Book Review


This volume represents the proceedings of an international symposium honoring James V. Neel on the occasion of his official retirement in June 1985. In the first chapter, his long-time collaborator on the Atomic Bomb Casualty Commission studies, William J. Schull (Scientist, Journalist, Orchidist—Will the Real James V. Neel Please Stand Up), portrays the pioneering role that Neel played in the establishment of human genetics as a visible and viable discipline. He considers Neel's "preoccupation with the phenomenon of mutation" to be the thread that connects all of his research. It clearly underlies this book, which is divided into four sections that reflect interests of the honoree: "The Genetics of Populations" (L. L. Cavalli-Sforza and C. C. Li), "Evolutionary Problems Posed by the Structure of DNA" (D. J. Weatherall et al. and G. Felsenfeld et al.), "Mechanisms of Genetic Changes" (C. M. Radding, R. Holliday, and R. T. Schimke et al.), and "Evolution at the Molecular Level" (M. Goodman, M. Nei, W. M. Fitch, and D. L. Hartl).

Cavalli-Sforza ("Population Structure") stresses the importance of a dynamic approach to the study of populations and describes a "budding" model for the geographic expansion of hunter-gatherers that might represent the rapid occupation of America. Li ("Inbreeding and the Balance between Selection and Mutation") reviews two more areas of great interest to Neel and shows that whereas the recessive genotype frequency is independent, the recessive gene frequency is highly dependent on population structure.

Weatherall et al. ("The Relationship between the Common Mutations of the α Gene Cluster and Its Evolutionary History") provide a concise and highly readable review of the α-globins. They describe their studies of the molecular basis of the α-thalassemias and the value of this cluster for the study of the origins of human populations. Felsenfeld et al. ("Chromatin Structure near Transcriptionally Active Genes") describe their important studies on the regulation of the chicken βA-globin gene and suggest that cell-type-specific regulation of eukaryotic genes could be controlled by unique combinations of perhaps three or four regulatory proteins chosen from a total of ~100, thus avoiding the need for as many regulatory as regulated genes.

Radding ("Homologous Pairing and Strand Exchange Mediated by Rec A Nucleoprotein Filaments and Networks") emphasizes "the remarkable dual nature of recA protein" in promoting both the pairing of homologous single strands (renaturation) and the pairing of single-stranded DNA with duplex DNA (strand invasion). Holliday ("Gene Conversion") reviews the role that gene conversion may play in evolution, DNA repair, and the repair of epigenetic defects. Schimke et al. ("Over-replication of DNA and the Rapid Generation of Genomic Change") describe their view that "any cell perturbed during the process of DNA replication can overreplicate DNA," resulting in a "variety of chromosomal aberrations and rearrangements."

Goodman ("Molecular Evidence on the Ape Subfamily Homininae") reviews the molecular evidence supporting both the monophyletic Homo-Pan-Gorilla grouping and his hypothesis that mutations have been fixed at a lower rate in the Homo lineage than in Pan and Gorilla. Nei ("Stochastic Errors in DNA Evolution and Molecular Phylogeny") discusses how (a) the number of nucleotide sequence residues required to obtain the "correct" tree and (b) the effect of polymorphic alleles on constructing the "correct" tree are affected by phylogenetic tree topology and branch lengths. Fitch ("An Estimate of the Number of Invariable Sites Is Necessary for the Accurate Estimation of Number of Nucleotide Substitutions since a Common Ancestor") addresses
Kimura's assumption that all sites are variable by analyzing an 896-bp-segment mitochondrial DNA in five primates and two mammals after identification and removal of the invariant sites. Hartl ("Evolution and Tinkering: The Molecular Genetics of Bacterial Adaptation") concludes the book with a fine review of directed evolution in bacteria, discussing the important role of transposable elements.

The book is in camera-ready format, with considerable unevenness in the appearance of the contributions. It falls somewhere between being a tribute and an attempt to synthesize ideas from different areas. Nevertheless, readers should profit, as I did, from the juxtaposition of such interesting and diverse topics.

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