vertebrates bred in captivity in 1966 (some 1250 species); and a census of captive animals regarded in 1967 as rare or endangered in the wild (375 species). A special feature is a group of 15 papers on a Survey of Marking Techniques employed on wild animals in captivity. Several appendixes and an index complete the book.

These volumes, a mine of helpful information on most vertebrate types except fishes, are indispensable to professional zoo employees and offer a wealth of fundamental material to behaviorists, conservationists, veterinarians, and biologists generally. They effectively point up the scientific and educational value of the zoological garden in the world today, and indicate the vital role that zoos can play in modern society by contributing to the perpetuation of our vanishing fauna.

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Genetic Vocabulary

A Dictionary of Genetics. ROBERT C. KING. Oxford University Press, New York, 1968. 292 pp., illus. Paper, $3.95.

This is a good dictionary which should make geneticists appreciate the efforts the author must have put into the project. One of the useful features is the inclusion of the structural formulas for numerous antibiotics, mutagens, analogues, and normal components of macromolecules. There is a clear diagrammatic illustration of protein synthesis (under *translation*, however), but the diagram for the regulatory control of the operon is not as helpful. In addition to genetic terms from various specialties, there are useful terms from evolution, ecology, and related biological fields. The common names and genera of organisms used by geneticists are also included and defined.

As a test of the usefulness of the dictionary, I checked the technical terms in a recent article ("Unstable redundancy of genes for ribosomal RNA" by F. M. Ritossa in *Proc. Natl. Acad. Sci. U.S.* **60**, 509–16). Only 3 of some 50 terms were not listed (*integration, dechorionate, marker gene*). Undoubtedly each specialist will find some terms lacking. Among those I noted were *paracentric, aneucentric, germinal choice, transmissibility, cryptic mosaic*, and *quinacrine mustard*. King uses the most recent definitions of evolving conceptual terms. Thus *cistron* is "the section of the DNA molecule that specifies the formation of a particular polypeptide chain" rather than Benzer's original "smallest unit of genetic function." A few terms involve page-chasing by the user (*acaricide* is defined as "miticide," *beta ray* as "a stream of beta particles," *homograft* as "homeoplastic graft," *pedogenesis* as "neoteny," *proband* as "propositus"). Pronunciations are not included, which makes the dictionary somewhat less useful to students. I hope that a second edition will incorporate this important feature. King gives to his definitions genetically useful interpretations. The intracellular functions of antibiotics, for example, are usually stated (*chloramphenicol* ". . . attaches to the 70 s ribosome and prevents the addition of an amino acid to the growing polypeptide chain"). Older terms found in the literature before 1950 have not been included. Thus, definitions of *factor, unit character, genomere*, and *step allele* would have to be sought in the original papers or in older textbook glossaries.

King concludes his dictionary with a chronology of events. While these chronologies are useful, they also perpetuate errors and oversimplifications (despite the disclaimer to the user to read some histories of genetics for details). Tschermak is dropped as a rediscoverer of Mendelism (following Stern's interpretation), Bateson's early defense and clarification of genetic terms is omitted, Lock's significant *Heredity, Variation and Evolution* (1906) is not cited, Wilson's *The Cell in Development and Inheritance* (1896) is listed under 1925 (King probably used the date of the third edition), *nondisjunction* is not included in the events of 1914–1916, but the less important *deficiency* is listed for 1917. Despite the inadequacies of the dictionary mentioned in this review, its wealth of information in every field of genetics makes it a useful tool for the geneticist and an essential reference book for the nongeneticist wishing to read genetic literature.

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Tropical Tree

The Coconut Palm. YAN FRÉMOND, ROBERT ZILLER, and M. DE NUCÉ DE LAMOTHE. Translated from the French edition (Paris, 1966). International Potash Institute, Berne, 1968. 225 pp., illus. Sw.F. 13.

The coconut palm is the most widespread of cultivated trees. This book provides the nonspecialist with an outline of its botany, the management of plantations, the technology of the oil-extraction industry, and the importance of oil and other coconut products in world trade, demonstrating the influence of recent research on coconut growing. The emphasis is inevitably on the work of the organization (Institut de Recherches pour les Huiles et Oléagineux) with which the authors are associated. Nevertheless the book succeeds well in giving a general impression of the coconut industry in a space rather more modest than the number of its pages suggests because of a lavish layout. Major sources of information are indicated, and reference is made to 71 recent research articles (up to 1965). There is no index, and the book is clearly not intended as a work of reference. Some unevenness of style inevitable in a work by three authors is obvious, and it is unfortunate that most of the obscure expression which the translator has not eliminated occurs in the earlier chapters. The section on the botany of the palm is least successful and suggests how well the industry would be served by a modern and detailed account of the development and physiology of the coconut. The later chapters, particularly those on coconut-oil technology, are lucid and informative to the nonexpert. To anyone wishing for a good introduction to this major tropical crop this book can be recommended.

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