orologists and often criticizes them on the basis of his own incomplete understanding. This tendency is particularly evident in the discussion of turbulence. Certain ideas on turbulent structure and turbulent dispersion are much more amenable to practical use in the atmosphere than he supposes.

Finally, many developments in the last 20 years that are relevant to the subjects Scorer discusses are not referred to in the book. Almost nothing is said about Briggs's work on plumes, which has proven valuable in practical pollution predictions. Neither does he refer to Deardorff, whose experiments and theoretical analysis of convective boundary layers have made the physics of this region tractable.

In spite of these faults, the book is a provocative treatise of certain atmospheric phenomena, and it should be of interest generally to physical scientists and engineers.

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Evolutionary Mechanisms

Endopolyploidy and Polyteny in Differentiation and Evolution. Towards an Understanding of Quantitative and Qualitative Variation of Nuclear DNA in Ontogeny and Phylogeny. WALTER NAGL. North-Holland, Amsterdam, 1978 (U.S. distributor, Elsevier, New York). xiv, 284 pp., illus. $54.50.

Chromosomes have evolved in higher cells as a successful mechanism to achieve two cellular functions: the precise passage of genetic information from generation to generation and the expression of this information during the cell's lifetime. Usually, chromosomes in somatic cells are identical with those in the germ line. However, there are numerous instances in which there are somatic variations in the chromosomes, usually as polyploidy, an increase in the number of copies of each chromosome within the nucleus, or as polyteny, an increase in the number of chromatids, and hence DNA strands, per chromosome.

Endopolyploidy and Polyteny in Differentiation and Evolution also appears to have two functions. The first is to assemble the information on the occurrence and functions of polyploid and polytene nuclei. The second is to bring this information together with our current understanding of chromosome organization to explain some aspects of speciation and cellular differentiation.

The current interest in molecular approaches has led many researchers away from much of the cytological literature. Nagl does a great service in his remarkably complete review of the cytology of polyploid and polytene nuclei. Much of the book concentrates on the varied processes that give rise to polyploidy and polyteny in animals, protists, and plants. Indeed, many of the better examples of polyploidization events are from plants, and considerable attention is paid to this often neglected branch of biology. Applications of polytene chromosome cytology, especially gene mapping, are outside the author's aim and so are omitted. A number of photographs are included, some of them very fine and some of them almost impossible to interpret.

The increase in DNA content by polyploidization or polytenization that occurs during differentiation is seen by Nagl as an analogy for changes in DNA that take place in evolution. He presents evidence that cells have an optimum DNA content that can be reached by either a somatic or a generative DNA increase. Further, nuclear DNA content is a phenotype subject to rather strong selective pressure. As the nuclear DNA content changes, so does the number of repeated DNA sequences. Because repeated DNA sequences are suspected to be involved in regulation of gene expression, Nagl concludes that a change in DNA content may result in alterations in the patterns of genetic activity. Thus, new species may arise abruptly as a consequence of a change in these regulatory patterns, independently of any major divergence of structural genes.

This scheme is certainly interesting, but its vagueness and reliance on broad assumptions limit its utility and testability. That some repeated DNA sequences are involved with genetic regulation seems quite likely, but most of the repeated DNA, especially the highly repeated or satellite DNA, probably is not. Unfortunately, Nagl fails to distinguish between the satellite DNA and those repeated sequences which are interspersed among structural genes. Another problem is that Nagl views phyletic evolution and speciation as distinct processes, each with its own causal mechanism. Thus phyletic evolution is the result of structural gene mutation, and speciation is the result of changes in control elements. There are certainly many instances of saltatory speciation that do not require substantial change in structural genes, but it is simplistic to expect to find any single process of speciation.

We are left with a very thorough review of chromosome structure and somatic DNA variability and a somewhat tenuous but interesting model of the effect of quantitative DNA change on evolution. As the title might indicate, the book is not easy reading. The short glossary is helpful, but a reader without a background in chromosome cytology will have slow going. Nevertheless, those interested in the diversity of nuclear organization may find the time well spent.

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