Dill's early co-workers as well as more recent authorities. The book is broad in scope, containing theoretical discussions of the concepts of adaptation as well as accounts of adaptations within systems and their interrelations, and including a section dealing with psychophysiological problems at altitude and the similarity of symptoms of mountain sickness and senescence. Each chapter is complete in itself so that it can be read without reference to others.

For the most part, the book is devoted to the physiological response of man to heat, exercise, and altitude. Indeed, the two chapters on large and small mammals in the desert seem almost out of place. The brevity of this treatment is not inappropriate, however, because desert animals have been reviewed in several recent books.

The chapter "Vertebrates at altitudes" by the late R. W. Bullard provides very interesting and stimulating reading, particularly for comparative physiologists. Its major thesis is that adaptations of species native to high altitudes are different from those of their sea level relatives acclimatized to altitude. One of the major features of acclimatization to altitude in sea level species is increased red blood cell production and an increase in the oxygen-carrying capacity of the blood. For example, in men exposed to altitudes of 5300 meters for long periods of time there may be a 30 percent increase in the oxygen capacity of the blood. A survey of isolated highland species revealed no unusually high hematocrit. In fact, llamas at sea level had higher O_2 capacities than llamas at 5340 meters. The affinity of hemoglobin for oxygen is critically important in the transport of oxygen from environment to tissues. The discovery that 2,3-diphosphoglycerate (DPG) and other organic phosphates reduce the affinity of hemoglobin for oxygen has precipitated a search for an adaptive role of such compounds in controlling the release of oxygen from hemoglobin to tissues. When man, rat, and domestic guinea pig are exposed to high altitude the concentration of DPG in red blood cells increases. The increase in DPG (which shifts the O_2-hemoglobin dissociation curve to the right) along with the increase in oxygen capacity results in an increase in O_2 delivery to the tissues and has been considered an adaptation to altitude. Bullard has pointed out again that native high-altitude species have dissociation curves to the left of those of sea level residents. Furthermore, most high-altitude mammals have blood which contains no DPG or hemoglobin which binds weakly, if at all, with DPG. It is suggested that those species that are most successful at high altitudes have become so without the perceived benefits of DPG and increased oxygen capacity. The chapter concludes with the demonstration that isolated tissues from ground squirrels native to 5800 meters have a greater capacity for anaerobic glycolysis than those from rats acclimatized to the same altitude, implying that evolutionary adaptation occurred primarily at the tissue level and resulted in the ability to maintain function at low tissue pO_2. The factors that permit the maintenance of cellular function at low pO_2 are yet to be resolved.

From a comparative viewpoint I found this chapter particularly stimulating. Readers of a different inclination will surely also find interesting reading and provocative speculations among the contents of this book.

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Human Development

Developmental Physiology and Aging. P. S. TIMIRAS. Macmillan, New York, and Collier-Macmillan, London, 1972. xii, 692 pp., illus. $19.95.

Developmental Physiology and Aging is a textbook concerned with the physiological changes that occur during the human life-span. The book is in two parts. Part 1 covers events taking place from the time of fertilization to adulthood, and part 2 those of the adult years and senescence. The section on aging constitutes about one-third of the text. Seven of the 31 chapters were written by or with the aid of collaborators. What the author considers optional reading has been set in smaller type, and there is a good deal of such material. The author is most interested in neurophysiology and endocrinology. However, she does not hesitate to include anatomical and biochemical information when appropriate. The references at the end of each chapter are a valuable feature of the book. They seem carefully selected and complete titles are given.

The quality of the chapters is uneven. The book is strongest in the areas of Timiras's expertise, where she can make interpretations and criticisms. It is not particularly original in areas such as biochemistry, although an effort is made to compile relevant information. It is weak in some areas, for example, the immunology of aging. The author is not particularly concerned with microscopic anatomy or the finer details of the anatomy of the nervous system. In spite of its size this is therefore somewhat a personal book. It reflects Timiras's interests and skills and her approach to teaching. Whether or not it is used in a course on developmental physiology and aging will depend on the approach of the teacher. To some it will be a valuable book, to others with particular interests in pathology or biochemistry it will prove rather disappointing. Reading the book straight through will require effort. The book is attractive physically, with appropriate tables, figures, and photographs. The idea of treating development and aging in the same volume is carried off rather well. This reviewer is not an enthusiast for the approach that regards senescence as analogous to embryonic development. This issue is handled with restraint, and the ability to refer backward and forward between the two sections of the book seems a valuable feature. A good index helps.

The book will seem rather advanced to most undergraduates, because of its encyclopedic coverage, but it will disappoint many specialists when they seek out the chapters on their subjects. It will probably not prove to be the definitive book in this field, but on the other hand there is no comparable volume available. It would be a useful book for a small library. A behavioral scientist interested in learning something about the physiology of development and aging would find it helpful, as would a biochemist with a background deficient in this kind of physiology. For a graduate student trying to get it all together it might be very helpful. Timiras makes an honest effort to take a broad interdisciplinary approach and to tell what is known about some fundamental aspects of physiology from the viewpoint of different disciplines. Many of the shortcomings of the book derive from the magnitude of the task of writing something somewhere between a textbook and a definitive monograph on such a broad topic.

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