Kelley in the June 1973 issue of the trade magazine *Laser Focus*, which summarized these volumes as "ambitious, but of varying quality." The editors of the book judge the laser field to be still young, in absolute terms (the first laser operated in 1960) and in the continuing emergence of new laser systems and new scientific and especially industrial applications, but also to be reasonably mature in the development of the basic theory and the understanding of the general properties of lasers. This seems a valid judgment. Their objective given this situation has been to provide "an encyclopedic review . . . of the more mature areas of laser research, and also a contemporary survey of the more youthful areas of laser applications."

The editors' efforts in selecting and organizing their material to meet this objective have been largely successful, although one can find fault with some of their inclusions and some of their omissions. Many though not all of the reviews and surveys are excellent. It is a particular pleasure for American readers to obtain access to the outstanding foreign contributions. In general the detailed coverage of specific laser devices is limited, and there are some important new laser devices that have emerged even since this handbook was prepared. On the other hand, the reviews of basic principles, of basic phenomena produced in and by lasers, and of an incomplete set of laser applications are often excellent and of lasting value. The technical level of the contributions does vary. Some are the kind of survey and review to which one could send a new graduate student as a starting point for his introduction to a field. Others are aimed at considerably more advanced experts.

The editing on a microscopic scale is also excellent. The format is unified throughout; the organization is generally clear and careful (with some exceptions); and the production is excellent.

Given considerably more space, it would be possible to review and criticize these volumes chapter by chapter (as did Moulton, Kildal, and Kelley). The key question, however, is whether or not your library should buy this handbook, at its price of 9¢ a page. If your organization is large and actively engaged with lasers the answer will probably have to be yes. For others there is a serious question of cost-effectiveness. There are enough significant omissions in coverage and enough articles aimed primarily at experts that it is unlikely these volumes can serve as the one and only laser encyclopedia for a small library. Standing in competition for coverage of the laser field are at least 150 other books (see A. E. Siegman, "Laser book list," *Applied Optics* **10**, A38 [Dec. 1971] and updates)—texts, translations, trade books, handbooks, reprint volumes, "advances" series, books on subspecialties—with an average price of around 4.7¢ a page, and with more than 75 percent of the group under 6¢ a page. The buyer with $175 to spend on laser information might consider buying instead the CRC *Handbook of Lasers* (4.2¢ a page); A. F. Harvey's massive survey *Coherent Light* (Wiley-Interscience, 1970, 3.5¢); one or two basic texts (Lengyel, Maitland and Dunn, Roess, Siegman, Yariv, 3.3 to 5¢); one or two reprint collections (for example, Barnes at 3.2¢); perhaps a book on laser applications (Beesley, Charschan, Ready, 3.8 to 6.5¢); and a selection of some of the *Lasers: A Series of Advances* volumes (Ross, Goodwin, Levine and DeMaria, 4.0 to 6.4¢).

The *Laser Handbook* is reasonably well done. At a more reasonable price it would be a very much more attractive purchase.

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Early Domestic Animals

Domestikationsforschung und Geschichte der Haustiere. Proceedings of a symposium, Budapest, April 1971. JÁNOS MÁTOLCSI, Ed. Akadémiai Kiadó, Budapest, 1973. 402 pp., illus. $20.

Domestikationsforschung und Geschichte der Haustiere is the proceedings of a symposium that approaches domestication and the origin of domestic animals by way of both analysis of faunas associated with prehistoric sites and studies of the biology of domestic forms and their ancestors. It includes 41 papers (25 in German, two in French, and the rest in English) grouped according to six major topics: biological and historical questions of domestication, biological consequences of domestication, history of animal husbandry, analysis of faunal assemblages and a comparison between animal husbandry and hunting, history of different breeds of domestic animals, and methods of analysis of faunal material in archeological context. Most of the papers report on studies from Europe and the Near East, and a number of contributions are included on work in Eastern Europe which draw upon sources that are less familiar to American readers.

The spread both temporally and spatially of the older, most enduringly important domesticates, the sheep, goat, cow, and pig, is discussed in a number of papers. Thorough coverage is also given to some of the more recently domesticated forms such as the house cat, ferret, and pigeon. The origin and development of domestic horses are discussed in a number of papers, by Boessneck, Nobis, Karaiwanow and Petrow, Matolcsi, and Firouz. The history of horses is traced in Spain, Bulgaria, Germany, and Hungary, and the miniature Caspian horse is compared to early representations of Iranian horses. An important development of these studies is the correlation that has been found between the dimensions of the phalanges and the height of the horse at its withers. The working out of relationships between the size or weight of skeletal elements and that of the whole animal has contributed to a better understanding of the early domestic animals.

It is, in fact, the use of a number of such new analytical methods that makes this book a particularly valuable contribution. The potentially most important discovery for the identification of domestic forms is that the bone mineral crystallites are oriented randomly in wild animals and uniformly in domestic ones. The technique by which these differences are revealed is described by Daly, Perkins, and Drew. Once the skeletal remains are identified by this method or conventional morphological techniques, the data have to be evaluated to reconstruct prehistoric animal use. A number of techniques are suggested for more accurately assessing faunal remains. In addition to the traditional use of number of identified specimens or minimum numbers of individuals, the advantages of basing analyses on weights of bone identified for each species and for unidentifiable remains, percentage of identifiable and unidentifiable remains, and relative frequencies are discussed in papers by Perkins, Kubasiewicz, and Uerpmann. The contribution each of these techniques can make to a more accurate understanding of a past subsistence system

must be kept in mind not only for the analysis of any one faunal assemblage but ultimately for comparison of assemblages on a worldwide basis. For this reason Lawrence has made a plea for standardization in identification and analysis so that valid intersite comparisons can be made. She suggests that reports on faunal remains include an account of the archeological techniques used to obtain the samples and that there be a uniformity in both qualitative and quantitative criteria for identification. In addition to identifications other data should be recorded, such as location of each skeletal element in the site, age and when possible sex of each animal, type of bone fragments, and modification of bone as by butchering. She further suggests that a data retrieval system would facilitate intersite comparisons. Since the presentation of this paper several museums in the United States and Europe have started data retrieval with the Selgem computer system. This system could facilitate comparisons on a very large scale, but the caution Lawrence presents must still be kept in mind and the data entered into the memory storage be made uniform. This approach and the data and methods presented in this volume offer hope that we may build on this foundation to gain greater understanding of and historical perspective on human use of animal resources.

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Mechanisms of Hearing

The Auditory Periphery. Biophysics and Physiology. PETER DALLOS. Academic Press, New York, 1973. xii, 548 pp., illus. $32.50.

The Auditory Periphery deals with the middle ear and the cochlea of the inner ear. The discussion of neural processes in the acoustic part of the eighth nerve is limited almost entirely to the whole-nerve potentials. The main part of the book concerns the mechanics of the middle ear and of the cochlea, the electrical potentials that have been recorded in the latter, and the associated biochemistry. Separate chapters are devoted to nonlinear distortions that have been studied in both the middle ear and the cochlea, but predominantly in the latter, and to feedback mechanisms both in the middle ear muscles and in the olivocochlear crossed and uncrossed efferent systems. These are preceded by a short overview of the auditory system and by a longer overview of the anatomical macro- and microstructures of the auditory periphery. At the end of the book the reader will find a welcome summary that may help him to order in his head the vast and sometimes confusing material of the volume.

Study of the auditory periphery requires a multidisciplinary knowledge including acoustics of audible sound and some mechanics, hydrodynamics, electronics, and biochemistry—all that coupled to knowledge of relevant anatomy and some fields of mathematics, such as algebra and calculus of complex variables. Dallos has not shunned any of these disciplines. The result is the most complete description of the auditory periphery written thus far by a single author. Dallos's attempt at integrating mathematical theory with experimental data is particularly noteworthy. Although the execution of this integration may be criticized on several points, the break it makes with the prevalent conservative tradition of keeping auditory processes within the easy fold of descriptive science is of importance.

The book clearly fills part of a void that has persisted in auditory science for many years. To my knowledge there has been no comprehensive textbook on the auditory periphery since S. S. Stevens and H. Davis wrote their classic *Hearing*, which was published in 1938. About 150 pages of that volume were devoted to the subject matter of Dallos's book, which has over 500 pages. To some extent the additional pages reflect the growth of our knowledge.

Unfortunately, the correlation between the state of our knowledge and the number of pages in Dallos's book does not appear to be close, especially if we regard knowledge as understanding rather than as accumulation of data. The implied criticism is aimed at least in part at the state of auditory science. Because of many missing pieces of experimental evidence, speculation often replaces tight logical deduction. In several places the book reflects this situation and presents long-winded arguments and counterarguments that consume many pages and tend to obscure the solid knowledge that is available. The problem is compounded by a style of writing studded with redundancy and repetitious statements. More thorough editing could have improved readability and decreased the length. If it were applied also to mathematical equations, it would have eliminated some trivial errors and ambiguities.

In addition to the editorial shortcomings the book contains some substantive errors. For instance, part of the mathematical analysis of cochlear hydrodynamics at low sound frequencies is clearly fallacious, and the analysis of the recorded whole-nerve action potentials appears inaccurate.

On the whole, however, the book is an impressive piece of work containing multidisciplinary information in satisfying depth. It should be of substantial help to all those who teach auditory science and to all those who want to learn it at a reasonably sophisticated level.

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Mineralization Processes

Calcium and Phosphorus Metabolism. JAMES T. IRVING. With chapters by Felix Bronner and Gideon A. Rodan. Academic Press, New York, 1973. x, 246 pp., illus. $15.

This monograph summarizes current understanding of the physiology of calcium ion and inorganic phosphate primarily in relation to the mineralization of the hard tissues, bones and teeth, with major emphasis on application to man. It is in the main authored by James T. Irving with a chapter on "Kinetic and cybernetic analysis of calcium metabolism" by Felix Bronner and one on the "Cellular functions of calcium" by Gideon A. Rodan. This last chapter is the only part of the book that discusses the role of calcium ion in biologic functions other than the formation of mineralized tissues. In view of the multiplicity of cell functions that require or are affected by calcium ion, this chapter can only touch on a few major physiologic problems, such as the role of calcium in nerve excitation and muscular contraction. The function of calcium ion in the secretory activity of endocrine and exocrine glands is not included.

The author has chosen to deal with the extensive literature on the physiology of calcium and inorganic phosphate in the style of an *Annual Reviews* chap-