B.C.) or just a simple hand ax, worked more from rules of thumb in choosing ore sources and alloying recipes than through compliance with any formal priestly edict or indeed any folklore "handbook" of their ancestors. Otherwise it is difficult to understand why any stylistic, let alone technological, evolution was ever possible. I also have an uncomfortable feeling that many elements of fickleness pervaded the decision-making processes of ancient artisans: Brief intertribal disagreements and events like river flooding would have a far sharper effect on trading of raw materials than we currently predict, and the division of time between the development of new ideas and the completion of daily chores that kept mouths fed was probably finely balanced.

Factors such as these make the topic of archeological chemistry as much an excursion into past socioeconomy as a laboratory exercise, as much a psychological analysis of why an ancient artisan saw fit to perturb his or her own notions of how to handle materials routinely as a playground for statisticians who seek to define what "routine" meant, generation after generation.

Necessarily, then, *Archaeological Chemistry—II* is an admixture of ideas failed (or, in the case of amino acid racemization dating, of potential far from fulfilled) and elegant little studies that really do give us an empathy with our distant ancestors. Blurred pictures emerge about just how reliable collagen is in radiocarbon dating of bone and about aging mechanisms in Near Eastern ivories. In contrast, three-dimensional plotting of the cerium, lanthanum, and thorium concentrations for Spanish Colonial majolica pottery reveals a dramatic difference in source clays used, one group from Spain itself, the other from Mexico. I would expect this study, when extended, to provide a fascinating insight into how swiftly the culture carried by the Spanish conquest actually infiltrated and overprinted local traditions in its early phases. Separately I was intrigued by the marked success of x-radiography in study of bronzes in the Metropolitan Museum, particularly in analysis of the construction technique of an arsenical bronze *Ibex* (Sumerian, around 2500 B.C.), the head and neck of which are joined by an ingenious tongue-in-groove method.

Perhaps it is a consequence of my personal interest in how bitumen came to gain popularity as a medicament in the Middle Ages that the contribution on asphalts from Middle Eastern sites attracted my attention. Use of asphalt in Zagros settlements dates at least as far back as 7000 B.C., four millennia before it became an essential building material in Mesopotamian cities. By 5000 B.C., seepage bitumen was being converted to asphalt with considerable sophistication, the only subsequent innovation being the addition of vegetal matter together with reduction of the bitumen content. The surprises for me were to learn how many specimens of this organic adhesive-cum-sealant have survived the ravages of time at sites such as Tepe Farukhabad (southwestern Iran) and then of the future possibility of provenancing them to source by the ratio of vanadium and nickel contents. Our comprehension of the complexities of trade and intercity conflict along the length of the twin rivers, Tigris and Euphrates, is dawning but slowly, so each new fragment of fact provides desperately needed clues, however small.

STUART FLEMING
MASCA, University Museum, University of Pennsylvania, Philadelphia 19104

Classical Problems in Physics

The Physics of Vibration. Vol. 1, containing Part 1, The Simple Classical Vibrator. A. B. PIPPARD. Cambridge University Press, New York, 1978. x, 432 pp., illus. $54.

At a time when 90 percent of the new-books shelf in the library is devoted to such specialized titles as *A Renormalization Group Analysis of the Hierarchical Model in Statistical Mechanics* and 10 percent to unsuccessful attempts to write a better textbook, this volume is a most refreshing diversion. Pippard presents here a potpourri of musings about a wide variety of problems related, often somewhat tenuously, by virtue of some connection to the simple harmonic oscillator.

If your students have wondered, as I did as a freshman, why so many weeks of valuable class time are devoted to that apparently innocuous problem of a mass dangling from a spring, they will find ample answer in a perusal of this book. Pippard finds the opportunity to touch on topics as varied as noise theory, parametric amplification, stability of nonlinear systems, finger holes in woodwind instruments, relaxation times in nuclear magnetic resonance, mode locking, atmospheric whistlers, cyclotron resonance, and the pendulum clock. He treats none of them in technical depth, as he reminds us rather tediously at the end of many sections with such remarks as "These are advanced matters which would be inappropriate here." He treats them all with a physical insight that is consistently sound and is often missing from conventional textbooks, which are of necessity more involved with technical details.

I find in this unconventional book insight concerning a number of questions of the sort one is reluctant to raise as a student for fear of displaying one's ignorance. How can a signal that is zero for all time before a particular time, t_0, possibly be represented by the sum of infinite wave trains that were nonzero when the signal was still zero? Why does $e^{\alpha t}$, with suitably chosen α, always satisfy a homogeneous linear differential equation with constant coefficients? I never found "because it works" a very satisfactory response. Pippard encourages and helps the reader to ponder such questions.

This is not a textbook in any conventional sense. It is rather a book that brings new physical perspective to familiar problems, introduces the reader to some of the important physical ideas and relevant mathematical approaches to unfamiliar problems, and, perhaps most important, illustrates something of the style with which an eminently successful experimentalist approaches the understanding of physical problems. The book will provide many provocative ideas to anyone teaching a course in undergraduate or graduate mechanics, though it could not serve as a textbook for such a course. The graduate student studying for comprehensive exams would find serious study of this volume a stimulating and refreshing contrast with review of the standard textbooks. Because of its wide range and its continuing invitation to explore simple problems in depth (physical, not mathematical), the book would serve well as the basis of a small senior-level seminar. Such a seminar would help consolidate many aspects of the undergraduate curriculum, give exposure to a number of new ideas, and provide an important introduction to the "back of the envelope" argument.

This volume, which is restricted to classical problems, is to be followed by a second one, treating quantum systems. I am looking forward to some fresh insight into such matters as the significance of simple harmonic oscillator level widths and the appropriate time scale for discussion of the γ-ray emission in the Mössbauer experiment.

R. H. SILSBEE
Department of Physics, Cornell University, Ithaca, New York 14853