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

reactions of serine proteases. He discusses the strengths and weaknesses of each approach and exposes ambiguities in interpretation. Anyone who thinks that the issue is settled regarding participation of a charge relay in catalysis by serine proteases will find this chapter fascinating. In the second book Kallenbach and Nelson have written an excellent history of the experimental investigation of protein folding, dating back to Anfinsen's experiments on ribonuclease. The authors discuss the structural differences between native and unfolded proteins, emphasizing the compensatory forces that result in small differences in free energy between folded and unfolded states. The authors describe different experimental methods for monitoring refolding and define experimental criteria for a simple two-state model in which no folding intermediates accumulate. The current experimental methods for detection and characterization of folding intermediates are also discussed, and the chapter helps evaluate the extensive and often confusing literature on protein folding.

Overall, these two volumes provide a detailed coverage of the progress in understanding enzyme catalysis and structure, and they document the initial successes and failures in implementing these principles in model systems. I recommend these books highly to the reader interested in the experimental and theoretical bases of these developments.

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Nonlinearities

Order and Chaos in Nonlinear Physical Systems. STIG LUNDQVIST, NORMAN H. MARCH, and MARIO P. TOSI, Eds. Plenum, New York, 1988. xviii, 496 pp., illus. $92.50. Physics of Solids and Liquids. Based on a school, Trieste.

Based on an International Centre for Theoretical Physics school of the same name as the book, the 17 chapters here present introductory and advanced material in chemistry, hydrodynamics, optics, solid-state physics, and mathematical physics. The volume will be a useful gateway into the field for the partially initiated. It is not replete with recent references (there are few after 1987), but they are generally not necessary, given the introductory nature of the material. This will be tough going as a first book for readers wishing to learn about nonlinear dynamics, but for those seeking breadth and a middle ground, it provides a wealth of discussions, introductions, and references.

The book is given unity by an introductory chapter by Lundqvist, in which he reviews terms and principles that are used in the succeeding chapters. Calogero and Degasperis's reprinted 1982 paper on solitons gives an excellent overview, with a wondrously detailed set of references and careful annotations, and it may well be one of the best places to begin for those only vaguely aware of the formal study of nonlinear wave propagation problems.

Chemical oscillators and chemically induced pattern are addressed by De Kepper, who mixes in illustrations and recipes for a few common demonstrations. Haken, Arecchi, and Loudon combine to provide a series of chapters that review much in the way of nonlinear dynamics in optics spanning the discovery of the behavior of lasers near threshold and the modern studies of optical bistability and optical chaos. Such topics as the topologies of attractors, routes to chaos, attractor dimensions, and entropies are addressed rather indirectly or incompletely in this volume, and a beginner will have some difficulty understanding the presentations of results in these chapters.

Mathematical aspects of nonlinear dynamics are covered in chapters on delay equations (maps), fractals, and symbolic dynamics. Indeed, one of the pleasant surprises of working on this review was the discovery of the tandem discussions by Percival and Hao of the use of symbolic dynamics to describe chaotic systems. The "experts" in the business of characterizing nonlinear dynamical time series and patterns have in large part moved to the study of the "complexity" of the signals. Rather than dealing with the extraordinary amount of digital information in numerically precise measurements of the behavior of a system, many now seek to compartmentalize the information so that a limited number of symbols and an associated grammar for symbol sequences can be used to characterize the behavior. The discussions of symbolic dynamics in this volume provide a useful introduction to concepts that have since been refined but that continue to rely on this core of theory. There are few other places where this aspect of the analysis of nonlinear systems is treated at this level.

As a helpful complement to the primary focus on nonlinear dynamics and chaos, Stinchcombe's discussion of phase transitions brings out such matters as criticality, critical exponents, stochastic fluctuations, fractals, and their relation to the dynamics discussed elsewhere.

Berry and Cvitanović contribute only brief chapters that do not convey the full strength of their expertise.

The concluding chapter is an unfortunately brief discussion by Haken and Wunderlin of the "slaving principle," which is the formal justification of "adiabatic elimination" of rapidly relaxing variables that become slaves to the dynamics of their more slowly varying companions. All those considering undertaking such "eliminations" should be cautioned to follow this chapter closely and then perhaps to study even more carefully the recent descriptions of the formal application of center-manifold theory such as those given by Oppo and Politi in *Instabilities and Chaos in Quantum Optics II* (N. B. Abraham, F. T. Arrechi, and L. A. Lugiato, Eds.).

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