havior of fluoroacetate in animals and plants are reviewed, and efforts to demonstrate the conversion of fluoride to an organic form in several species of vegetation are summarized, as is evidence for an organofluorine compound in serum. The genesis of the characteristic toxic convulsion of these compounds is not yet fully understood. This problem is explored in detail and much evidence is offered in support of the hypothesis that the fluoroinhibitors act to alter the metabolism and membrane transport of cerebral mitochondria as a result of enzyme inhibition. Work on the effect of fluoroacetate on the rat liver is presented, showing that sometimes conflicting reports on the accumulation of hepatic citrate can be explained by the nutritional state of the animal. In the fed rat the tricarboxylic acid cycle is strongly dependent upon pyruvate and fluoroacetate is converted to fluorocitrate, whereas in the starved animal the cycle depends more on fatty acids and less of the inhibitory fluorocitrate is produced. Certainly a chemist or biologist would prefer to emphasize the papers dealing more directly with his specialty, but surely we would agree that all the papers included are of high quality. The volume is attractively put together and remarkably free of typographical errors. It is a tribute to editors Katherine Elliott and Joan Birch, and to P. W. Kent, who assisted them.

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Developmental Process

Oogenesis. Proceedings of a symposium, Baltimore, Oct. 1970. JOHN D. BIGGERS and ALLEN W. SCHUETZ, Eds. University Park Press, Baltimore, and Butterworths, London, 1972. xii, 544 pp., illus. $19.50.

Mature ova are among the most massive and are possibly the most complex of all living cells. They are apparent contradictions of extreme specialization and complete totipotency. The developing oocyte, within its ovarian sanctuary, has long resisted the experimental manipulations of those bent upon learning secrets of its differentiation and growth. Recent observations on this developmental process are the subject of this volume, an offshoot of a symposium.

The book strongly reflects the editors' own research inclinations in that fully half of the 26 articles by 33 contributors deal only with mammalian oogenesis. Four of these, by Anderson, Calarco, Szollosi, and Zamboni, deal with various ultrastructural aspects of oocyte differentiation, growth, and meiosis. Biggers describes metabolism in early mouse embryos and draws inferences regarding oocyte metabolism. Beatty reviews evidence on parthenogenesis and summarizes known forms of heteroploidy, and Pederson presents data on kinetics of follicle growth. The remaining six mammal-oriented articles deal with various aspects of oogenesis as studied in vitro. These include observations on cultured primordial germ cells and ovarian material by Blandau and Odor, experiments on hormonal control and cellular interactions in meiotic maturation and ovulation by Baker and Neal, Thibault, Donahue, and Kennedy, and finally a description of ingenious experiments on induction of luteinization by Nalbandov.

Nine of the 12 nonmammalian articles deal exclusively with amphibians. Huang presents a concise review of eukaryotic chromosomal proteins, Miller reviews his electron microscopic observations on isolated nucleolar genes and lampbrush chromosomes, and Dawid comments on oocyte cytoplasmic DNA. King summarizes *Drosophila* mutations affecting oogenesis, and Blackler describes transfer of primordial germ cells between species of *Xenopus* to determine the effect of ovarian genotype upon oocyte phenotype. Crippa and Tocchini-Valentini, Ford, and Davidson discuss transcription, Smith demonstrates protein synthesis during maturation, and Wallace elegantly summarizes his work on vitellogenesis. Finally Kanatani and Schuetz describe hormonal regulation of maturation in starfish and amphibians, respectively.

The articles vary considerably in breadth and depth of coverage and in the proportion of new data. Some readers may regret the almost complete exclusion of invertebrate studies, although these were covered in Raven's 1961 volume of the same title. The texts have been professionally indexed and carefully edited, and there are few significant errors. Illustrations are frequent and of good quality. The result is a summary of the current status of many problems in oogenesis which will be of considerable value to investigators and advanced students of reproduction.

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Exercise Physiology

Energy Metabolism of Human Muscle. J. KEUL, E. DOLL, and D. KEPPLER. Translated from the German edition (Munich, 1969) by J. S. Skinner. University Park Press, Baltimore, 1972. xii, 314 pp., illus. $22.50. Medicine and Sport, vol. 7.

This is essentially an expanded and partially updated translation of the work *Muskelstoffwechsel: Die Energiebereitstellung im Skelettmuskel als Grundlage seiner Funktion.* Unlike many of the earlier volumes in the series Medicine and Sport, which have usually been proceedings of symposia or seminars, this one is written as a unity by the three authors, with some collaboration with G. Haralambie. This plan is an improvement on that of the earlier volumes and, with over 1000 references, this is the best available recent book on its topic.

The German title was more accurate, for coverage is by no means limited to energy metabolism. There are good discussions of "white" and "red" muscle, energy stores, anaerobic and aerobic energy supplies, the effects of hypoxia, and adaptation of the energy supply to physical activity. Most of the basic biochemistry and much of the basic physiology presented comes originally from work on muscles of frogs, rats, rabbits, guinea pigs, and pigeons. The authors have presented results from human muscle wherever possible, but in most cases the equivalent information just is not available for human muscle. The authors have, however, gathered together results on untrained and trained athletes that should be of great interest to a wide range of readers.

The Olympic games at Mexico City at an altitude of 2250 meters made possible a large-scale investigation of the performance of athletes under mildly hypoxic conditions. Many of the findings are presented here together with recent advances in training designed to increase speed, strength, or endurance.

It is remarkable that training regimes can be so selective. Strength training can increase the number of myofibrils and the muscle mass; speed training the amount of glycolytic enzymes; endurance training the oxidative capacity, the number of mitochondria, the amount of glycogen in the muscle, and the effectiveness of the cardiovascular system. Behind all there are improvements in neuromuscular coordination which reduce wasted work.

A virtue of the book is that it makes readily available much work on exercise physiology that was published only in German and has thus been neglected by many American and British scientists; a drawback is that in many areas it is three or four years out of date. Despite this it should be on the bookshelves of all who care about how muscles work.

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(Continued on page 309)