tistical characterization of the form and size of geographical ranges and the inferences that can be drawn from such analyses regarding the ecology of the organisms in question. Rapoport likens the geographical distribution of taxa to "the Chinese-lantern shadows produced by the different taxa on the continental screen" and explains that areography "is like measuring, weighing, and studying the behavior of ghosts." And he demonstrates that he has been quite busy compiling and analyzing in detail the geometric patterns of his ghosts.

Areography owes a large debt to the Hutchinson-MacArthur school of ecology in that Rapoport too devotes his energies to searching for patterns from which process is inferred. Many familiar topics emerge: latitudinal diversity gradients, the role of barriers in species dispersal, random breakage models, factors influencing the degree of overlap of species ranges, even *r* and *K* selection. The discussion of these topics does not deviate from ecological thinking of the early 1970's. *Areography* is also a descendant of the dispersalist biogeographic lineage, despite the facts that figures 5.2 and 5.3 are what vicariance biogeographers would call "track diagrams" and that Croizat, the prime mover of the vicariance renaissance, is cited in the bibliography. However, little of Croizat's or other vicariance biogeographers' thinking occurs in *Areography*, and the book remains faithful to the kind of reasoning put forward in MacArthur's (1972) *Geographical Ecology*.

Areography covers many matters not considered in recent biogeographical texts, although, as Rapoport points out, aspects of what he deals with have been treated by other biogeographers such as S. A. Cain and M. Udvardy. For those not accustomed to thinking about patterns formed by distributional maps there will be some insights and some interesting methods of data analysis. I particularly liked the discussion of different techniques for establishing the size and shape of a species range. I also enjoyed Rapoport's anecdote that one has to clean insects from car radiators more frequently during trips in subtropical to temperate regions than in tropical or cold temperate regions. The implication is that population sizes of insects are greatest in intermediate climates.

It is most unfortunate that this book, first published in Spanish in 1975, had to wait so long to be translated into English. For despite the fact that it is listed as a revised and enlarged version of the original, only six of the more than 200 works cited were published more recently than 1975, and four of these are the author's own. The recent debate between vicariance and center-of-origin biogeographers about how best to do historical biogeography is not even mentioned here, and none of the ecological biogeographers' recent pleas for substituting experiments for correlational studies or the recent criticisms of the MacArthurian approach are discussed. These omissions drastically reduce the value of the book for those active in the field.

Despite these significant shortcomings, *Areography* allows English-speaking biogeographers a chance to learn how some of their South American colleagues think. *Areography* will not affect the field of biogeography to the extent the writings of Rapoport's South American-based colleague Leon Croizat have recently, but I applaud the Fundación Bariloche for providing access to a hitherto unexplored, yet substantial, body of work.

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Observing Molecular Collisions

Chemical Dynamics via Molecular Beam and Laser Techniques. The Hinshelwood Lectures, Oxford, 1980. RICHARD B. BERNSTEIN. Clarendon (Oxford University Press), New York, 1982. x, 262 pp., illus. Cloth, $49; paper, $24.95.

For about 20 years, a growing group of chemical physicists has been seeking to observe individual molecular collisions in as much detail as possible. The goal is to understand what happens with the greatest resolution in order to be able to predict and control the outcome of more complicated systems involving mixtures of collisions in a variety of environments. Prior to the introduction of molecular-beam techniques the major problem in observing molecular collisions was that an observable one was usually the result of a very inhomogeneous group of collisions, highly averaged over initial thermal distributions of translational, vibrational, and rotational energy. Sometimes, for example in hot-atom chemistry or in some photolyses, one could observe the results of nonthermal distributions of collisions, but it was molecular-beam techniques that revolutionized our understanding of chemical dynamics at the single-collision level. More recently the laser, often combined with molecular-beam techniques, has become the tool nonpareil in this quest for detail.

Richard Bernstein has not only been part of the quest from its earliest days, he has been the leader of many phases of it. He has now written another book on the subject.

The book is based on lectures that Bernstein delivered in 1980, updated through 1981. The exact date of the latest reference is actually not too important because the book should remain "a good read" for a very long time. Bernstein reviews the many different ways in which individual collisions have been studied, with incisive discussions of an assortment of the classic experiments in the field and interpretation of the results.

The field has become too large for a complete survey of all the available techniques and results by a single author, and Bernstein makes no attempt at completeness in that respect. The book is, however, remarkably complete in mentioning examples of the kinds of approaches and illustrating the kinds of information that can be obtained by each, even to the point of including some discussion of techniques that involve neither molecular beams nor lasers. Some of the techniques discussed are state selection of collision partners by laser excitation, by inhomogeneous electric fields, or by prereactors and final-state analysis by laser-induced fluorescence or a bolometer. The discussion is heavily weighted to reactive collisions, and especially to utilization and disposal of various kinds of energy in chemical reactions, but elastic scattering and rotationally and electronically inelastic scattering also get appreciable attention. The theoretical level of the interpretative sections is sufficient to bring out the most important features, but it stops short of the kind of detailed theory that would make the book unreadable for the uninitiated. The material is so clearly presented that the book could be understood by an undergraduate.

One of the strengths of the book is that one can trust the author both in his selection of what is important and in his presentation of details. I found very few errors, although there are of course a few details with which one might quibble. For example, in discussing the Kneba-Wellhausen-Wolfrum experiment on the rate constant of D reacting with vibrationally excited H_2, the author assumes that the disagreement with theory must be due to the inadequacy of the calculations. I would have appreciated a caution that the experiment might be wrong. In discussing electronically nonadiabatic collisions, the Landau-Zener approximation is presented as quantitatively reliable at chemical energies. This is not true in all cases, but no exceptions are mentioned. There is an unfortunate misprint on p. 192, where "intersecting" is printed "interesting."

There are a generous number (156) of well-chosen illustrations. Most are adapted from journal articles and are accompanied by references so the reader may find further details. The book also contains a bibliography of 278 books, book chapters, and review articles. This book is a rarity for chemical physics in that one could actually read it cover to cover without struggle, and I will be disappointed if any student in my research group does not do so.

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