significance become the basis for a universal doctrine within a sentence or two. The reader should accept these foibles as necessary ingredients of the creative process and assign to himself the task of evaluation. In any event, an interested reader has little choice because very few texts in physiology and endocrinology provide an acceptable coverage of this important topic.

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Reproductive Biology

Physiology and Genetics of Reproduction. Proceedings of a symposium, Salvador, Brazil, Dec. 1973. ELSIMAR M. COUTINHO and FRITZ FUCHS, Eds. Two volumes. Part A. xxii, 418 pp., illus. $32.50. Part B. x, 454 pp., illus. $32.50. Plenum, New York, 1974. Basic Life Sciences, vols. 4A and 4B.

The tone of this publication is admirably set in the introductory paper by R. V. Short, who notes that "we must have a glimpse into the future to see whether our existing biological mechanisms are compatible with the reproductive restraints that we shall be increasingly forced to impose on ourselves." The two-volume work proceeds to examine these biological mechanisms in 54 brief, informative papers, many including comprehensive tables of data and relevant commentary by outstanding experts. Each paper has a useful summary and an excellent bibliography.

The principal emphasis of the papers is on the physiological aspects of reproduction, but a dozen or so transmit relevant concepts of basic and applied genetics. Of particular note are the lucid discussion of the structure of mammalian chromosomes by D. E. Comings, the ultrastructural analysis of rRNA (ribosomal RNA) genes and RNA synthesis on lampbrush chromosomes of amphibian oocytes and other cells by O. L. Miller, Jr., *et al.*, the quantitative electron microscopic analysis of ribosomal populations in mouse oocytes as related to nucleic acid and protein synthesis in oogenesis by R. B. Garcia *et al.*, and the analysis of DNA polymerase and oocyte enzymes in fertilization in lower forms by B. De Petrocellis *et al.* Comings details evidence, his own and that of others, concerning the idea that essential genes are relatively rich in glycine and cysteine and well methylated. The contributions of the types of heterochromatin and of proteins, especially nonhistone proteins, to chromosome banding patterns are analyzed. The arguments presented on this controversial and unsettled matter are as cogent now as they were at the time of the symposium. Miller's and De Petrocellis's papers point up the fact that progress in the analysis of genetic activity in oocytes is still very much confined to lower forms. Although some papers, such as Garcia's, have appeared that give important evidence concerning the possibility of gene amplification, the synthesis of RNA or protein prior to or during the progression from diakinesis to second metaphase, and the timing of bursts of DNA synthesis in mammalian oogenesis, the story is obviously far from complete. The relevance of such data to problems of contraception and mutation in the mammal is obvious. The controversy concerning the effects of androgen on the survival of mammalian female germ cells is well analyzed by M. F. Lyon in a discussion of the sex determination system in mammals. A wealth of well-documented information on human chromosomal errors and reproductive failure is presented from their particular perspectives by K. Benirschke in chapter 6 (part A), and by A. and J. Boué in chapter 48 (part B), each annotating the data with pertinent constraints concerning the significance of some published reports. Substantive basic arguments for explaining some of the phenomena summarized by these authors are made by R. A. Beatty in the section on genetic aspects of spermatozoa, where he documents experiments on the diploidy of human spermatozoa and the question of digyny. Evidence from embryogenesis in mutant mice, in which early fetal wastage often occurs, is clearly and imaginatively presented by A. McLaren.

Among the many papers on reproductive physiology is E.-E. Baulieu's lucid account of his views on the "forward approach" to the study of the mechanism of steroid hormone action. In this rapidly changing field evidence has been published by other authors since this symposium that does not entirely support some of the proposed ideas, but a strong case for many of the described features can still be made. The need for a suitable infrahuman primate model for human reproduction is exemplified by N. Hagino's paper on the baboon. Although detailed data on steroid and gonadotropin levels and interactions and on the physiology of menstruation, ovulation, and luteinization in other species are available, it is the application of such information to the production of these rapidly disappearing animals that is beginning to emerge at the top of many priority lists. The ancient, provocative problem of specificity in fertilization of mammals is updated by C. E. Adams. The marked differences in the success of reciprocal crosses, for example between goat and sheep, is discussed and data from experiments in vitro and in vivo are reviewed. The critical role of the zona pellucida and the vitelline membrane in many species emerges very clearly. The contractility behavior of the human fallopian tube is analyzed in a practical manner by H. Maia *et al.*, by comparison with findings in rabbit oviduct, and the variable responses at different times of the menstrual cycle are recorded. G. C. Liggins contributes an appropriate final chapter, a presentation of the apparently critical role of prostaglandin $F_{2\alpha}$ in parturition in sheep and its potential relevance to human birth mechanisms. This unfinished narrative has been developed considerably since this meeting by the work of McDonald and others. This year may see its final resolution.

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Genetic Data

Handbook of Genetics. ROBERT C. KING, Ed. Vol. 1, Bacteria, Bacteriophages, and Fungi. xvi, 676 pp., illus. $37.50. Vol. 2, Plants, Plant Viruses, and Protists. xii, 632 pp., illus. $35. Plenum, New York, 1974.

The linkage map is the heart of genetics in any organism. It is the representation of the functional units (genes) as they are arranged on the chromosomes. Linkage tests can resolve individual nucleotides as well as order genes over millimeter lengths of DNA. Every geneticist adds information to the map, which thus represents the aggregate effort of many workers over many years. Good maps do not become obsolete, only more complete.

If a geneticist is fortunate enough to be working with an organism like *Escherichia coli*, *Salmonella typhimurium*, *Saccharomyces cerevisiae*, or *Drosophila melanogaster*, the map adorning his wall will be the same as that used by all his colleagues because of the energy and effort of scientists (Taylor, Sanderson, Mortimer and Hawthorne, and Lindsley and Grell, respectively) who have undertaken the thankless task of compiling and publishing comprehensive genetic maps.

There are relatively few organisms about which enough genetic information exists to make an attempt to compile a comprehensive map worthwhile. Even among these genetically tractable species, only a small proportion have generally agreed-upon maps, and one often must wade through a swamp of unconnected literature in order to find linkage relation-

ships for each gene of interest. Furthermore, it usually turns out that the gene of interest is flanked by markers having designations like *zwf, gnd, cdx, sex, cdc, ubi, bdx* (or simply *ts*), making another foray into the library necessary in order to find out what these things mean. It was therefore a splendid idea to publish a handbook that would collect in one place genetic information for a variety of organisms.

The first thing one would expect in a *Handbook of Genetics* is the latest comprehensive maps together with complete tables of gene designations, their meanings, and references to the literature concerning their functions. One would further expect that such a handbook would include every organism for which a substantial linkage map has been constructed. The volumes under review (covering bacteria, bacteriophages, fungi, plants, plant viruses, and protists) unfortunately fall seriously short of the goal, but they still may help fill an important need.

Indeed, several of the articles in these volumes (those on *E. coli*; bacteriophages λ, T4, and φX174; the tryptophan operon of *E. coli*; and the histidine operon of *S. typhimurium*) contain only a map and a marker list. If all the articles had been of this type, we would have been satisfied; the handbook would have been short and universally accepted, like the *Handbook of Chemistry and Physics*. It should be noted, since accuracy is important, that a major error exists in the map of the histidine operon—genes I and E are deleted and genes A and F are duplicated.

A second set of articles includes the essential elements (map and list) and in addition contains more elaborate descriptions of relevant material (mutant isolation, media, storage methods, mapping techniques, dominance and complementation tests, life cycles, and so forth). In most of these cases the additional material is well chosen and illuminating; occasionally, however, it is voluminous, speculative, or distracting—out of place in a "handbook."

Unfortunately, a third set of articles (those on *Salmonella*, *Sordaria*, *Neurospora*, *Coprinus*, cotton, *Arabidopsis*, *Nicotiana*, *Anthirhinum*, and *Collinsia*) deals only with peripheral matters and does not even contain maps, let alone marker lists.

Worse yet, many organisms of genetic importance are omitted completely: for instance, in volume 1, the *E. coli* bacteriophages T5, T7, P1, P2; all the *Bacillus subtilis* bacteriophages; and the *Salmonella* phages P22 and ϵ^{34}. Additional fine structure maps of the *r*II genes of T4, the *arom* and *leu* systems in *Neurospora*, and the *cyc*-1 and *his*-4 genes in yeast would also have been welcome.

Finally, there is a set of miscellaneous articles containing such things as elegant and thorough reviews of years of research (Sonneborn on *Paramecium*), brief sketches of current thinking (Campbell reminds us about episomes and Sanders simplifies the lactose operon), and speculation (Margulies on evolution). These are sometimes beautiful and valuable to specialists, but they are not material for a "handbook."

These volumes may be useful, but they are far from ideal. They contain both more and less than they should, and thereby turn out to be expensive and wasteful compared to what could have been accomplished with better editing.

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Nutritional Deficiencies

Protein-Calorie Malnutrition. Papers from a symposium, Chiang Mai, Thailand, Jan. 1973. ROBERT E. OLSON, Ed. Academic Press, New York, 1975. xxvi, 468 pp., illus. $29.50. Nutrition Foundation Monograph Series.

All aspects of protein-calorie malnutrition (PCM) are considered in this book, from biochemical responses to epidemiology and prevention. Considerable attention is given to the controversy regarding the relative importance of protein and calories in the pathogenesis and treatment of this disease, but not to the exclusion of information on the specific vitamin and mineral deficiencies associated with it in certain parts of the world.

With respect to the protein-versus-calorie controversy, it is apparent from this book that the widely accepted view of the '50's and '60's that the lack of high-quality protein intake is the primary culprit in PCM has given way to the idea that insufficient caloric intake is a major cause of the syndrome, although it would appear that there are now sufficient data available to refute any assertion that inadequate protein intake plays no part. The significance of the change in perspective lies with the conclusion it leads to: that the utilization of the diets and foods already available in most communities in a more effective way is quite a feasible approach to preventing PCM.

After reading a couple of chapters in this book the reader may feel overwhelmed by the complexity of the factors involved in PCM. However, other chapters suggest that certain components of this syndrome may be specific to just one part of the world. For example, O. Thanangkul in his discussion of vitamin deficiencies in PCM indicates that deficiencies of one B vitamin may occur in PCM patients in one part of the world and not in patients in another. Also, the manifestations of protein deficiency in the mouth, skin, and gastrointestinal tract may overshadow the effects of deficiencies in B-complex vitamins. Thus, the clinical signs of PCM relative to vitamin-deficiency diseases are often deceptive. Since most studies show that children with PCM have lowered stores of water-soluble vitamins, it is suggested that these vitamins be administered during recovery from PCM. The same approach might also be taken with many minerals. H. H. Sanstead indicates that the metabolism of copper, zinc, chromium, and selenium is affected in PCM and that it is just a matter of time before some of the other trace elements are shown to be involved.

The discussions of the role of fat-soluble vitamins, endocrines, infection, and other factors in PCM make it clear that a complete understanding of this syndrome must await the elucidation of the role of many essential nutrients and the response of the child to a wide variety of nutritional deficiencies in many different environments.

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Books Received

Advance of Phycology in Japan. Jun Tokida and Hiroyuki Hirose, Eds. Junk, The Hague, 1975. 356 pp., illus. Dfl. 80.

Agnogenic Myeloid Metaplasia. Murray N. Silverstein. Publishing Sciences Group, Acton, Mass., 1975. viii, 126 pp., illus. $20.

Anatomy. A Regional Atlas of the Human Body. Carmine D. Clemente. Lea and Febiger, Philadelphia, 1975. viii, 322 pp. $24.50.

Astrophysical Formulae. A Compendium for the Physicist and Astrophysicist. Kenneth R. Lang. Springer-Verlag, New York, 1974. xxviii, 738 pp. $78.80.

Behavioral Research Methods in Environmental Design. William Michelson, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1975 (distributor, Halsted [Wiley], New York). x, 308 pp., illus. Cloth, $25; paper, $12.50. Community Development Series, 8.

Biochemistry of Human Cancer. Oscar Bodansky. Academic Press, New York, 1975. xiv, 658 pp., illus. $39.50.

Biology. A Contemporary View. Thomas A. Steyaert. McGraw-Hill, New York, 1975. xii, 500 pp. + plates. $11.95.

Bridge Deck Analysis. A. R. Cusens and R. P.

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