ence between Galileo's science and the conservative and stale natural philosophy of the Jesuits whose works he pored over in his early 20's. The evidence adduced by Wallace seems to be overwhelming in one sense: if this was Galileo's heritage he was born a pauper! Galileo's greatness is enhanced when we realize how far he had to travel to reach the avenue that was to lead to modern science. Galileo could not but hope to prove his system to the satisfaction of the Aristotelians, but he drew his inspiration from other sources. Niccolo Gherardino, who had known Galileo personally and was one of his first biographers, writes: "He exalted Plato to the skies for his truly golden eloquence, and for his method of writing and composing dialogues, but above everyone else he praised Pythagoras for his way of philosophizing, but in genius he said that Archimedes had surpassed them all, and he called him his master." The omission of Aristotle's name from this role of honors is not insignificant.

It is inevitable that a book of the scope and ambition of this one will be controversial and give rise to objections of the kind put forward here. What ought not be controversial, however, is that Wallace has given us an outstandingly lucid and intelligent account of matters of great interest. This book is the first comprehensive and unified treatment of the influence that the Jesuits exerted on one of the greatest minds of all times, and the nature and extent of that influence are now open for debate.

WILLIAM R. SHEA
Department of Philosophy,
McGill University,
Montreal, Quebec H3A 2T7

Atom-Atom Collisions

Theory of Slow Atomic Collisions. E. E. NIKITIN and S. YA. UMANSKII. Springer-Verlag, New York, 1984. xii, 432 pp., illus. $49. Springer Series in Chemical Physics, 30. Translated from the Russian edition (Moscow, 1979).

The theory of slow atomic collisions plays a fundamental role in the microscopic understanding of a variety of processes in chemical physics and chemical kinetics. The term "slow" means that the velocity of the atoms is substantially smaller than the velocity of the electrons in the atoms, and generally applies to atom-atom collision energies less than 10 electron volts in the center-of-mass frame. Considerable progress has been made on the development of this theory, and the time is ripe for a comprehensive presentation such as is provided by Nikitin and Umanskii. Both authors have been at the forefront of research in this subject and have made seminal contributions to the current form of the theory.

The main focus of the book is on the quasi-classical version of the theory. Most of the formal development has occurred with this version, perhaps because the fully quantum mechanical version is more "well defined" and hence is somewhat more of a computational problem. This is not to say that all aspects of a fully quantum mechanical description are well understood, but the quasi-classical approach allows for more "art" in its execution. Furthermore, it is generally simpler to apply (once the correct formulation is constructed for a given problem), and it often provides a clearer physical picture of the collision process. A theoretical analysis of slow, quasi-classical atomic collisions can be viewed in three stages: calculation of the adiabatic electronic terms and couplings between relevant states; calculation of the probability amplitudes of nonadiabatic transitions between these states, induced by the relative motion of the atoms; and calculation of differential and total cross sections using these probability amplitudes. Though previous books have dealt with selected aspects of the three stages, the present book provides the most balanced and up-to-date treatment of all three aspects.

Since the treatment of electronically nonadiabatic transitions in atomic collisions must include two or more electronic states (and, indeed, most atomic collisions of current research interest are nonadiabatic—the elastic approximation is generally restricted to the collision of two closed-shell atoms, both in ^1S states colliding at low energy, or to nonzero spin states when the electronic orbital angular momenta are zero), the collision theorist has been forced to consider electronic degrees of freedom explicitly. This means that the well-rounded collision theorist must be a good "spectroscopist" in terms of understanding various electronic and nuclear angular momentum coupling schemes. The authors, who are established experts in this regard, have devoted considerable space in the book to this subject. The novice collision theorist is no longer forced to look in many different places in order to gain a unified picture.

The authors have not sacrificed discussions of the cornerstones of basic collision theory, such as elastic scattering and two-state semiclassical models. With respect to the latter, they have tackled the fundamental problems of multiple transition points and the breakdown of the standard JWKB (Jordan-Wentzel-Kramers-Brillouin) approximation, such as occur in nonadiabatic transitions near a turning point.

The book is written in a very readable style. I would be happy to teach a course on modern collision theory based on it. The concepts presented are restricted to atom-atom collisions, and for an up-to-date understanding of atom-molecule collisions, particularly rearrangement processes, one must turn to journals and review articles. The restriction to atom-atom collisions is part of the reason for the success of the book: All three stages of slow, quasi-classical atomic collisions are covered thoroughly, with considerable attention given to many "nasty" details that are usually omitted. The book can be viewed as the first volume of the current theory of atom-molecule collisions.

THOMAS F. GEORGE
Department of Chemistry,
University of Rochester,
Rochester, New York 14627

Avian Ecology

Shorebirds. Behavior of Marine Animals, vols. 5 and 6. JOANNA BURGER and BORI L. OLLA, Eds. Plenum, New York, 1984. Vol. 5, Breeding Behavior and Populations. xvi, 437 pp., illus. $59.50. Vol. 6, Migration and Foraging Behavior. xiv, 329 pp., illus. $49.50.

The papers in these two volumes document the increased interest in shorebird biology that has developed over the last decade or so. The 15 contributions cover shorebird classification, population dynamics, breeding systems, migratory behavior, foraging and spacing patterns, and conservation and related topics. Most provide useful, interesting, and often provocative blends of literature review and current research that lead to new insight into ecological and evolutionary questions or at the least point out limitations in current knowledge. I was surprised in the review sections at how much of the information on shorebird biology derives either from what might be called anecdotal sources (incidental observations and short-term or topical investigations) or from a relatively few intensive investigations. The latter, in particular, have been concerned with only a handful of species, most of which have been studied by only one investigator at one site over a period of at most a