membrane of rabbit colon. The sodium current-voltage relationship was determined, and the possibilities of a channel or a carrier accounting for the sodium uniport are lucidly discussed.

The heterogeneity of epithelial transport functions and the large number of tissues under current investigation make it impossible to cover the field in a single volume, as do the number of biophysical and biochemical approaches to the study of these complicated tissues. Hence, it is probably not entirely fair to criticize the choice of topics, but I could not help missing discussions of important recent developments, such as transport studies in isolated membrane vesicles and noise analysis techniques applied to both tight and leaky epithelia.

The section on cell-volume regulation, although interesting by itself, does not fit clearly in the volume. Since these papers were not restricted to the subject of cell-volume regulation in epithelia, it might have been appropriate to include one or more papers on the interesting recent results obtained in red blood cells.

In summary, this is a useful, timely volume. I recommend it highly to both established workers and newcomers to the field.

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The Chromosomes of Insects

Insect Cytogenetics. Papers from a symposium, London, Sept. 1979. R. L. BLACKMAN, G. M. HEWITT, and M. ASHBURNER, Eds. Published for the Royal Entomological Society by Blackwell Scientific, Oxford, 1981 (U.S. distributor, Halsted [Wiley], New York). viii, 278 pp., illus. $69.95. Symposia of the Royal Entomological Society of London, No. 10.

The insects show more chromosomal diversity than any other class of animals. This diversity is manifested in the range of the number of chromosomes and amount of nuclear DNA, the variety of chromosomal sex-determining systems, and the multiplicity of chromosomal forms. It is also reflected in the enormous amount of research carried out on insect chromosomes. This book is a collection of 15 papers that cover the breadth of studies on insect cytogenetics. The papers are grouped into sections on genome organization, chromosome structure and function, breeding systems, ecology and speciation, and the cytogenetics of pest insects. The contributors are of the first rank of insect cytogeneticists, and this is reflected in the overall high quality of the papers.

The papers concentrate on two topics, the organization of DNA within insect chromosomes and evolutionary cytogenetics. The treatment of the first of these comprises five papers. Peacock and Lohe review with remarkable brevity the literature on repeated sequences in *Drosophila* chromosomes. The subject has been studied extensively, and this paper furnishes the reader with a nearly complete introduction that is direct and readable. Peacock and Lohe are willing to speculate on the functions of repeated sequences and to interpret freely the evidence from a number of laboratories. Though this is one of the better papers, I mention it chiefly as an example of the general style of these five. They are comprehensive, are usually concise and current, and include general conclusions and speculation. Ashburner's review of the organization of polytene chromosomes demands special note. Despite the extensive research on the giant chromosomes of insects, many questions about their structure and their relationship to the interphase chromosomes of diploid cells remain unanswered. Ashburner has performed a valuable service in laying out these questions clearly, with extensive citation of the literature.

The material on evolutionary cytogenetics is presented as comprehensive research papers, each concentrating on a single species. Many of these papers address the issue of chromosomal changes and the isolation of species. Because of the nature of cytogenetic evidence, it is not surprising that the ideas presented about speciation have more to do with gross chromosomal mechanisms than with genetic polymorphism. This inherent bias notwithstanding, the evidence for population changes related to chromosome rearrangements is strong. Since subspecies of grasshoppers can be distinguished by their karyotypes, it is possible to study the origins and effects of hybrid zones between taxa. The papers by Hewitt and Barton and by Shaw, Moran, and Wilkinson demonstrate clearly that parapatric taxa can be isolated by hybrid inferiority without major geographical barriers. Though these authors indicate that chromosomal changes alone do not account for the observed heterozygote inferiority, it becomes clear that rare single events, such as chromosome fusions or inversions, can, under appropriate conditions, lead to genetic isolation.

Many of the other papers on chromosome systems in insects give an indication of the diversity of karyotype variations, many of which could lead to species isolation. Noteworthy examples are Nur's review of the difficult literature on coccid chromosome behavior, Rothfel's clever analysis of the natural occurrence of chromosome rearrangements in blackflies, and Carson's reconstruction of the recent evolutionary history of the picture-winged *Drosophila*.

It is apparent that the integration of molecular analysis into more classical cytogenetics has barely begun. This excellent volume, if read carefully, establishes many of the areas in which this hybridization is likely to occur.

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