The adaptation path is well represented in the book, with chapters on responses to rise in sea level, future agricultural adaptations, Third World agriculture, possibilities presented by currently unmanaged forests, and water resource management. The work of those identifying specific impacts of climate change on various sectors of the economy is hampered, except for studies of rising sea level, by the present inability of the climate modelers to say very much about what will be the local or regional manifestation of the climate warming. In this volume, the authors of the adaptation chapters plow ahead despite this difficulty either by assuming that the relevant feature of the global projection is applicable to the region under discussion or by considering a wide range of possible impacts. These chapters are informative, provocative, and well worth reading. Especially noteworthy is the chapter on sea level written, not surprisingly, by a scientist from the Environment Ministry of the Netherlands.

Although the adaptation discussions suggest that adaptive steps will be very difficult and very expensive unless the rate of climate change is slowed, abatement processes are much less well represented in the book. Climate scientists, here and elsewhere, do not report any estimates of how large a decrease in the emissions of infrared-trapping gases would be required in order to slow the climate heating rate by some amount, and perhaps this fact discourages abatement studies. Only one chapter in the book discusses details of an abatement strategy, that of planting new forests to sequester carbon dioxide and so reduce the annual atmospheric increase. The authors of this chapter estimate the area and resources needed to create enough forests to absorb all of the yearly increase of atmospheric carbon dioxide, and both are very large. These numbers do not, I think, completely eliminate afforestation as a component of an approach to slowing climate change, only warn that it alone cannot do the job.

Beyond the discussion of forests, the only consideration of abatement is in a chapter on the use of an economic model to project future carbon dioxide emissions. Four hundred separate runs of this model were made to investigate the sensitivity of the projected emissions to 79 parameters governing how the model treated population, economic growth, energy conservation, the resource base of fossil fuels, and so on. The authors display the statistics of the 400 calculations—what fraction of the runs produced how much emission for various dates in the future. But they do not reveal the most policy-relevant result: which of the policy-sensitive parameters in the model have the greatest effect on emissions. The discussion that follows the description of the model leaves the impression that this omission was not accidental, that the authors regard any policy action—a carbon tax, for example, or government encouragement of improved energy efficiency—as economically suspect and not to be considered. Their stance is softened, however, in the final paragraph, in which they concede that, for consideration of climate change, "standard economic models, rooted within contemporary cultural norms and employing standard economic constructs and relationships, may provide insufficient perspective."

This book has an excellent degree of coordination among chapters. Authors argue with statements made in other chapters, for example, and several chapters summarize the whole meeting. I learned numerous facts from reading this volume. In addition, I brought away (or had reinforced) the message that the problem the world faces with the climate is very large and that business-as-usual will not suffice to avoid its trauma.

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Health Differentials

Minorities and Cancer. LOVELL A. JONES, Ed. Springer-Verlag, New York, 1989. xviii, 334 pp., illus. $59. From a symposium, Houston, TX, April 1987.

Understanding the heterogeneity of risk among human populations is a fundamental exercise in cancer epidemiology. We seek to discern differences between men and women, old and young, black and white, Asian and Hispanic. Each of these demographic subgroups is understood as a discrete entity that differs from other subgroups with respect to cancer risk—differences in cancer rates between men and women, between older and younger people, and between blacks and whites have been studied. But though the distinction between such subgroups is considered essential in cancer research, rarely is a single subgroup treated as heterogeneous. A major theme of this report from the first Biennial Symposium on Minorities and Cancer is that heterogeneity within minority groups must be understood if progress is to be made in cancer prevention, treatment, and care. This work decries our inability to quantify cancer risk in nonblack minorities (Hispanics, Asian-Americans and Pacific islanders, Native Americans) because of the gaps in national and regional data about specific subgroups.

In the United States, many types of cancer occur more frequently in minority groups than in the white population. The question raised by these symposium papers is What are the reasons for the excess cancer incidence among minority groups? Issues that must be addressed to provide answers to this question are the focus of this book. They include the following: identification of cancers for which specific ethnic groups are at especially high risk; identification of excess risks that are due primarily to lower socioeconomic status; development of profiles of high- and low-risk groups within minority groups; and identification of cancers for which the risk can be reduced.

The National Cancer Institute has stated that its goal for the year 2000 is to reduce cancer mortality in the United States by 50%. Jones and his coauthors provide many examples in which specific minority groups have an incidence of cancer two to ten times greater than that of the general population. They ask whether the excess risk has been taken into account in programs being implemented to achieve the year 2000 goal. If cancer mortality is reduced overall by 50% without special attention to high-risk minority groups, then the current inequities of risk will not be eradicated. The authors urge the cancer research and care communities to design studies and programs that will reduce cancer mortality in a way that will result in an equalization of rates by the year 2000.

This volume is organized around several topics: cancer incidence in minority populations, prevention and detection programs, cancer research regarding minority issues, treatment needs of minority cancer populations, supportive care, and the roles of historically black colleges and universities, the federal government, and national voluntary health agencies. In each of these areas, a plea is made to involve more minority professionals in cancer prevention and care and to utilize their cultural sensitivity in the development of programs for defined subgroups of blacks, Hispanics, Native Americans, or Asian-Americans. The commitment of the U.S. Office of Minority Health, the National Cancer Institute, minority academic health centers, and the American Cancer Society to addressing the problems of excess cancer risk encountered by minority populations is highlighted.

This book clearly raises important issues regarding the sensitivity of cancer research in this country to social and cultural differences within our minority populations. Jerome Wilson and Suresh Mola point out that basic research could benefit through the investigation of oncogenes and other biomarkers among blacks, particularly for those cancers for which blacks are at exceptionally

high risk. Claudia Baquet describes the necessity for cancer prevention research that begins with the recognition of heterogeneity within minority populations, documents the characteristics of minority subgroups, then outlines prevention programs that would be sensitive to differences within groups. Issues such as modes of interaction with the health care system by various groups of blacks or Hispanics, attitudes about cervical or breast cancer screening among women of different ages and educational backgrounds within Asian, black, and Native American populations, and the ability of minority patients to comply with treatment regimens and modes of providing treatment that have been developed primarily for middle-class whites must be investigated if the system for cancer prevention and care is to be modified in ways that will facilitate compliance rather than establish barriers. Lemuel Evans adds, "Our overall challenge lies in convincing Blacks and other minorities that there is a direct relationship between lifestyle choices and the risk of contracting cancer."

The most dynamic chapter in this book is written by Alan Blum, who describes the all-out campaign directed at black and Hispanic communities by the tobacco industry. He states that smoking is "the only major risk factor that is entirely preventable and actively promoted." Using the analogy of parasitic diseases to describe the tobacco industry's influence on minority populations, he concludes, "A crucial phase in American public health will be reached when the seven major tobacco companies in the U.S. are recognized as seven of its leading parasites." Describing the mode of infestation of this parasitic disease, Blum paints a portrait of devastating marketing campaigns: more than 50% of billboard advertising is for cigarettes; $3 billion is spent each year in efforts to recruit new smokers to replace those who quit and to make smoking seem socially acceptable; small circulation, minority publications are targeted for cigarette advertising; and tobacco companies sponsor street fairs and jazz festivals in black and Hispanic communities. Blum also describes the need for health professionals to act in more decisive and creative ways to eradicate smoking in our society.

In other chapters, Baquet, Clayton, Robinson, Hunter, and Clendeninn point out that clinical research suffers from the lack of participation of either minority patients or minority physicians, and Vallbona, Esparza, and Perez lament the lack of involvement of minority health care professionals in the direct provision of cancer prevention and care services.

This book reviews state-of-the-art knowledge about cancer prevention and care in an abbreviated way, and if that were all it had to offer it would add little to the literature. However, many of the authors have applied this knowledge to the needs of various minority populations in imaginative ways. As a result, the book serves as a creative agenda for the development of cancer prevention and care programs that will meet the needs of minority populations and for the specification of research required to disentangle the factors affecting the occurrence of cancer among them. Scientists and health care professionals engaged in cancer research, prevention, and care could benefit from incorporating ideas proposed by these authors into their activities.

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Enzyme Chemistry

Mechanistic Principles of Enzyme Activity. JOEL F. LIEBMAN and ARTHUR GREENBERG, Eds. VCH, New York, 1989, xii, 404 pp., illus. $89. Molecular Structure and Energetics, vol. 9.

Environmental Influences and Recognition in Enzyme Chemistry. JOEL F. LIEBMAN and ARTHUR GREENBERG, Eds. VCH, New York, 1989. xvi, 349 pp., illus. $89. Molecular Structure and Energetics, vol. 10.

The last decade has witnessed a crescendo of interest in molecular recognition and enzymatic catalysis, propelled by two main developments. An increasing number of enzyme structures have been determined by x-ray diffraction studies of crystalline proteins and, more recently, by two-dimensional NMR spectroscopy of small proteins in solution. The resulting data permit deductions about the general principles of construction of catalytic centers, and the use of site-directed mutagenesis allows testing of hypotheses concerning the functions of individual residues in the catalytic centers. The second development has been the recruitment of an enlarging cadre of physical organic chemists interested in biocatalysis. As A. W. Czarnik puts it in the first of these books, "Nature's solution . . . has caused chemists to reevaluate their own powers." There has been an increasingly sophisticated implementation of biomimetic chemistry—that is, development of small organic catalysts that mimic the selectivity of binding, the large rate accelerations, and the stereospecificity and regiospecificity characteristic of catalysis by enzymes.

These two volumes chronicle some of the exciting developments of the past decade in research on molecular recognition and enzyme catalysis. The editors have assembled an eclectic collection of essays, and almost every reader will be introduced to some unfamiliar research areas. The contributions in *Mechanistic Principles of Enzyme Activity* include chapters on the application of principles of physical organic chemistry, such as those involved in general acid-base catalysis, stereoelectronic effects, or intramolecular proximity and strain effects, to enzymatic reactions and chapters on the catalysis of specific classes of enzymatic reactions. The contributions in *Environmental Influences and Recognition in Enzyme Activity* cover a broad span of research that ranges from the use of fractal geometry to assess the texture of protein surfaces to studies of the structure of hydration shells around hydrophobic molecules and of protein folding. Developments in biomimetic chemistry are well represented in this volume, with chapters by Tabushi on artificial allosteric molecules, by Rebek on the use of Kemp triacid-based catalysts to probe the stereoelectronics of carboxyl function, and by Schultz and Jacobs on catalytic antibodies.

Many of the contributions in these two volumes are not reviews but personal accounts of research in the authors' laboratories. Authors were instructed by the editors "to explain not only 'what' they know, but 'how' they know it," and the essays contain detailed and sometimes quite technical descriptions of the methodology and assumptions required for their investigations. Occasionally, discussions of enzyme mechanism fail to include sufficient information on the constraints imposed by experimental studies on the proteins themselves, and biochemical studies of enzyme mechanism and structure are sometimes neglected in favor of model chemistry of dubious relevance to the system under investigation. There are some surprising omissions, such as a discussion of RNA-catalyzed phosphoryl transfer reactions. Also I find it unthinkable that a series focused on molecular recognition does not include a chapter on what has been learned from structural studies of the recognition of DNA sequence by proteins.

A number of chapters provide authoritative reviews. In the first book Schowen's "Structural and energetic aspects of protolytic catalysis by enzymes: Charge-relay catalysis in the function of serine proteases" provides a masterful synthesis of information derived from structural studies of the serine proteases, from investigations of acyl transfer reactions in model systems, from molecular dynamic simulations of serine protease reactions, and from proton inventory assessments of the movement of protons in the transition states of acylation and deacylation