

The occurrence of these conditions is not associated with socioeconomic status, however, and the numbers affected are too small to contribute to the prediction of variance in IQ in the population. In any event, prospective studies of unstratified populations are usually not the method of choice for studying these conditions.

There is much more of interest in this book, although the presentation is disciplined to a fault, so that the broader implications of the findings are seldom broached. There is also much more in the CPP that remains unreported and demands study. No single analysis of these important topics, even of monograph length, can satisfy all readers or meet the needs of all investigators. Some might ask, for instance, for analyses that merge the data on black and white children and do not keep them separate throughout, as was done here. One effect of merging might be to heighten the proportion of variance in IQ accounted for by social status and maternal education. Would such a result be nearer or further from the truth? Some might prefer to consider systematically the contribution of the predictors to various outcomes taken in sequence, for example, newborn infant dimensions, 8-month-old Bayley scores, and so on. There is considerable interest, too, in anthropometric measures as outcomes. Clearly even a volume as thoroughly executed as this one cannot do justice to this rich data source.

Since no one in his senses would contemplate repeating the CPP, the scientific need for intensive exploration of this massive data set is compelling. A strong case can be made for setting up the materials as a public resource. The public interest stems from the vast federal expenditure on the CPP, from the multiple data sources and contributors, and from the probability that many of the data will be left fallow or incompletely used if they are not made available. The tapes ought now to be made readily accessible to researchers and their use encouraged. A mine the CPP certainly has proved to be, and it deserves to be fully exploited.

ZENA STEIN

*Epidemiology of Mental Retardation
Research Unit, Psychiatric Institute,
Columbia University, New York City*

References

1. E. Werner, J. M. Bierman, F. E. French, K. Simonian, A. Connor, R. S. Smith, M. Campbell, *Pediatrics* 42, No. 1, 112 (1968); C. M. Drillien, "Complications of pregnancy and delivery," in *Mental Retardation*, I. J. Wortis, Ed. (Grune and Stratton, New York, 1969), p. 280; R. G. Record, T. McKeown, J. H. Edwards, *Ann. Hum. Genet. Lond.* 33, 71 (1969); R. Davie, N. Butler, H. Goldstein, *From Birth to 7: Studies in Child Development* (British Book Centre, New York, 1972); G. Neligan, D. Prudham, H. Steiner, *The Formative Years: Birth, Families and Development in Newcastle-upon-Tyne* (Oxford Univ. Press, New York, 1974).

Muscle Research

Exploratory Concepts in Muscular Dystrophy II. Control Mechanisms in Development and Function of Muscle and Their Relationship to Muscular Dystrophy and Related Neuromuscular Diseases. Proceedings of a conference, Carefree, Ariz., Oct. 1973. A. T. MILHORAT, Ed. Excerpta Medica, Amsterdam, and Elsevier, New York, 1974. xviii, 664 pp., illus. \$51.95.

In 1973 the Muscular Dystrophy Associations of America, with the Italian National Research Council, sponsored an international research meeting. The resulting volume is testimony to the good works of this voluntary organization. With the arrested and uncertain growth of the National Institutes of Health, it has become a major force in supporting muscle research that has wide ramifications.

The volume contains 52 papers, which encompass the field. From the variety of investigations reported several trends can be discerned:

1) Muscle cell culture has come to occupy a central position in studies of membrane specialization, such as development of acetylcholine receptors (Fambrough and Devreotes) or surface alterations that prepare for the fusion of myoblasts to form myotubes (Bischoff and Lowe), and of nerve-muscle interaction (Steinbach and Heinemann).

2) Structural differences of the contractile proteins from different sources (Adelstein and Conti; Adelman; Perry) and factors controlling the synthesis of these proteins (Schubert and Tarikas; Sarkar; Morkin; Morales *et al.*) are being identified.

3) The interactions between these proteins (Ebashi *et al.*; Bárány *et al.*) have become linked to phosphorylation, influenced by calcium and protein kinase (Krebs *et al.*) as well as sarcoplasmic reticulum (Margreth *et al.*).

4) The relative importance of neural control and activity patterns of muscle in determining the physiological and biochemical characteristics of individual muscles (Buller; Close; Mommaerts; Schiaffino *et al.*; Robbins; Sréter *et al.*; Romanul *et al.*) continues to be a major unsolved problem.

5) New ultrastructural techniques, including freeze-fracture (Rash *et al.*), scanning electron microscopy (Shimada and Fischman), and quantitative morphometry (Eisenberg), are beginning to be applied to the study of muscle membranes.

6) At this meeting, the emphasis was on basic science. Only a few papers are directly concerned with dystrophies, and more of these are concerned with mouse

and chicken than with the human diseases. Times seem to be changing, however. Human sarcolemma is beginning to be studied in dystrophic muscle (Peter *et al.*); mitochondrial biochemistry has been applied to human disease (DiMauro *et al.*); disorders of carnitine metabolism cause different syndromes in man (Engel *et al.*; DiMauro *et al.*); diseased human muscle can be grown in culture (Askanas); and the neurogenic theory of the dystrophies (McComas *et al.*) is challenged (Buchthal *et al.*; Desmedt and Borenstein).

The accelerating attention to muscle augurs well for the future solutions of important problems, and this volume amply records the present state of affairs.

LEWIS P. ROWLAND

*Department of Neurology,
College of Physicians and Surgeons,
Columbia University, New York City*

Vitamin B₂

Riboflavin. RICHARD S. RIVLIN, Ed. Plenum, New York, 1975. xiv, 434 pp., illus. \$46.90.

This volume is a collection of 12 review articles designed to "represent an interdisciplinary approach to an understanding of the chemistry, physiology, and medical significance of the vitamin riboflavin." However, I found the focus to be almost exclusively on physiology and medical significance. Only the introductory chapter by Weimar and Neims deals with any of the chemical properties of flavins that are relevant to their biological function. This chapter is worth reading and presents a sensible although telescoped set of comments on spectroscopic properties of the isoalloxazine system, followed by a section on binding of flavin coenzymes to apoproteins and two or three pages on riboflavin synthesis. Only a single paragraph is allotted to how flavin coenzymes function. This strikes me as a major defect.

Chapters 2 and 3 deal with methods for flavin analyses in tissues. They could easily be omitted from the volume, since they provide technical information only and the methods have been reviewed recently in *Methods in Enzymology*. Replacing them with a full chapter on flavin chemistry including dark reactions and susceptibility to nucleophilic attack or electrophilic attack depending on oxidation state would have been a service. A chapter on the types of enzymatic reactions that require flavins as obligate coenzymes could then also have been inserted.

Such chapters would have provided a molecular basis for the evaluation of sub-

sequent chapters dealing with nutritional intake, absorption and excretion, and riboflavin deficiency syndromes. Currently, these chapters strike me as a compendium of phenomenological observations without rational conclusions. This reflects the state of the science.

The chapter by Lambooy on biological activity of analogs of riboflavin and that by McCormick on riboflavin metabolism may be of interest to pharmacologists and medicinal chemists. Although the literature references in some chapters are as recent as 1974, no mention is made of either roseoflavins, 6- and 8-hydroxyflavins, or 5-deazaflavins as analogs of biological interest.

The concluding chapter by Rivlin on the medical significance of riboflavin and cancer and on hormonal regulation of riboflavin metabolism may be the most stimulating and tantalizing to life scientists. They serve the function of indicating problems of medical interest where much of the basic research knowledge is still lacking. These include transport of the vitamin in plasma and across cellular membranes, regulation of enzymes of flavin metabolism by adrenocorticotrophic hormone and thyroid hormone, and adaptation of flavin adenine dinucleotide synthetase in hepatomas.

It is likely that this volume is of more direct interest to medical and clinical researchers than to biochemists or enzymologists, yet the latter groups will find it worth perusal also because the material is not usually reviewed in biochemical publications.

CHRISTOPHER WALSH

*Departments of Chemistry and Biology,
Massachusetts Institute of Technology,
Cambridge*

Genetics of Fungi

Mycogenetics. An Introduction to the General Genetics of Fungi. J. H. BURNETT. Wiley, New York, 1975. xiv, 376 pp., illus. \$34.

Fungi have had considerable, but quite selective, attention from biologists for many years. A mycologist will concentrate on taxonomy; a molecular biologist on mitochondrial DNA or enzyme aggregates; a geneticist on gene conversion and tetrad analysis; an industrial researcher on mushroom, beer, penicillin, or citric acid production; and an agriculturalist on rusts, smuts, and other pathogens. Few workers in any of these fields can know much about the other specialties, largely because of the variety of intellectual traditions involved.

Yet one phenomenon that bedevils or intrigues almost all workers is the variability and diversity of fungi. Usually fungal variation is mastered or exploited in narrow ways appropriate to a given situation. But by now fungal biology is advanced enough to support sophisticated population and evolutionary studies. Fungi offer enough unusual genetic mechanisms, such as mitotic recombination, heterokaryosis, and non-Mendelian systems, to suggest that unique modes of evolution might be discovered. Many phenomena in quantitative genetics, pathogenesis, mating type systems, and isolating mechanisms are waiting to be fully rationalized in terms of these unusual genetic mechanisms. The book under review is an initial and largely successful attempt to do this. In the course of it, mycological phenomena are brought to the attention of geneticists, and experimental mycologists are invited to consider their world in genetic terms.

The first major section of the book is an introduction to mutagenesis, formal genetics, and the unusual features of the genetic system of fungi referred to above. Unfortunately, the author is forced to be quite telegraphic when dealing with well-known aspects of these subjects, and the use of algebraic discourse, which is almost wholly dispensable to an intuitive understanding, makes these aspects even more daunting for a naive reader. Also, many phenomena, such as complementation or temperature-sensitivity of mutants, are described initially without reference to physiological or molecular mechanisms, which gives the appearance of superficiality. The unique genetics of fungi is treated more amply, however, with well-chosen examples and references. The second major section of the book, on fungal population genetics, demonstrates through examples of work on mutation, mating systems, natural and experimental selection, and isolating mechanisms, that a sophisticated population genetics of fungi is well within our grasp. While speculation is limited, the author points clearly to problems, such as the sympatric origin of species, deserving of solid genetic work. A final section integrates some of the themes of the previous two in a discussion of the applications of mycogenetics. These include descriptions of improvements in penicillin yield, the analysis of virulence and aggressiveness of plant pathogens, and the analysis of recombination mechanisms and gene action. But for the last two topics, the section is a very successful reinforcement of the preceding material. Throughout, the prose is simple and the illustrative tables and figures, taken from the original literature, are informative.

Mycogenetics is highly recommended to biologists conversant with genetics who wish to explore this field. One might hope, with Burnett, that the book will stimulate a more intensive study of the population biology of fungi.

ROWLAND H. DAVIS

*School of Biological Sciences,
University of California, Irvine*

Northern Ungulates

Alces. Moose Ecology. Ecologie de l'Orignal. Papers from a symposium, Quebec City, Mar. 1973. J. BÉDARD, E. S. TELFER, M. L. WOLFE, J. PEEK, D. W. SIMKIN, P. C. LENT, and R. W. RITCEY, Eds. Presses de l'Université Laval, Quebec, 1975 (U.S. distributor, International Scholarly Book Services, Portland, Ore.). x, 742 pp., illus. Paper, \$27.50. *Le Naturaliste Canadien*, vol. 101 (1974).

This publication consists of papers that were presented at an international symposium on moose ecology. Of the 42 papers, four are from workers in the U.S.S.R. and four from Scandinavian biologists. With one exception the papers are in English. All the major workers in the field have contributed, and with few exceptions the papers meet a high standard. As a result the volume is a complete and up-to-date summary of all aspects of moose ecology under current investigation, and it will be essential reading for all those who are interested in game biology and wildlife management.

The volume is made up of six sections. There are eight papers on habitat distribution over almost the entire range of the species. It is difficult to compare these papers because of the lack of standardization of the information presented. It is remarkable to find such a large list of environmental factors being considered responsible for regulating the distribution of moose. The factors appear to vary not so much with the geographical distribution of the moose as with the state or provincial boundaries involved.

Of the five papers on nutrition, three are good reviews of food habits, energy requirements, and blood chemistry. In the first, the author comments also on the lack of standardized data collection systems. The paper on blood chemistry is an outstanding contribution in its clarity and as a data source. Emphasis is placed on the role of stress in the handling of large ungulates and subsequent effects on blood parameter values.

The next two sections consider inter-